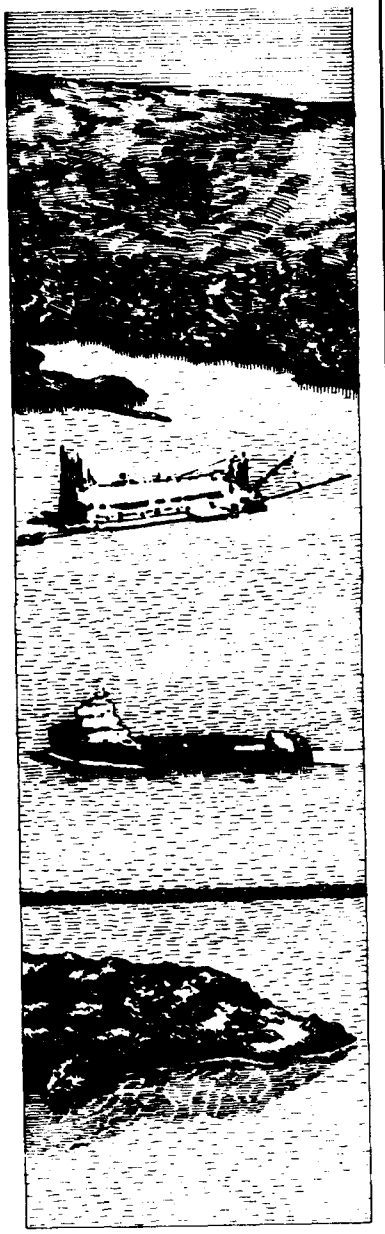
DREDGING RESEARCH PROGRAM

TECHNICAL REPORT DRP-92-6

US Army Corps of Engineers



ADCIRC: An Advanced Three-Dimensional Circulation Model for Shelves, Coasts, and Estuaries

Report 5
A Tropical Storm Database for the East and Gulf of Mexico Coasts of the United States

by

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Report 5 of a Series

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Prepared for DEPARTMENT OF THE ARMY
U.S. Army Corps of Engineers
Washington, DC 20314-1000

Under Work Unit No. 32466

US Army Corps of Engineers
Waterways Experiment Station

Dredging Research Program Report Summary

ADCIRC: An Advanced Three-Dimensional Circulation Model for Shelves, Coasts, and Estuaries; Report 5, A Tropical Storm Database for the East and Gulf of Mexico Coasts of the United States (TR DRP-92-6)

ISSUE: Dredged material disposal sites located in open water are classified as either dispersive or nondispersive depending on whether local water velocities are strong enough to erode and transport dredged material from the deposited mound. The Corps needs the capability to predict stability of the mound and long-term migration patterns of eroded material to (1) identify acceptable disposal site locations, and (2) provide a quantitative approach for gaining site designation approval.

RESEARCH: The overall work-unit objective is development of a systematic approach for predicting the dispersion characterization of a specific open-water disposal site. This objective includes the following goals:

- Identify realistic wind-, wave-, tide-, and storm-generated velocity boundary conditions.
- Develop numerical models capable of simulating dispersion characteristics of dredged-material mounds for periods of time in excess of 1 year.
- Provide site-designation technology to field engineers as a tool in site identification and designation.

This study reports the tropical storm database developed for locations along the east and gulf coast of the United States, which is a part of the first two goals listed above.

SUMMARY: The numerical model ADCIRC-2DDI (a two-dimensional, depth-integrated, finite-element-based hydrodynamic circulation code) was applied to the western North Atlantic, Gulf of Mexico, and Carribbean Sea to develop a tropical storm database. This report presents initial results of the simulation of 134 historically based tropical storms and their maximum storm surge elevations at 486 locations along the east and Gulf of Mexico coasts of the United States. The availability of elevation and current hydrographs corresponding to each event and station is also described.

AVAILABILITY OF REPORT: The report is available on Interlibrary Loan Service from the U.S. Army Engineer Waterways Experiment Station (WES) Library, telephone (601) 634-2355. National Technical Information Service (NTIS) report numbers may also be requested from the WES librarians.

To purchase a copy call the NTIS at (703) 487-4650.

About the Authors: Dr. J. J. Westerink and Ms. C. A. Blain are members of the Department of Civil Engineering and Geological Sciences of the University of Notre Dame; Dr. R. A. Luettich, Jr., the Institute of Marine Sciences, University of North Carolina at Chapel Hill; and Dr. Norman W. Scheffner and Mr. David J. Mark, the Coastal Engineering Research Center, WES. For further information about the DRP, contact Mr. E. Clarke McNair, Jr., Manager, DRP, at (601) 634-2070.
Point of Contact: Dr. Scheffner, Principal Investigator for work unit.

Dredging Research Program

Technical Report DRP-92-6
August 1994

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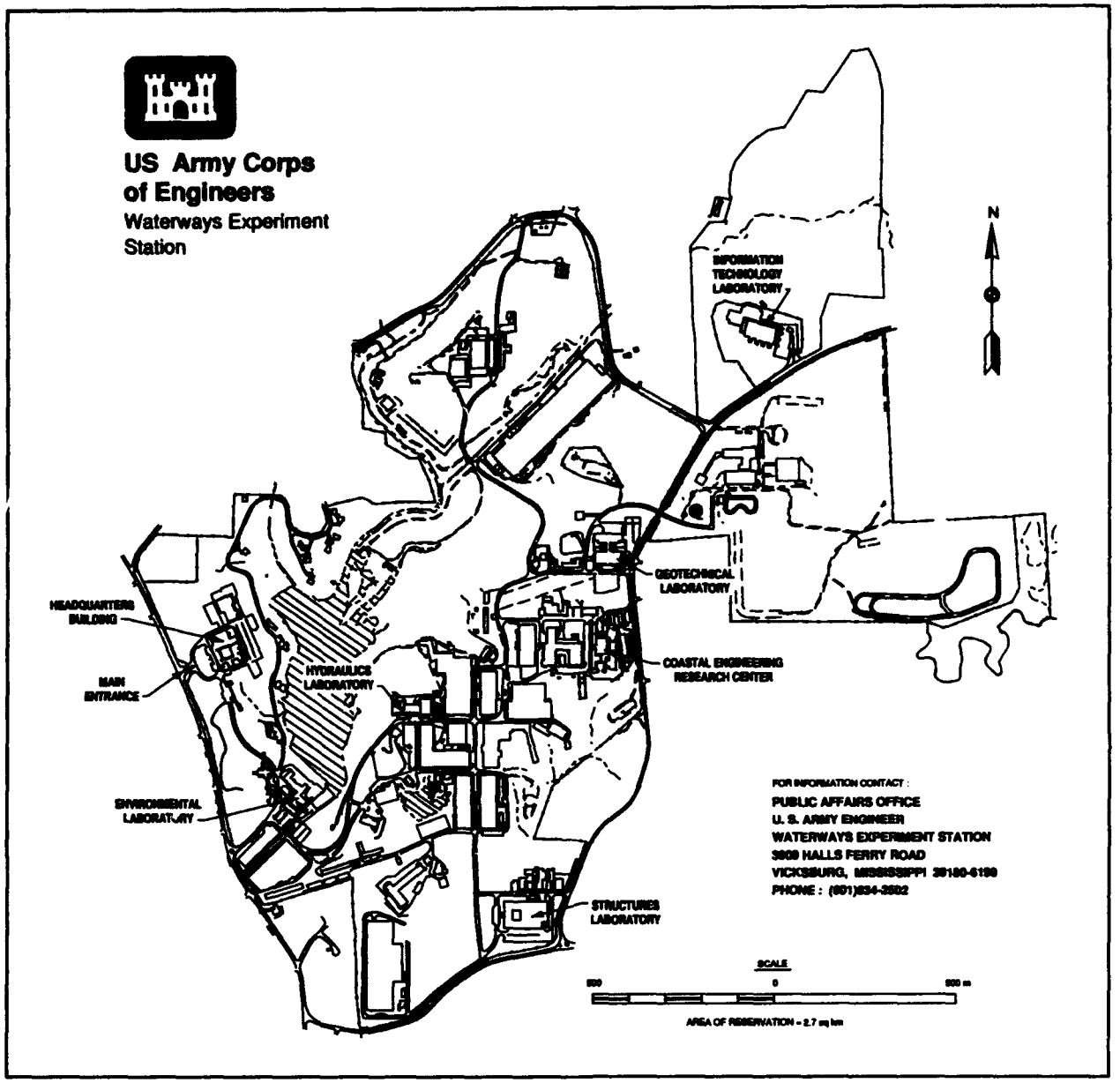

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Preface

The work described in this report was authorized and funded under Work Unit No. 32466, "Numerical Simulation Techniques for Evaluating Long-Term Fate and Stability of Dredged Material Disposed in Open Water," of Technical Area 1 (TA1), Analysis of Dredged Material Placed in Open Water, of the Dredging Research Program (DRP), sponsored by Headquarters, U.S. Army Corps of Engineers (HQUSACE). Messrs. Robert Campbell and Glenn Drummond were DRP Chief and TA1 Technical Monitor from HQUSACE, respectively. Mr. E. Clark McNair, Jr., Coastal Engineering Research Center (CERC), was DRP Program Manager (PM), and Dr. Lyndell Z. Hales was Assistant PM. Dr. Nicholas C. Kraus, Research Division (RD), CERC, was the Technical Manager of the DRP TA1, and Dr. Norman W. Scheffner, RD, CERC, was the Principal Investigator of Work Unit No. 32466. The numerical modeling goals, concepts and methodologies were developed by Drs. Norman W. Scheffner; Joannes J. Westerink, University of Notre Dame; and Richard A. Luettich, Jr., University of North Carolina at Chapel Hill. Development and implementation of the hydrodynamic model were completed by Drs. Westerink and Luettich. This report was written by Drs. Scheffner, Westerink, and Luettich and Mr. David J. Mark, CERC, and Mr. C. A. Blain, University of Notre Dame.

This study was performed and the report prepared over the period 1 September 1992 through 1 April 1994. Dr. Scheffner was under the administrative supervision of Dr. James R. Houston, Director, CERC; Mr. Charles C. Calhoun, Jr., Assistant Director, CERC; and Mr. H. Lee Butler, Chief, RD, CERC.

At the time of publication of this report, Dr. Robert W. Whalin was Director of WES. COL Bruce K. Howard, EN, was Commander.

Conversion Factors, Non-SI to SI Units of Measurement

Non-SI units of measurement used in this report can be converted to SI units as follows:

Multiply	By	To Obtain
degrees (angle)	0.01745329	radians
feet	0.3048	meters
knots (international)	0.5144444	meters per second
miles (U.S. statute)	1.609347	kilometers

Summary

This report summarizes results of a numerical storm surge study conducted for the east and Gulf of Mexico coasts of the United States. The report describes a database of surge elevations and currents produced from the numerical simulation of 134 historically based tropical storm events and their maximum water level surge impact at 486 discrete locations along the east and gulf coasts and Puerto Rico. A visual indication of the spatial distribution of peak surge elevation is provided in the form of an atlas of storm track and maximum storm surges corresponding to a 246-station nearshore subset of the 486-location database. The report contains cross-reference tables of stations impacted by each event and the events impacting each station. Included in the report are information on accessing the full 486-station computer database containing the surge elevation and current hydrograph for each storm event at each impacted location.

The hydrodynamic model selected for storm surge simulation is the ADCIRC-2DDI (ADvanced CIRCulation- 2-Dimensional, Depth-Integrated) model, which implements a finite element formulation of the depth-integrated conservation laws for mass and momentum. Storm surge elevations and velocities corresponding to each storm are computed over a very large domain encompassing the western North Atlantic Ocean, the Caribbean Sea, and the Gulf of Mexico. Previously, this domain was shown to accurately represent the peak storm surge as well as resonant modes associated with the storm surge response. Parameter specifications and details pertaining to boundary and internal forcings, ramp-up periods, time-step, and output format are included in this report. Computational requirements on a CRAY-YMP 6128 Computer for the average storm length of 11 days are 2.3 Central Processing Unit (CPU) hours.

The generation of data contained in the atlas is based on use of the National Oceanic and Atmospheric Administration (NOAA) National Hurricane Center's HURricane DATa base (HURDAT), the Planetary Boundary Layer (PBL) hurricane model, and the ADCIRC long-wave hydrodynamic model. This report describes in detail these primary components of the study with an emphasis on the ADCIRC storm surge simulations.

Although this database was developed to provide input to a model that evaluates the long-term fate and stability of dredged material, the potential use

of such a database goes far beyond the testing of disposal site stability. The database described in this report can be used to provide offshore or nearshore boundary conditions for any type of coastal modeling or analysis requiring storm-generated elevation or current data, thus providing a benefit for all users requiring storm design criteria.

1 Introduction

Background

The goal of the "Numerical Simulation Techniques for Evaluating Long-Term Fate and Stability of Dredged Material Disposed in Open Water" work unit is to provide a simulation technique for determining how a specific dredged material mound behaves over time. The methodology is intended for site designation investigations and is based on coupled numerical model simulations using local hydrodynamic boundary condition input data. The intended use of the program is to provide a systematic and quantifiable approach to analyzing disposal site stability based on local environmental conditions.

If dredged material is eroded from a disposal site and transported beyond the limits of the designated site, the site is classified as dispersive; otherwise, it is nondispersive. For locations predominated by strong wave and current regimes, sediment transport calculations based on average wave and current data may easily show the site to be dispersive; however, if the local environmental conditions are not severe, material may either remain within the limits of the designated site or take months or years to be transported in significant amounts beyond the limits of the designated site. The ability to identify long-term dispersive sites is especially important since eroded material could be transported into environmentally sensitive areas. These long-term dispersion investigations cannot be accurately made without knowledge of the local wave climate and current conditions at the specific site.

Objective

The approach selected for disposal site analysis is a coupled hydrodynamic, sediment transport, and bathymetry change model driven by long-term local boundary condition input. These conditions represent those forcings that entrain and transport sediment. In the Dredging Research Program (DRP), short wind-driven waves, tidal elevations and currents, and storm-induced surge elevations and accompanying currents have been identified as the primary forcings of interest.

The Long Term FATE (LTFATE; Scheffner et al. 1994) disposal site analysis program is a series of coupled PC-based models available through the DRP and the Coastal Engineering Research Center (CERC). The LTFATE model is a coupled hydrodynamic, sediment transport, and bathymetry change model which predicts the long-term fate and stability of a dredged material disposal site as a function of local wave and current conditions. The procedures for generating stochastic wave height, period, and direction time series are reported in Borgman and Scheffner (1991). The database of tidal elevations and currents for the east coast, Gulf of Mexico, and Caribbean Sea are described in Westerink, Luettich, and Scheffner (1992). The objective of this report is to describe the development of and access to a database of tropical storm surge and current hydrographs for use as input to LTFATE for evaluating mound stability as a function of tropical storm events. Extratropical events will be treated in a follow-up report.

A database containing realistic approximations of the surge response to tropical events along the eastern U.S. and Gulf of Mexico coasts can be utilized for a wide range of problems other than the intended disposal site stability application. For example, seaside communities require estimates of potential storm surge heights for the development of strategies to eliminate or reduce the severity of coastal flooding and beach erosion caused by hurricane storm surges. Storm surge responses are incorporated into design criteria for offshore oil structures. In fact, many interests require storm surge elevation and current information to design and evaluate coastal protection measures. Estimates of these data are available through use of this database.

The unpredictable nature of tropical storms suggests that a storm surge database which approximates historically occurring events, incorporating such factors as the storm path, spatial extent, and intensity, would be an extremely useful design tool for evaluating various structural or nonstructural storm mitigation design alternatives. The implication of using this database is that extensive knowledge of the storm surge produced by past hurricanes can offer insight into storm surges which may be generated by some future event. Development of the database of surge elevations and currents necessarily begins with the simulation of numerous historically based events.

The work described herein is based on a series of simulations of 134 historically based hurricanes which have impacted the eastern and gulf coasts of the United States during the period from 1886 through 1989. The storm surge response for each storm is computed over a domain which includes the western North Atlantic Ocean, the Caribbean Sea, and the Gulf of Mexico. The hydrodynamic storm surge simulator is the finite-element-based model ADCIRC-2DDI (Luettich, Westerink, and Scheffner 1992; Westerink et al. 1992; Westerink et al. 1993a; Westerink, Leuttich, and Scheffner 1993b). Storm surge elevations and velocities produced in this series of simulations are recorded at 486 coastal and near-coastal stations. The station elevation and velocity time series data generated by each storm comprise the tropical event database.

The sequence of tasks required to generate this database is as follows: (a) selection of historic events, (b) estimation of descriptive parameters corresponding to the historic events for input to a Planetary Boundary Layer (PBL) storm wind field model, (c) use of the wind field model to generate a temporal and spatial pressure and wind field distribution, and (d) use of that data as input to the large-scale hydrodynamic model ADCIRC to compute the spatial and temporal distribution of storm surge elevations and currents.

The steps described above are used to generate surge information using the 134 selected historical tropical storm events. Computed storm surge hydrographs were archived for 486 discrete locations for each simulation. Of the 486 station locations, 240 stations correspond to Wave Information Study (WIS) station locations (237 along the east and gulf coasts and 3 offshore of Puerto Rico), and 246 represent nearshore extensions of the WIS stations (237 along the east and gulf coasts with 9 located near Puerto Rico). This report summarizes the results of these simulations. Maps of the spatial distribution of the nearshore surge corresponding to each of the 134 events which impacted the coastline are provided in this report along with cross-reference tables showing stations impacted by each storm and storms which impact each station.

Because of the voluminous amounts of data involved with the generation of the database, computed storm responses have not been verified to prototype surge elevation data. This is due to the fact that the storm events were simulated without tides and are relative to mean sea level (msl) (therefore, peak values do not reflect the stage of the tide at the time of historical occurrence) and the fact that the hurricane parameters estimated from the HURDAT storm database are only approximate (i.e, all information necessary to numerically simulate each event is not known to a high degree of accuracy). Therefore, selected values have not been optimized by comparison of simulated results to prototype observations. For example, geostrophic wind speed and direction, radius to maximum wind, far field pressure, etc. are not known for each event and were estimated from available data. Because very few observations are available for events in the early 1900s, a consistent approach to parameter selection was developed. In defense of the above approximations is the intent of the database, i.e., to generate realistic tropical surge elevations and currents for use as boundary conditions for evaluating structural and nonstructural response to a variety of storm events.

The ADCIRC model has been rigorously verified for tidal and storm surge propagation. These efforts are described in the following sections. However, for this database, lack of verification of historical storm input parameters and their resulting wind and pressure fields may result in ADCIRC-computed surges which do not accurately reproduce historical surge measurements. Nevertheless, it is felt that the full storm database of events is representative of the range of historic events. Comparison of computed surge elevations to published observations of many simulated events, especially those that make landfall, shows that the simulated events do give a reasonably accurate depiction of observed maximum values. Again, the purpose of this database and the descriptive summary atlas is not to provide hindcast data for historic storm surge

elevations because of the limitations described above; instead, it is to provide an approximation of the potential magnitudes and durations of storm surge which can occur along the east and gulf coasts of the United States as well as a realistic database of surge elevation and current hydrograph boundary conditions.

This report describes the primary components of the study--namely, the database of historically derived storm events and the assumptions made in their selection, the PBL hurricane wind-field model and its input, and the hydrodynamic model and its application to the generation of the database of tropical storm surge hydrographs. Finally, the contents of the database are described.

2 Study Components

HURDAT Database of Tropical Storm Events

The historic events used as the basis for all computations in this study were obtained from the HURDAT database developed by the National Oceanic and Atmospheric Administration's (NOAA) National Hurricane Center (NHC) (Jarvinen, Neumann, and Davis 1984). This database summarizes all hurricane and tropical storm events that occurred in the North Atlantic Ocean, Gulf of Mexico, and Caribbean Sea and covers the 104-year period from 1886 through 1989.

Information contained in the HURDAT database includes latitude and longitude of the eye of the storm, central pressure in millibars (mb), and maximum wind speed in nautical miles per hour (knots) at 6-hr time intervals during the entire duration of each event. An example storm track is shown in Figure 1 for hurricane Bonnie, a relatively low-intensity event which impacted the gulf coast in June 1986. Table 1 shows the corresponding HURDAT Format information in which the date (month/year), north latitude (×10), west longitude (×10), and four values of maximum speed and central pressure corresponding to 0000, 0600, 1200, and 1800 Greenwich Mean Time (GMT) of the prescribed day are listed. In the example shown in Table 1, the storm begins at 1800 hr on 23 June 1986, with the eye of the hurricane located at 25.6 deg north latitude and 87.2 deg west longitude, a maximum wind speed of 25 knots,[1] and a central pressure of 1,014 mb. The 6-hr location, pressure, and maximum speed data are shown in the next 5 lines, the storm terminating on 28 June 1986 at 1200 hr with a speed of 10 knots and a central pressure of 1,012 mb.

A detailed description of the HURDAT data is provided by Jarvinen, Neuman, and Davis (1984). As stated above, some of the data contained in the HURDAT database for old storm events may not be as reliable as the more recent data; however, the data represent an extremely comprehensive database of historic events and is ideally suited to the goals of this project.

[1] A table of factors for converting non-SI units of measurement to SI units is presented on page ix.

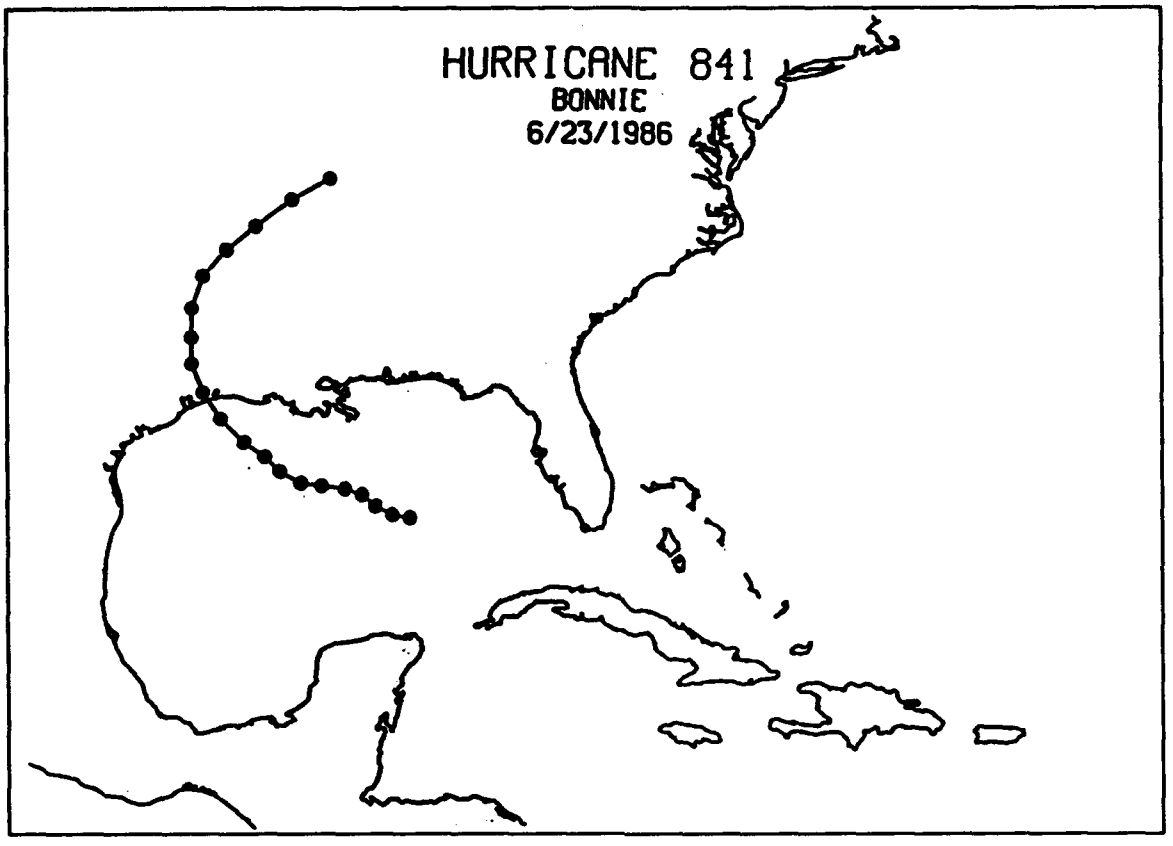


Figure 1. Hurricane track for Hurricane Bonnie

Table 1
HURDAT Data for Hurricane Bonnie

```
86560 06/23/1986 M= 6  2 SNBR= 841 BONNIE      XING=1 SSS=1
86570 06/23*                  *                  *2560872  25 1014*
86580 06/24*2570878  25 1013*2600884  25 1014*2640889  30 1011*2660895  40 1006*
86590 06/25*2670903  45 1001*2680910  50 1002*2720917  55  997*2770922  65 1001*
86600 06/26*2820929  70  999*2900937  75  995*2990943  65  992*3090947  35 1000*
86610 06/27*3180947  30 1009*3280947  25 1015*3390943  20 1016*3480935  20 1016*
86620 06/28*3560925  15 1014*3650913  10 1013*3720900  10 1012*                  *
86630 HR TX1
```

The HURDAT database was used to provide input to the hurricane wind model in order to provide wind and pressure field input for the hydrodynamic model. A brief description of the wind-field model and its input requirements is given below.

PBL Hurricane Wind and Pressure Model

The PBL wind-field numerical model (Cardone, Greenwood, and Greenwood 1992) was selected for simulating hurricane-generated wind and atmospheric pressure fields. The PBL wind model determines wind speed by solving the equations of horizontal motion which have been vertically averaged through the depth of the planetary boundary layer. The model includes parameterization of the momentum, heat, and moisture fluxes together with surface drag and roughness formulations.

The well-known exponential pressure law is used to generate a circularly symmetric pressure field P_s centered at the low pressure eye of the storm:

$$P_s = P_{eye} + \Delta p e^{-(R/r)} \tag{1}$$

where

P_{eye} = pressure at the center or eye of the storm

Δp = $P - P_{eye}$, the pressure anomaly with P taken as an average background or far-field pressure

R = scale radius (often assumed equivalent to the radius to maximum wind)

r = radial distance outward from the eye of the storm.

The pressure field computed by the PBL model simulation is more conveniently expressed in terms of an equivalent height of water, $P_s/\rho_0 g$.

Wind speeds generated by the model are converted to surface wind stresses using a relationship proposed by Garratt (1977):

$$\frac{\tau_{s\phi}}{\rho_0} = C_D \frac{\rho_{air}}{\rho_0} |W| W_\phi \tag{2}$$

and

$$\frac{\tau_{s\lambda}}{\rho_0} = C_D \frac{\rho_{air}}{\rho_0} |W| W_\lambda \tag{3}$$

where

$\tau_{s\phi}, \tau_{s\lambda}$ = wind stresses in the ϕ and λ directions, respectively

ρ_{air}/ρ_0 = 0.001293 the ratio of the air density to the average density of seawater

C_D = frictional drag coefficient computed as $0.001(0.75+0.67|W|$ where $|W|$ is the magnitude of the wind velocity, and W_ϕ, W_λ are the components of the wind velocity vector in the ϕ and λ directions, respectively. For simulations presented in this report, all surface roughness parameters pertain to the open ocean.

The PBL model requires a series of input "snapshots" consisting of a set of meteorological parameters defining the storm at various stages in its development or at particular times during its life. These parameters include: latitude and longitude of the storm's eye; track direction and forward speed measured at the eye; radius to maximum winds; central and peripheral atmospheric pressures; and an estimate of the geostrophic wind speed and direction. Radius to maximum winds is approximated using a nomograph that incorporates the maximum wind speed and the atmospheric pressure anomaly (Jelesnianski and Taylor 1973). All of these snapshot parameters were computed for each 6-hr storm location contained in the HURDAT tape.

The PBL model also requires a "histogram" file containing the hourly location of the eye of the storm. These data, as well as all pertinent storm parameters (i.e., forward speed, central pressure, direction, etc.), were computed for each hour from the 6-hr data in the HURDAT database via a cubic spline interpolation. Peripheral atmospheric pressures were assumed to be equal to 1,013 mb, and the geostrophic wind speeds were specified as 6 knots and having the same direction as the storm track.

The PBL model computes a stationary wind and pressure field distribution corresponding to each of the 6-hr snapshots on a nested grid composed of five subgrids. Each subgrid measures 21 by 21 nodes in the x- and y-directions, respectively, and the centers of all subgrids are defined at the eye of the hurricane. Although the number of nodes composing each subgrid is the same, the spatial resolution is doubled for each successive grid. For this study, the center grid with the finest resolution had an Δx and Δy grid spacing of 5 km. Incremental distances for the remaining subgrids were 10, 20, 40, and 80 km. These fixed grids translate with the propagating storm.

The hurricane translational or forward motion is incorporated into model calculations by adding the forward and rotational velocity vector components. A nonlinear blending algorithm is then incorporated to generate a nested grid field of wind and pressure for each hour during the life of the storm event. The location of each grid field corresponds to the location of the storm eye contained in the histogram file described above. These hourly wind and pressure fields are then interpolated from the PBL nested grid onto the hydrodynamic grid and subsequently stored for use by the ADCIRC model described in the following section.

Careful consideration must be given to the specification of meteorological forcing for each simulated storm event. Because wind stress and pressure gradients drive the numerical storm surge model, surge computations are limited by the accuracy of the specified wind stress and pressure fields (Hubbert, Leslie, and Manton 1990; Dendrou, Moore, and Myers 1985; Flather 1984). The PBL model utilizes meteorological data corresponding to historical storms to compute the associated wind stress and pressure forcing. As previously stated, data for all storm parameters, i.e., radius to maximum, geostropic wind field, far-field pressure, etc., are not readily available and must be approximated.

These approximations may deviate somewhat from the conditions which occurred during the actual storm event. Therefore, the wind and pressure fields and resulting surge computations may not be precisely equivalent to observed conditions; however, their values will most likely not be in error by a substantial amount. Although this historically based simulation procedure should not be considered as a hindcast for the reasons presented above, the simulations are physically based and offer a more realistic representation of the meteorological forcing and response than empirically based simulations such as the Standard Project Hurricane model (Cialone 1991) used by Westerink et al. (1992) and other empirical models used by Johns et al. (1983), Flather (1984), Jarvinen and Lawrence (1985), and Hearn and Holloway (1990).

ADCIRC-2DDI Hydrodynamic Model

The finite-element-based hydrodynamic model ADCIRC-2DDI (Luettich, Westerink, and Scheffner 1992) was used for all storm event simulations. The model is the depth-integrated option of a system of two- and three-dimensional hydrodynamic codes (Luettich, Westerink, and Scheffner 1992; Westerink et al. 1992b). The model uses depth-integrated equations of mass, in the form of the generalized wave-continuity equation (GWCE), and momentum conservation, subject to incompressibility, Boussinesq, and hydrostatic pressure approximations. Using the standard quadratic parameterization for bottom stress and neglecting baroclinic terms and lateral diffusion/dispersion effects, the following set of conservation statements in primitive, nonconservative form expressed in a spherical coordinate system is incorporated in the model (Flather 1988; Kolar et al. 1993b):

$$\frac{\partial \zeta}{\partial t} + \frac{1}{R\cos\phi}\left[\frac{\partial UH}{\partial \lambda} + \frac{\partial (UV\cos\phi}{\partial \phi}\right] \tag{4}$$

$$\frac{\partial U}{\partial t} + \frac{1}{r\cos\phi}U\frac{\partial U}{\partial \lambda} + \frac{1}{R}V\frac{\partial U}{\partial \phi} - \left[\frac{\tan\phi}{R}U + f\right]V =$$

$$-\frac{1}{R\cos\phi}\frac{\partial}{\partial\lambda}\left[\frac{p_s}{\rho_0}+g(\zeta-\eta)\right]+\frac{\tau_{s\lambda}}{\rho_0 H}-\tau_* U$$

$$\frac{\partial V}{\partial t}+\frac{1}{r\cos\phi}U\frac{\partial V}{\partial\lambda}+\frac{1}{R}V\frac{\partial V}{\partial\phi}-\left[\frac{\tan\phi}{R}U+f\right]U=$$

$$-\frac{1}{R}\frac{\partial}{\partial\phi}\left[\frac{p_s}{\rho_0}+g(\zeta-\eta)\right]+\frac{\tau_{s\lambda}}{\rho_0 H}-\tau_* V \qquad (5)$$

where

t	=	time
λ and ϕ	=	degrees longitude (east of Greenwich is taken positive) and degrees latitude (north of the equator is taken positive)
ζ	=	free-surface elevation relative to the geoid
U and V	=	depth-averaged horizontal velocities
R	=	radius of the earth
H	=	$\zeta + h$ is the total water column depth
h	=	bathymetric depth relative to the geoid
f	=	2Ω sin
ϕ	=	Coriolis parameter
Ω	=	angular speed of the earth
p_s	=	atmospheric pressure at the free surface
g	=	acceleration due to gravity
η	=	effective Newtonian equilibrium tide potential
ρ_0	=	reference density of water
$\tau_{s\lambda}, \tau_{s\phi}$	=	applied free surface stress
τ_*	=	$C_f(U^2 + V^2)^{1/2}$ /H where C_f equals the bottom friction coefficient

The above governing equations for the model are based on spherical coordinate balance equations which have been transformed using a Carte Parallelogrammatique Projection (CPP) (Pearson 1990). The accuracy of these equations in solving various shallow-water problems is well-documented (Walters 1988; Werner and Lynch 1989; Walters and Werner 1989; Gray 1989; Foreman 1988; Lynch et al. 1988; Lynch and Werner 1991; Luettich, Westerink, and Scheffner 1992; Westerink et al. 1992, 1993b, c).

Model Verification

Although the ADCIRC model results were not verified for each individual storm event of the 134-storm input data set, the model has been thoroughly verified to both tidal forcing and storm surge propagation. This section briefly summarizes the verification efforts which have been undertaken to demonstrate and document the ability of the model to accurately simulate the propagation of long waves.

Prior to verification of the model to physical domain flow systems, a considerable amount of effort was expended to demonstrate the model's ability to correctly reproduce long-wave hydrodynamics by comparing model simulations to analytical results for idealized flow regimes. Quarter annulus tests as well as slosh tests conducted in a grid representation of a rectangular channel were performed. Results of these tests demonstrated the high degree of accuracy of the model, showed that there was negligible numerical damping in the solutions, showed that spurious-node solutions were not generated by the model, and finally demonstrated that waves with a wavelength of 2 Δ-x were accurately propagated through the computational grid.

Following the initial idealized case model tests, a benchmark application of the model was made to tidal flow through the English Channel. The computational grid consisted of 1,613 elements and 911 nodes. In this application, an 11-constituent tidal elevation time series boundary condition was used to drive the model. A 190-day simulation resulted in a successful verification of the model to 11 surface elevation stations and 8 velocity stations. Prototype data used for verification was the North Sea Benchmark data set. Details of both the initial model tests and the benchmark test are reported in Luettich, Westerink, and Scheffner (1992).

A proof of concept application of the model was made to demonstrate the premise that the model could accurately reproduce tide and storm propagation over large domains. The pilot study for this concept was tested for the entire Gulf of Mexico. In this initial study, a three-tier verification of the model was completed. These phases included: (1) tidal elevation verification over the entire Gulf, (2) Mobile Bay tidal current verification, and finally (3) Panama City, FL, hurricane storm surge propagation verification to Hurricane Kate.

The computational grid used for the study is shown in Figure 2. The grid contains 3,939 nodes and 6,807 elements and demonstrates the flexibility of an unstructured grid by showing a ratio of maximum element area to minimum area greater than 15,000. This large ratio results from high grid resolution along the continental shelf in the vicinity of Mobile Bay and Panama City and low resolution in the deep portions of the gulf.

The tidal verification of the model was based on a five-constituent tidal time series (O_1, K_1, P_1, M_2, and S_2) boundary condition imposed at the Yucatan Channel and Strait of Florida, as shown in Figure 3. Tidal potential forcing, with a theoretical Earth tide potential reduction factor of 0.69, was

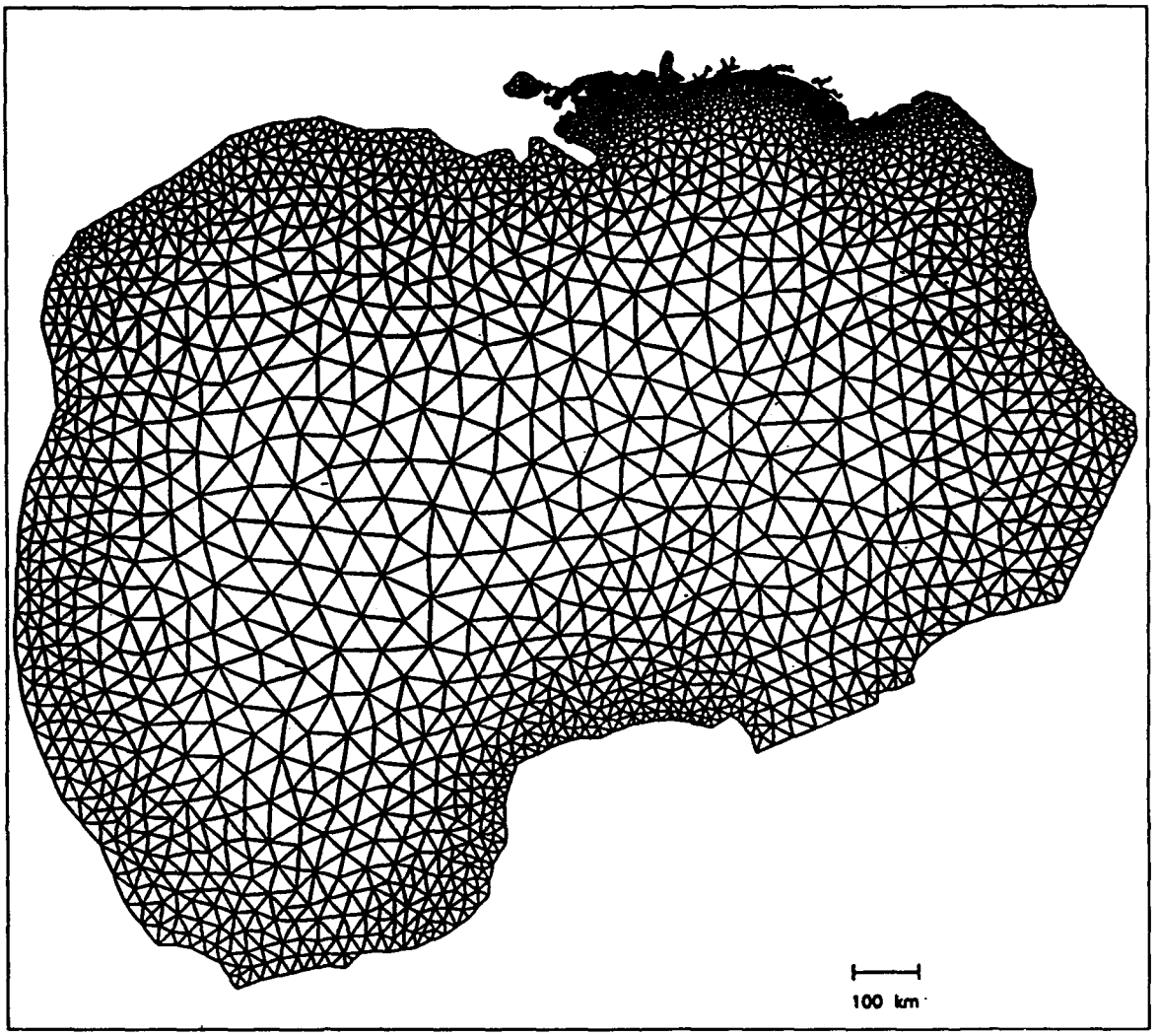


Figure 2. Gulf of Mexico computational grid

used for all simulations. Tidal comparisons were made at 20 elevation stations (shown in Figure 3), with results published by Reid and Whitaker (1981) and 20 tidal current stations located in Mississippi Sound (shown in Figure 4) reported by Outlaw (1983). Once grid resolution had been optimized for long wave propagation, tidal simulations were performed with no additional calibrations.

Therefore, the simulations of the study were entirely predictive and were highly successful at reproducing tidal elevations and currents throughout the domain. Typical comparisons for elevation and current are shown in Figures 5 and 6. Detailed comparisons of additional time series are given in Westerink et al. (1993a).

Verification of the model to tropical storm surge was made by simulating the propagation of Hurricane Kate, which made landfall in the vicinity of

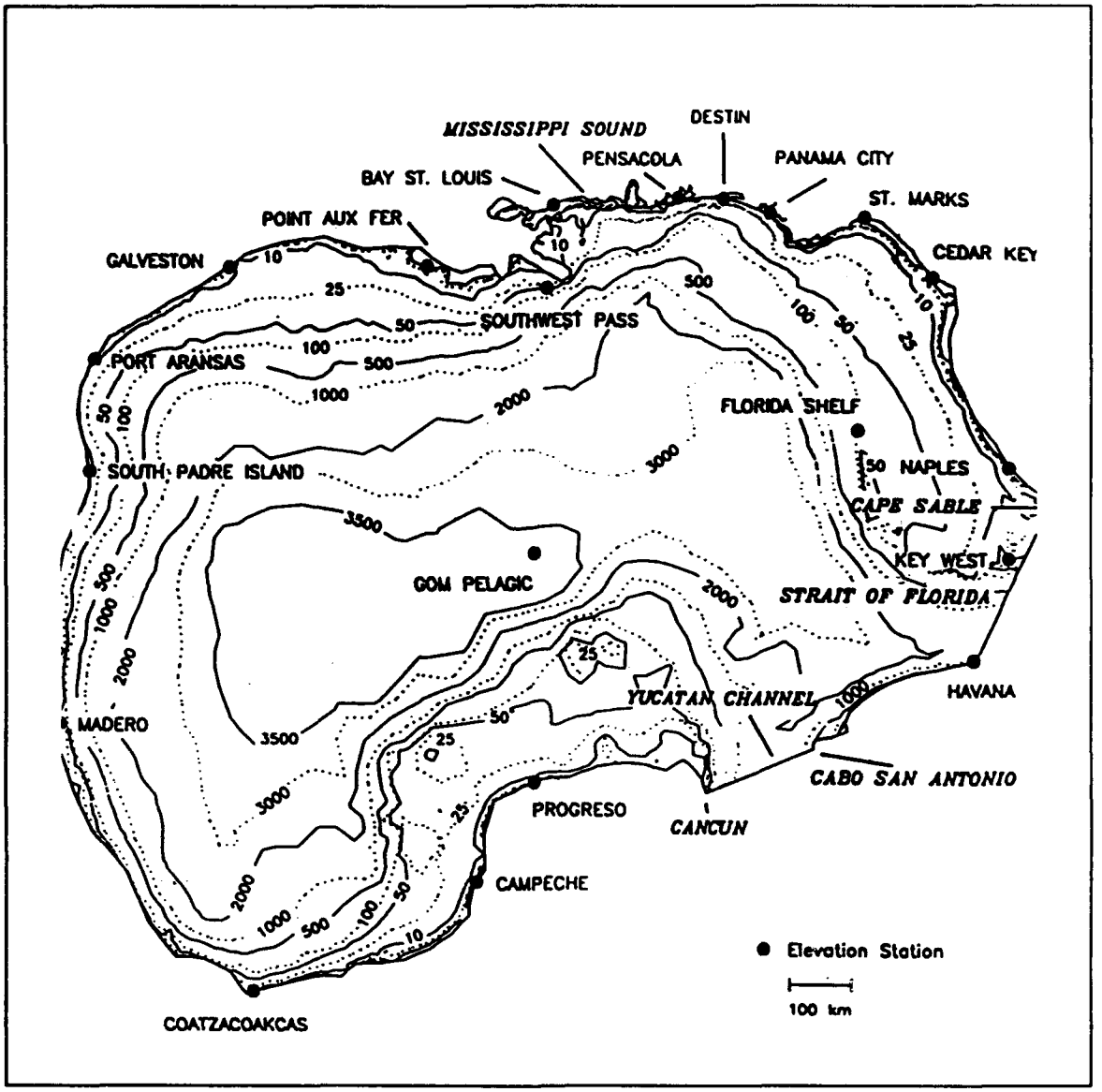


Figure 3. Gulf of Mexico tidal elevation stations

Panama City, FL (Figure 7), in November 1985. Wind and pressure fields were generated for input to ADCIRC through application of the Standard Project Hurricane (SPH) model (Cialone 1991). The PBL model described above has since replaced the SPH model as the model of choice. Comparisons of model-to-prototype surge elevations are shown in Figure 8 for two stations located to the east of landfall. In both cases, the model was able to reproduce the storm surge with a reasonable degree of accuracy.

A large-domain ADCIRC application to storm surge propagation was made for a study that examined storm surge versus frequency of occurrence along the coast of Delaware. This study involved verification of the model to a combination of tide and storm surge. Some of the inadequacies of the SPH

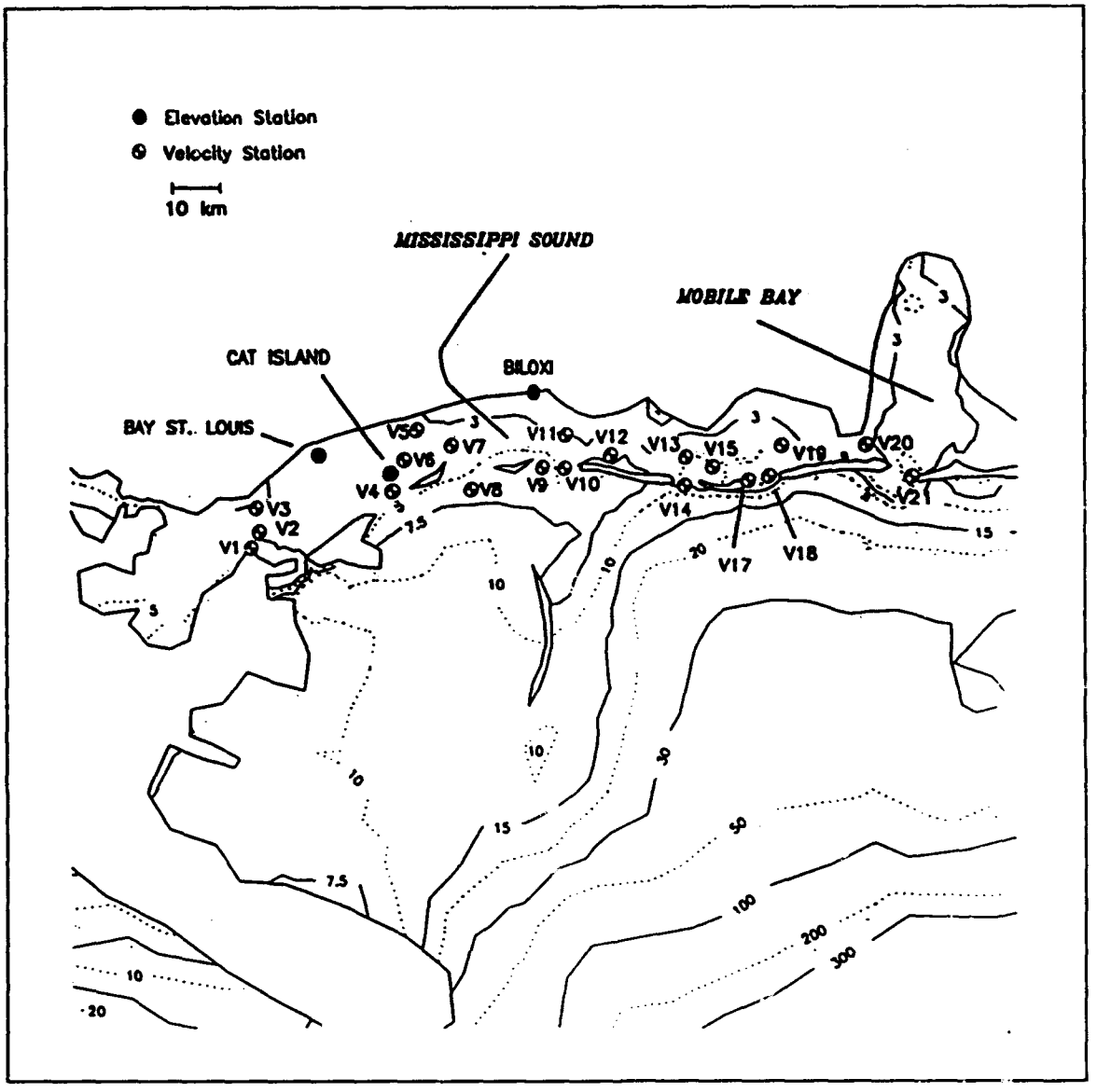
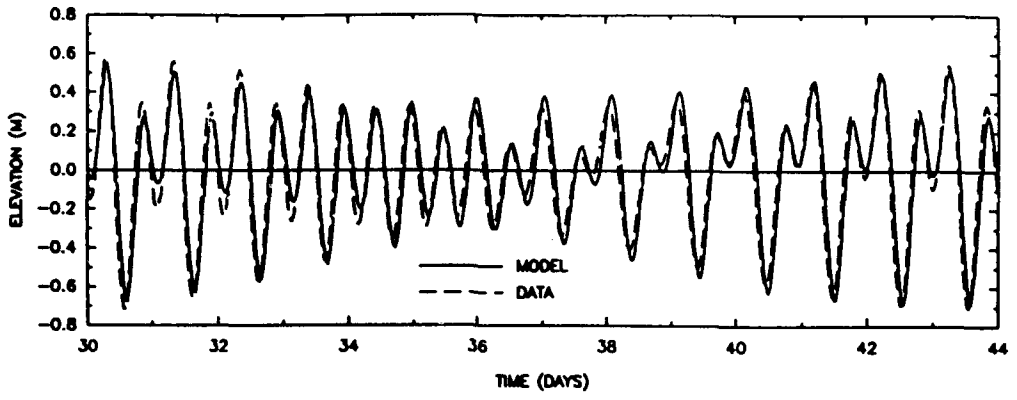
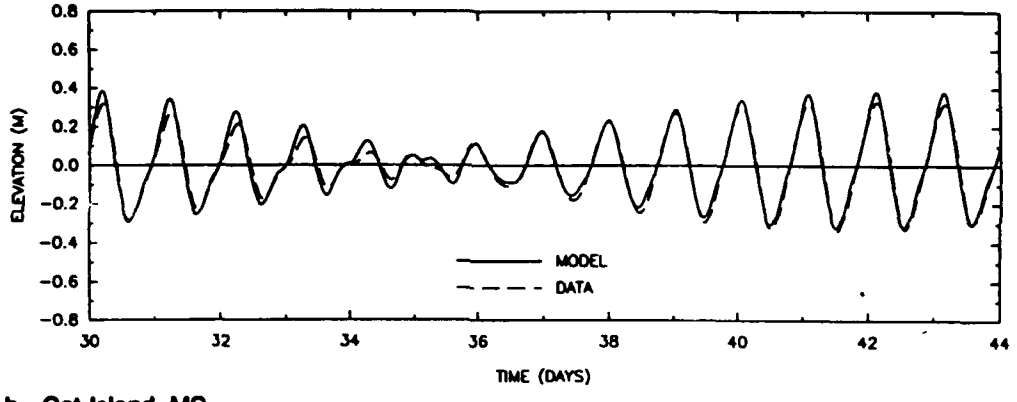


Figure 4. Mississippi Sound tidal current stations

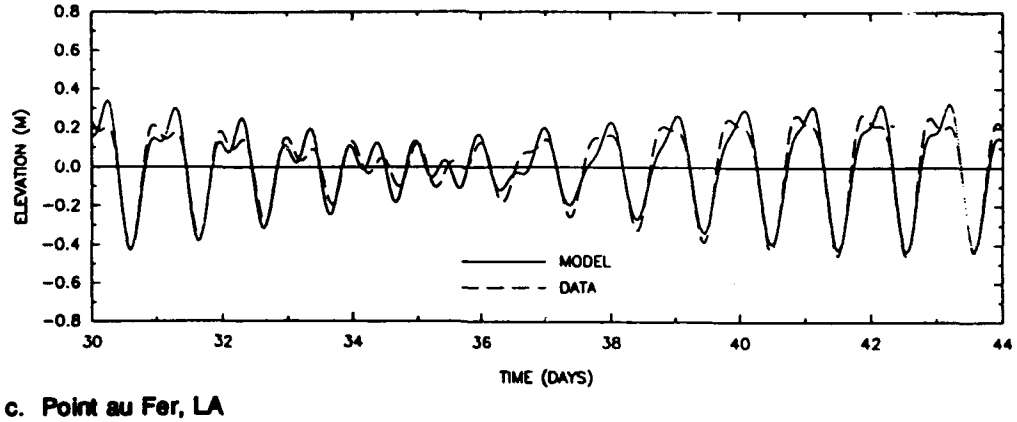
model noted in the Panama City study were rectified by selection of the PBL model over the SPH model. In fact, this study represented the pilot application of the combined PBL and ADCIRC modeling approach to simulate the propagation of storm events over very large computational domains. Details of the study are presented in Mark and Scheffner (1993). Accuracy achieved with the model can be seen in the model-to-prototype comparison for Hurricane Gloria shown in Figure 9. As evidenced in the figure, the comparison is excellent and it initiated generation of the full tropical storm database described in the following sections.



a St. Marks Light, FL

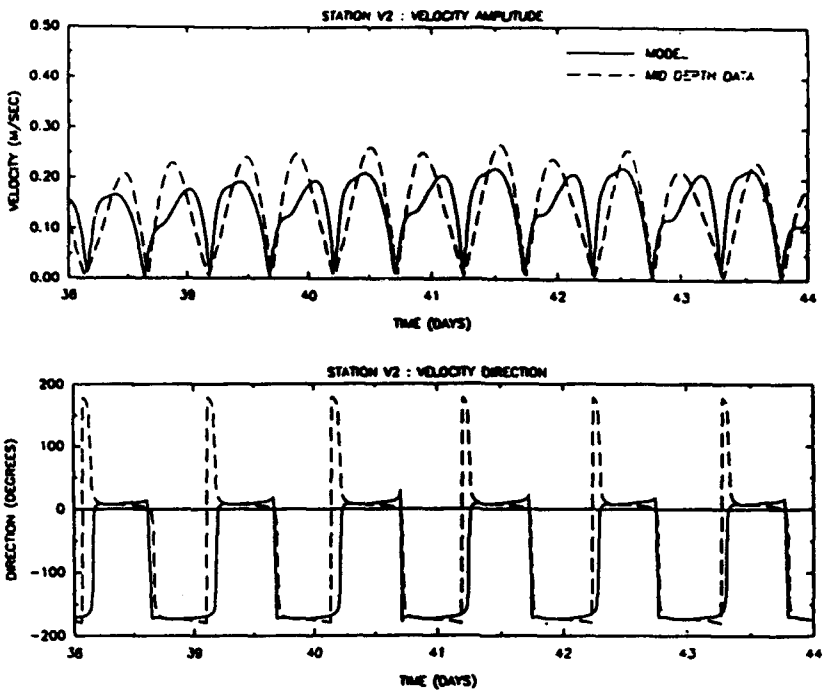


b. Cat Island, MS

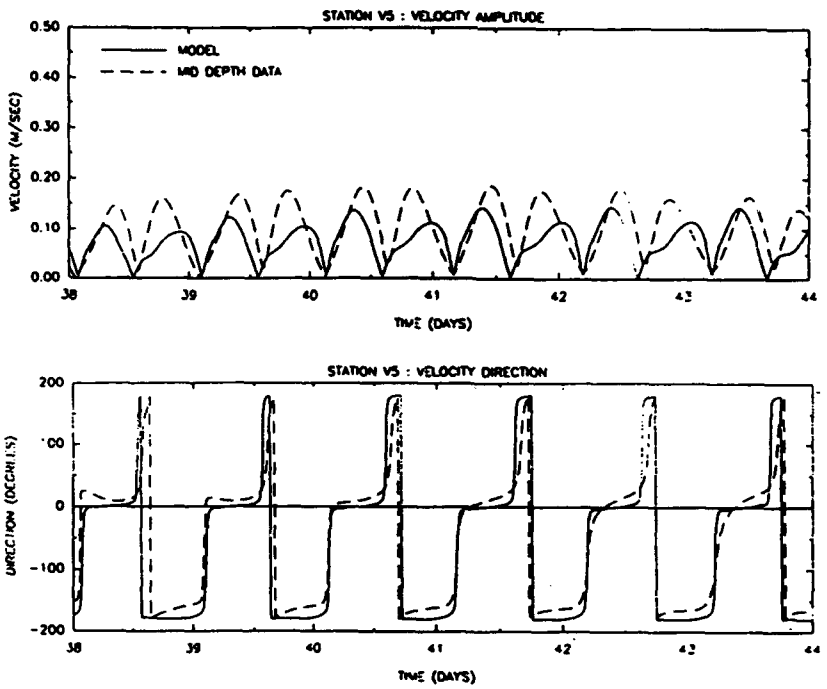


c. Point au Fer, LA

Figure 5. Typical tidal elevation comparisons



a. Station V2



b. Station V5

Figure 6. Typical tidal current comparisons

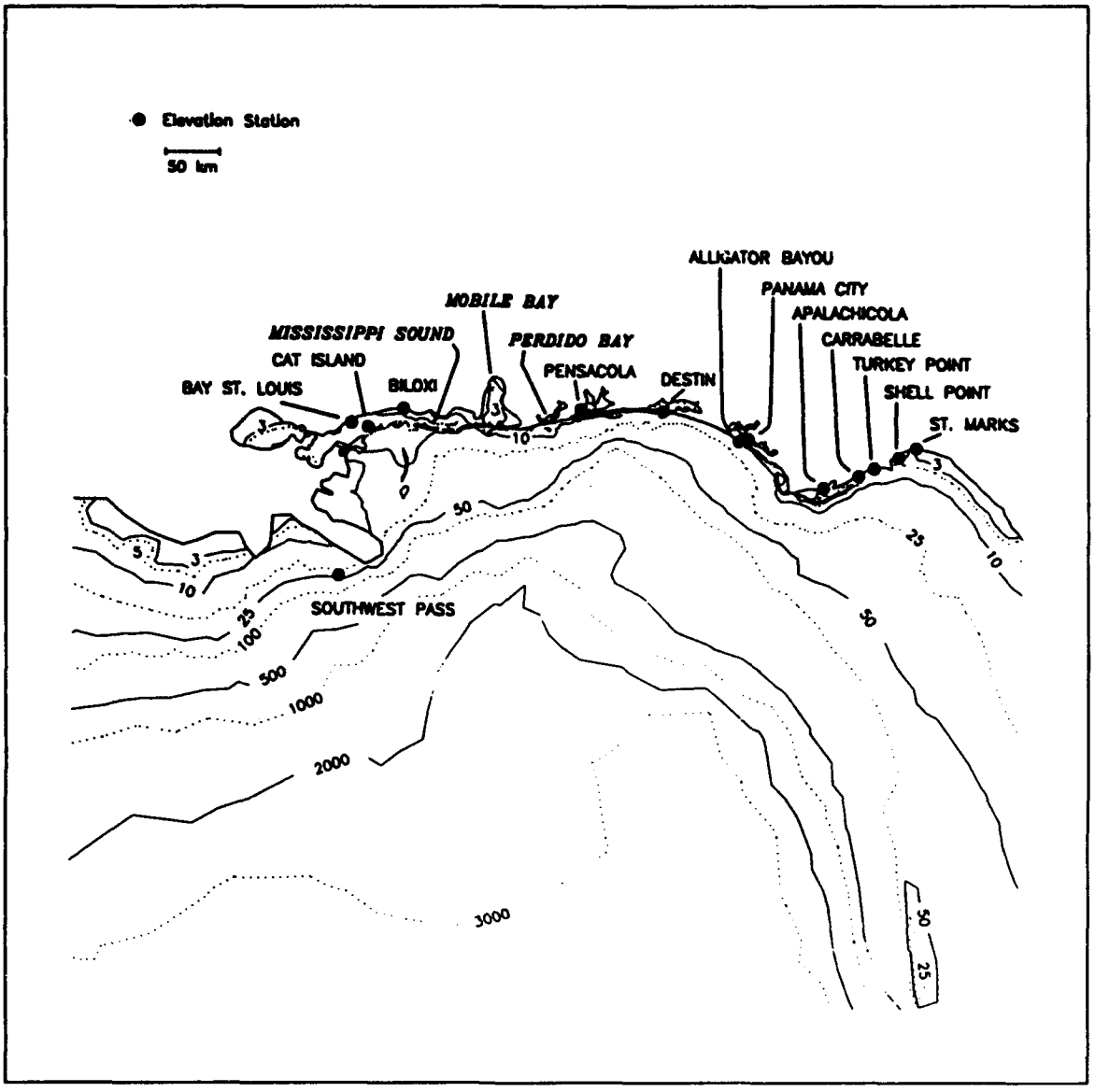


Figure 7. Coastline in the vicinity of Panama City, FL

Simulation Modifications

Two modifications to the standard governing equations and boundary conditions specification were made for the surge computations. First, an inverted barometer effect was specified at the open-ocean boundary to partially account for meteorological forcing there. The inverted barometer effect $P_s/\rho_0 g$ is defined as the height to which the sea water will rise due to static pressure forcing. Second, the convective and finite amplitude terms were not included in the governing equations for these simulations due to instabilities caused by near-drying elements as the storm moves onshore and winds are directed offshore. Consequently, the only nonlinear term included in the governing

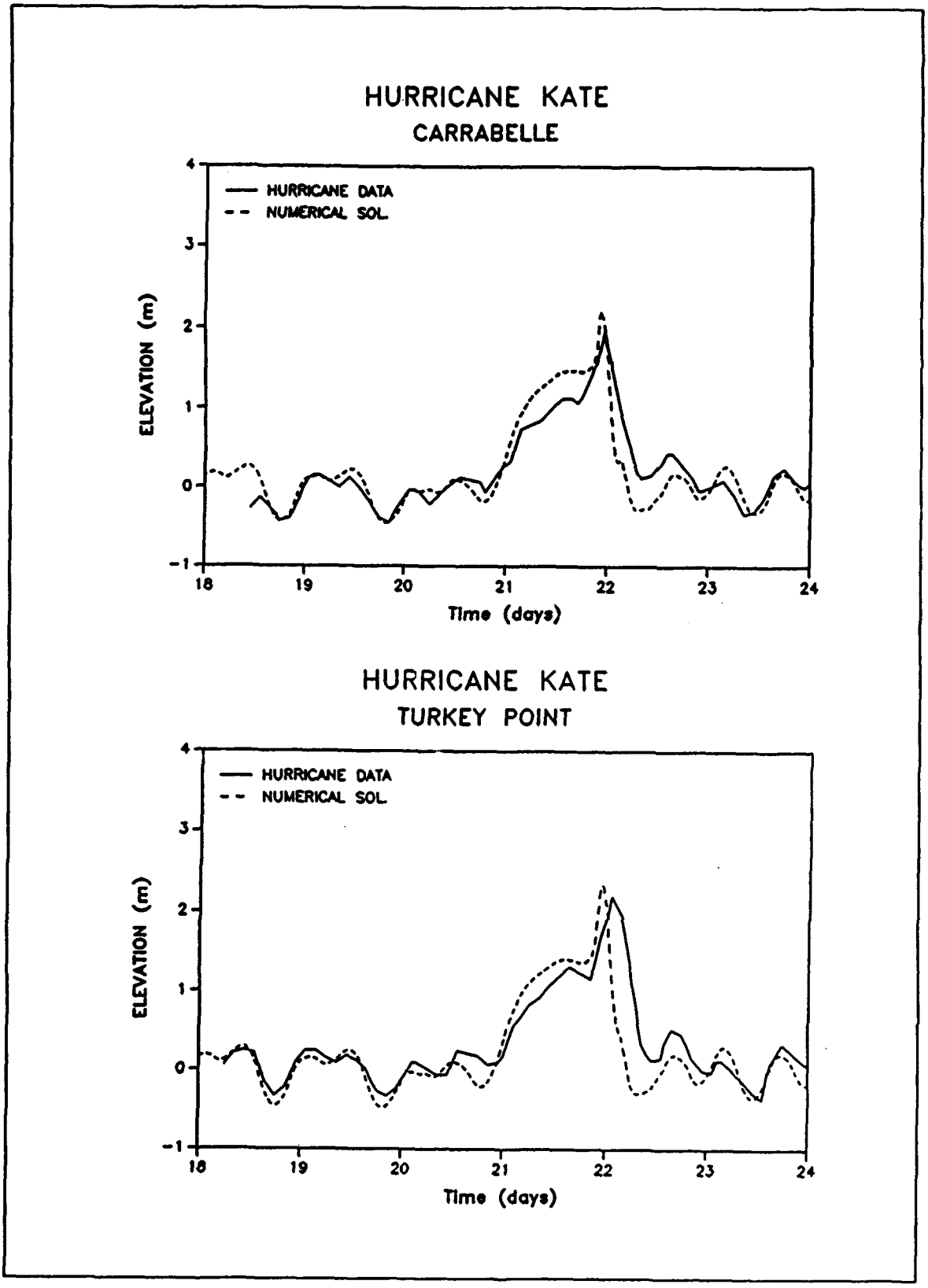


Figure 8. Model-to-prototype surge comparisons for Hurricane Kate

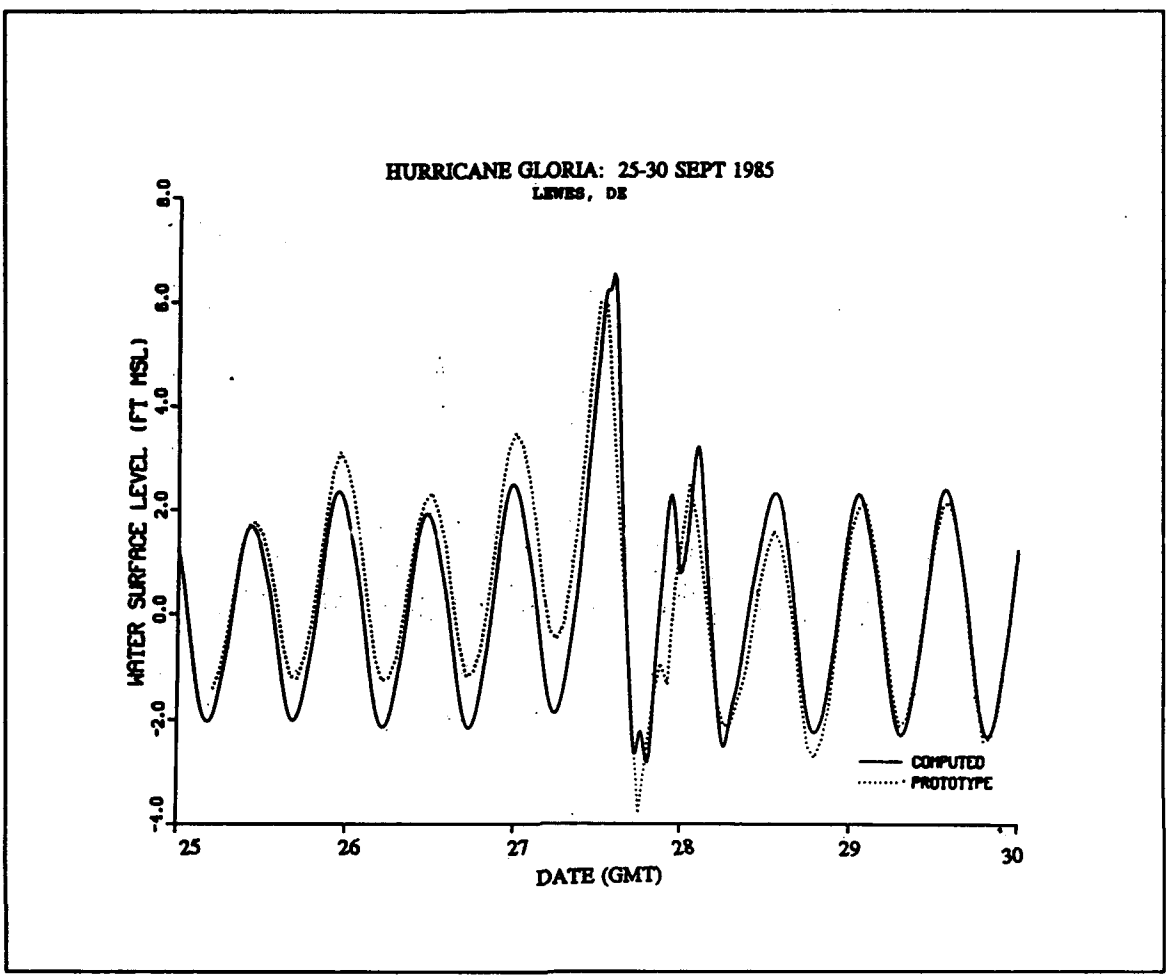


Figure 9. Comparison of model-to-prototype observations for Hurricane Gloria

equations is bottom friction. The bottom friction coefficient is held constant and equal to 0.003 over the entire domain.

The Coriolis parameter spatially varies throughout the domain and is computed on a nodal basis. The GWCE parameter τ_0, which represents the balance between the primitive continuity and wave equation portions of the GWCE, is set to 0.001 (Kolar et al. 1993a). A minimum depth of 3.0 m is also specified. Eddy viscosity is not included in model computations.

Simulations are spun up from static initial conditions using a 1-day ramp in time. Application of a hyperbolic ramp function reduces the excitation of nonphysical short wavelength frequencies. An identical 1-day ramp function is applied to the wind and pressure forcing as well as the inverted barometer boundary condition. Therefore, the total simulation time is equal to the length of the event (determined from the HURDAT database) plus the 1-day ramp-up period. If the storm event is outside the modeled domain, the wind and pressure fields imposed on the model are set to zero; however, ADCIRC computations are made with the null boundary conditions in order to preserve the event

timing with, and proper correlation to, the HURDAT data. During the first 6 hr preceding the simulation, the initial hurricane wind and pressure forcings are held stationary. Following this initial 6-hr period, storm surge predictions begin on the zero hour of the storm and continue through the final hour of the storm as indicated by the historical hurricane data. A time step of 45 sec is used throughout the simulation period. For these simulations, no calibration or tuning of parameters was performed for either the PBL model or the hydrodynamic model.

The finite element formulation used in the ADCIRC hydrodynamic model, with its inherent grid flexibility, facilitates the use of a large computational domain and is considered an ideal formulation for a storm surge model. Flexibility of the finite element method leads to easy incorporation of coastline detail and nodal densities which range from three to four orders of magnitude in spatial resolution. This wide variation in nodal density arises due to the hydrodynamic considerations of surge propagating from deep open water to the coast zone. These considerations require high grid resolution in shallow coastal areas, in regions of complex coastlines and/or bathymetric change, and in regions of significant storm surge caused by, for example, focusing effects and coarse discretizations in the deep ocean where processes occur gradually.

The efficiency of the finite element method leads to a discrete problem associated with a large domain that remains well within computational limits. Finite element equations generated within the ADCIRC model are solved using a preconditioned conjugate gradient iterative solver which further minimizes storage requirements. Specifics of the surge computations follow.

3 Storm Surge Computations

As mentioned earlier, the storm events comprising the tropical storm database were not rigorously verified to prototype measurements; rigorously comparing the output of 134 events to observed data at hundreds of locations was beyond the scope, in both time and cost, of this project. However, as described in the previous section, the ADCIRC-2DDI model has been well-verified to long wave propagation. These verification efforts extend from detailed tidal elevation and circulation applications to multiple tropical storm surge simulations. Therefore, although precise comparisons to existing data were not made, solutions can still be considered reasonably accurate because the model has been thoroughly verified for tide and storm surge propagation. Any discrepancies between model simulation and prototype observations are due to a lack of knowledge concerning the storm event descriptive parameters used as input to the PBL model. These uncertainties are usually not too severe, as was determined by numerous spot comparisons of model surge computations to maximum elevation prototype observations. However, exceptions occur which should be noted.

For example, a maximum storm surge (no tide) of 1.31 m was recorded at Lewes, DE, in the simulation of Hurricane Gloria described above. The post-hurricane memorandum (Jarvinen and Gebert 1986) reported that Hurricane Gloria had a radius to maximum of 20 statute miles when positioned approximately 40 statute miles offshore of the entrance to Delaware Bay. If a value of 20 statute miles is specified as input to the PBL model, the resulting wind and pressure fields produce an ADCIRC simulated maximum surge elevation of 1.37 m. The comparison shown in Figure 9 is based on this value. However, in the simulation of the 134-event database, radius to maximum values were based on the nomograph approximation for radius to maximum presented by Jelesnianski and Taylor (1973). This approximation produced a radius to maximum value in excess of 35 miles, approximately the same distance between the eye of the hurricane and Lewes, DL. As a result, the computed maximum surge along the coast is reported to be 3.3 m, approximately 2.5 times greater than observed. This discrepancy is due to the fact that the forward speed of Hurricane Gloria rapidly increased as the storm passed the coast, resulting in a lower radius to maximum than that obtained from the nomograph, which is based on normal conditions.

Inconsistencies of this type were not found to be common in the data and do not invalidate the intent or usefulness of the database. Their presence only demonstrates that accurate hindcasting of a particular event requires accurate specification of input storm event parameters. Verification of the computed storm surge must then be made to prototype data.

The following sections describe details which relate to the storm surge computations contained in the database. Initially, a description of the domain size over which computations proceed is given. The ADCIRC model parameter values and simulation specifications are then outlined. Finally, a description of the selection of coastal and offshore stations at which storm surge elevations and water velocities are recorded is included.

Domain Description

A very large computational domain, shown in Figure 10, is used for modeling the storm events selected as the basis for this database. The modeled area includes the western North Atlantic Ocean, the Gulf of Mexico, and the Caribbean Sea. This domain was initially developed for tidal propagation studies (Westerink et al. 1993b); however, its implementation for storm propagation has been demonstrated through accurate predictions of both the primary storm surge and the surge forerunner effect (Blain, Westerink, and Luettich 1993). The very large expanse of the adopted computational domain compares to an area on the order of 40 times the scale of an average hurricane.

The primary benefit of using this existing grid is that it permits a hurricane to progress through the domain, generating and propagating storm surge in a natural and realistic fashion. The inclusion of contiguous basins allows proper setup of basin resonant modes and facilitates the accurate propagation of storm surge throughout the domain onto the continental shelf, where development of the storm surge is most critical. Because the open boundaries lie within the deep Atlantic Ocean and are far removed from the intricate processes occurring in response to the storm on the continental shelf and within the Gulf of Mexico basin, errors introduced by near-storm computational boundaries are minimized. Thus, with a large domain, open ocean boundary conditions are simplified and basin-to-basin interactions, as well as basin resonant modes, are accurately represented.

The offshore boundary condition is represented by a single deep Atlantic Ocean boundary which extends from Glace Bay, Nova Scotia, to the vicinity of Corocora Island in eastern Venezuela approximately along 60 deg west longitude. All other boundaries are defined by the eastern coastlines of North, Central, and South America. Topography within the domain, depicted in Figure 11, includes the continental shelf whose depths range from an imposed minimum of between 3 and 7 m to 130 m at the shelf break; the continental slope, which has a typical depth range of 130 m to 3,000 m; and the

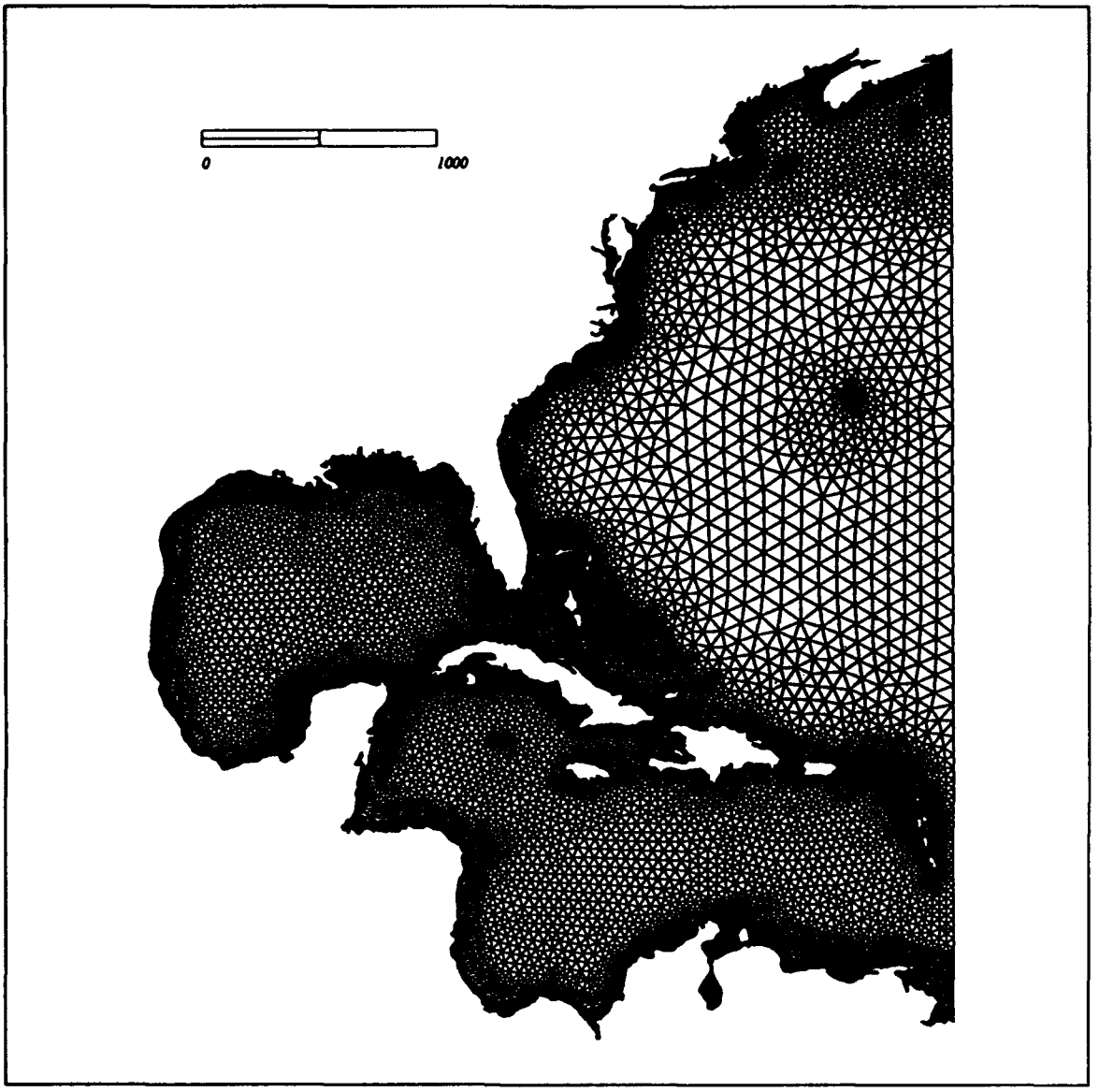


Figure 10. The east coast, Gulf of Mexico, and Caribbean Sea computational domain

continental rise and deep ocean, where depths increase upwards from 3,000 m to almost 8,000 m.

Bathymetry values are taken from the ETOPO5 database of the National Center for Atmospheric Research and, in regions along the Florida coast and shelf bathymetries, by the National Ocean and Atmospheric Administration Digital U. S. Coastal Hydrography sounding database (distributed by NOAA National Geophysical and Solar-Terrestrial Data Center in Boulder, CO). Discretization of the computational domain, shown in Figure 10, entails 22,711 nodes and 41,709 elements. Grid spacing has a wide variability within the computational domain. For example, the minimum node-to-node spacing is approximately 0.5 km along the Florida shoreline, while in the deep Atlantic

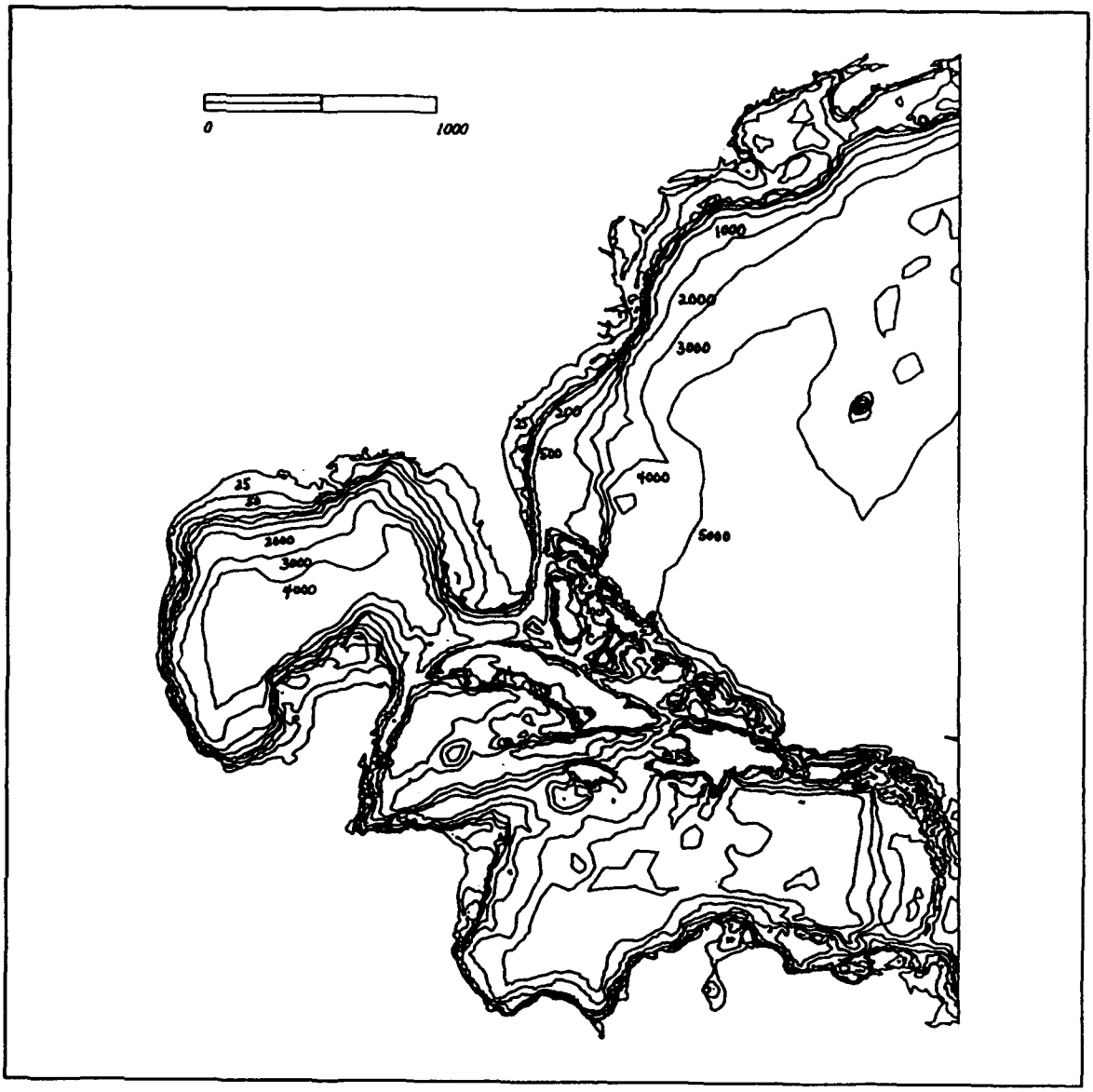


Figure 11. The computational domain and bathymetry contours in increments of 25, 50, 100, 200, 500, 1,000, 2,000, 3,000, 4,000, 5,000, and 8,000 m

ocean, spacing increases to about 105 km. Optimal gridding and the flexibility of the finite element method make a large computational domain manageable.

Storm Event Selection

The selection of events from the HURDAT data for the construction of this database was begun by partitioning the U.S. coastline into the eight coastal segments described by Ho et al. (1987). These segments are described in Table 2 and referenced to the locator map of Figure 12. Each of these regions

Table 2
Coastal Segments (after Ho et al. (1987))

Segment Number	Milepost Range	Description
1	0-400	Gulf coast from Mexican border to Galveston, TX
2	400-700	Gulf coast from Galveston, TX, to Mississippi Delta
3	700-1100	Gulf coast from Mississippi Delta to Suwannee Sound, FL
4	1100-1415	Gulf coast from Suwannee Sound, FL, to the southern tip of Florida Peninsula
5	1415-1800	Whole Atlantic Coast of Florida
6	1800-2200	Atlantic coast from Georgia to Cape Hatteras
7	2200-2700	Atlantic coast from Cape Hatteras to Rhode Island
8	2700-3100	Atlantic coast from Rhode Island to Canadian border

was defined to have a homogeneous population of events such that storm parameters associated with events for one location in the segment appear similar to the parameters associated with another location within the segment. A thorough analysis of the selection process and procedures is presented in Ho et al. (1987).

The initial selection of events was made by defining a latitude and longitude rectangle encompassing each of the eight regions. These regions are shown in Figure 13. The tracks of all 875 events in the 1886-1989 edition of the HURDAT file were examined to determine if they entered the segment rectangle. Of those that did enter the rectangle, events whose minimum central pressure was greater than 995 mb, whose track was only on the landward side of the rectangle, and whose location was far from the shoreline near the seaward boundary, were discarded. This process of elimination resulted in the selection of the following number of events associated with each rectangle: 1-27, 2-35, 3-29, 4-33, 5-55, 6-52, 7-30, and 8-21.

Because many of the events impacted two or more segments, there were numerous redundancies identified in the segment-by-segment selection of events. After removing duplications, 134 events were selected for use in the modeling simulation process. These selected events are listed in chronological order in Table 3 according to date of inception, corresponding HURDAT number, and given name.

The 134 storm events selected for this study were simulated via the HURDAT-based event parameter computation, the PBL model generation of wind and pressure fields over the computational grid, and the ADCIRC computation of storm surge surface elevation and current hydrographs. The selection of appropriate locations for archiving these time series data is described in the following section.

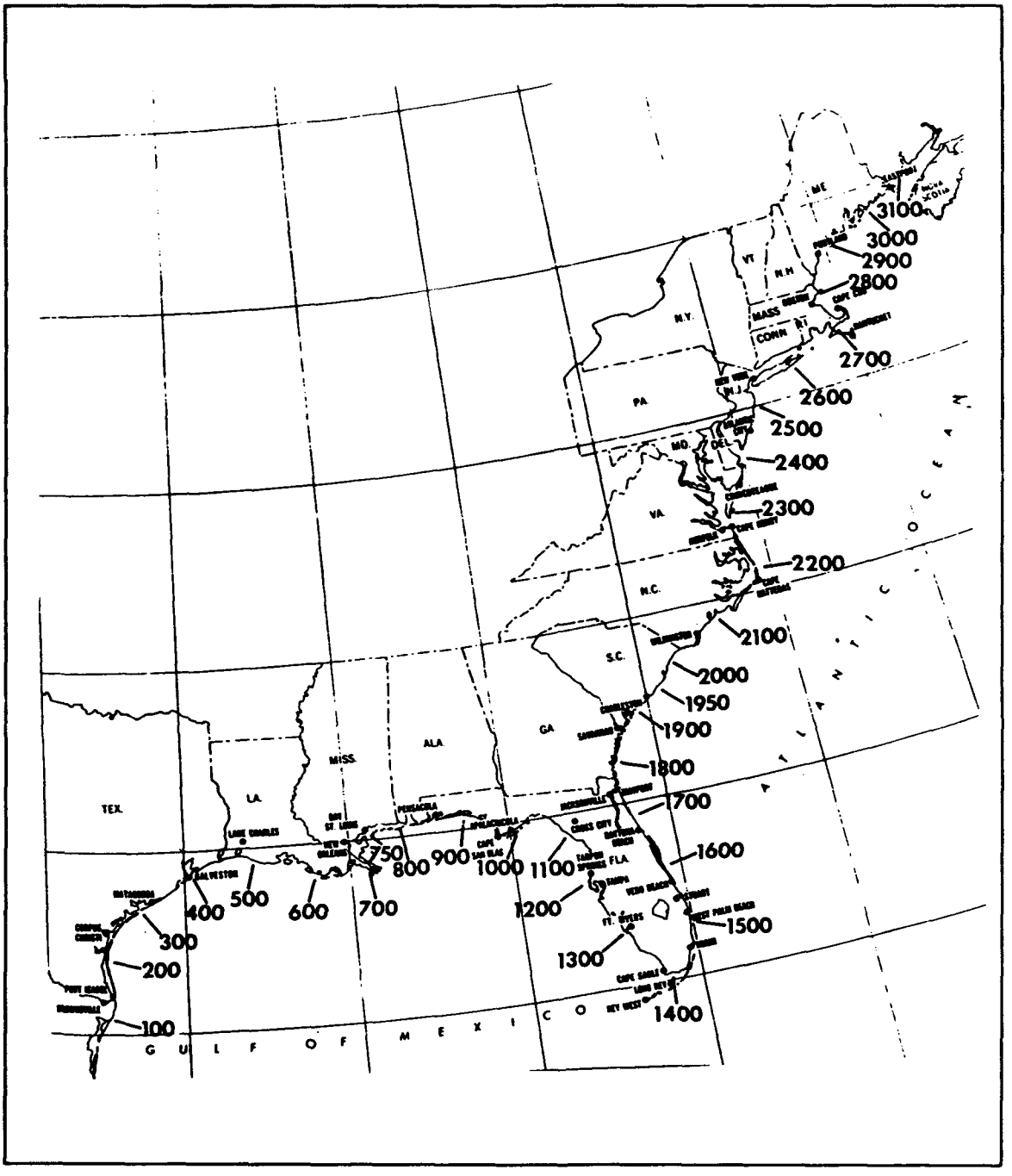


Figure 12. Locator map with coastal distance intervals in nautical miles (after Ho et al. (1987))

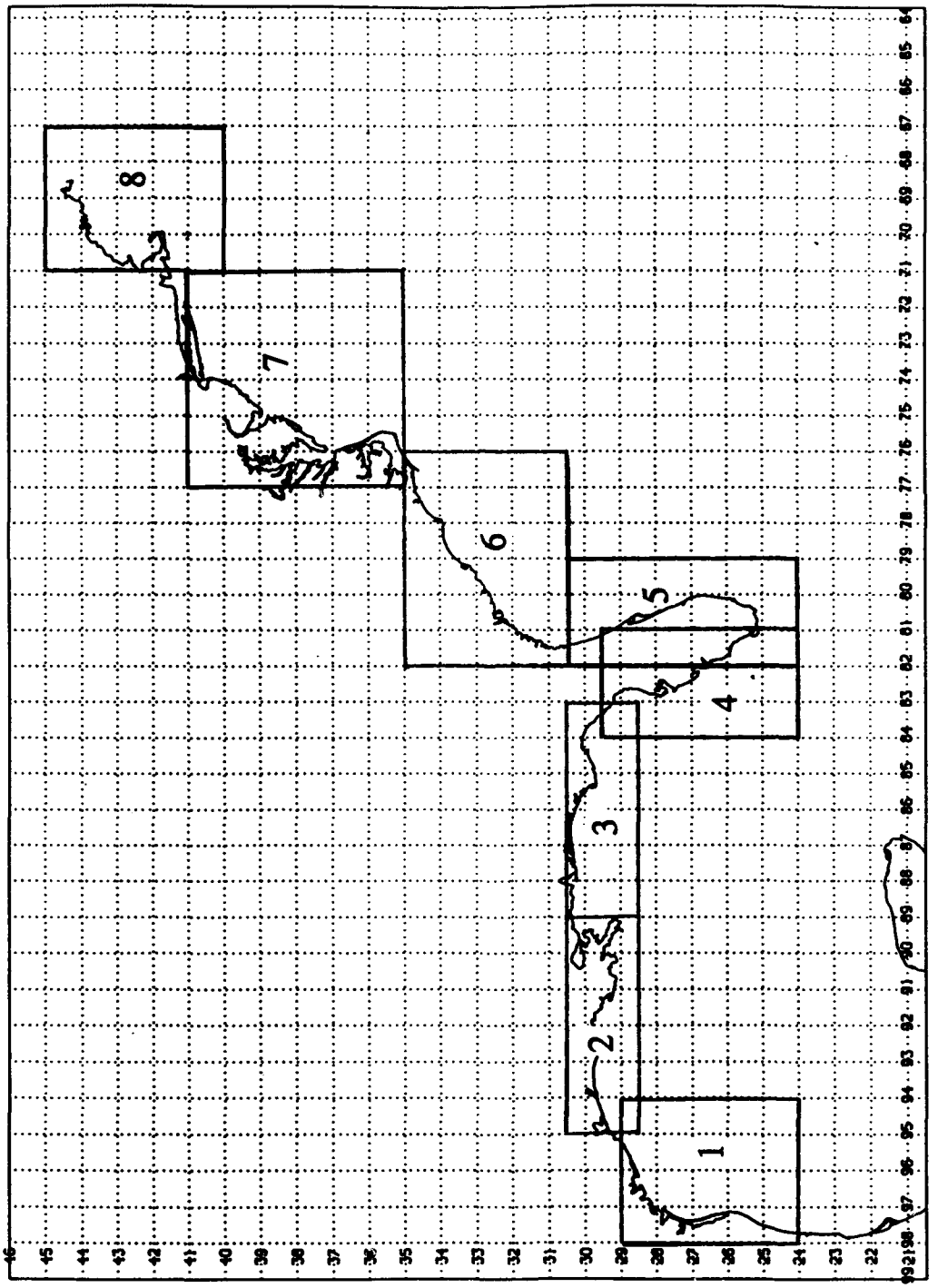


Figure 13. Coastal segment rectangles

Table 3
Historical Tropical Storm Database

1	8/12/1886	HURDAT	0	5	NOT NAMED	51	9/ 4/1947	HURDAT	0	461	NOT NAMED
2	8/15/1893	HURDAT	0	72	NOT NAMED	52	9/20/1947	HURDAT	0	463	NOT NAMED
3	9/27/1893	HURDAT	0	76	NOT NAMED	53	10/ 9/1947	HURDAT	0	465	NOT NAMED
4	9/22/1896	HURDAT	0	94	NOT NAMED	54	9/ 1/1948	HURDAT	0	471	NOT NAMED
5	8/30/1898	HURDAT	0	103	NOT NAMED	55	9/18/1948	HURDAT	0	473	NOT NAMED
6	8/ 3/1899	HURDAT	0	112	NOT NAMED	56	10/ 3/1948	HURDAT	0	474	NOT NAMED
7	8/27/1900	HURDAT	0	117	NOT NAMED	57	8/23/1949	HURDAT	0	477	NOT NAMED
8	8/ 4/1901	HURDAT	0	127	NOT NAMED	58	8/20/1950	HURDAT	0	490	BAKER
9	9/ 9/1903	HURDAT	0	141	NOT NAMED	59	9/ 1/1950	HURDAT	0	493	EASY
10	7/13/1909	HURDAT	0	183	NOT NAMED	60	10/13/1950	HURDAT	0	499	KING
11	9/10/1909	HURDAT	0	187	NOT NAMED	61	8/11/1953	HURDAT	0	520	BARBARA
12	10/ 6/1909	HURDAT	0	189	NOT NAMED	62	8/28/1953	HURDAT	0	521	NOT NAMED
13	10/ 9/1910	HURDAT	0	194	NOT NAMED	63	8/28/1953	HURDAT	0	522	CAROL
14	8/23/1911	HURDAT	0	196	NOT NAMED	64	9/23/1953	HURDAT	0	526	FLORENCE
15	8/ 5/1915	HURDAT	0	211	NOT NAMED	65	10/ 7/1953	HURDAT	0	530	HAZEL
16	9/22/1915	HURDAT	0	214	NOT NAMED	66	8/25/1954	HURDAT	0	535	CAROL
17	6/29/1916	HURDAT	0	215	NOT NAMED	67	10/ 5/1954	HURDAT	0	541	HAZEL
18	7/11/1916	HURDAT	0	217	NOT NAMED	68	8/ 3/1955	HURDAT	0	545	CONNIE
19	8/12/1916	HURDAT	0	218	NOT NAMED	69	8/ 7/1955	HURDAT	0	546	DIANE
20	10/12/1916	HURDAT	0	227	NOT NAMED	70	9/10/1955	HURDAT	0	552	IONE
21	9/21/1917	HURDAT	0	231	NOT NAMED	71	9/21/1956	HURDAT	0	562	FLOSSY
22	8/ 1/1918	HURDAT	0	232	NOT NAMED	72	6/25/1957	HURDAT	0	565	AUDREY
23	9/16/1920	HURDAT	0	241	NOT NAMED	73	8/24/1958	HURDAT	0	575	DAISY
24	10/20/1921	HURDAT	0	249	NOT NAMED	74	6/18/1959	HURDAT	0	584	NOT NAMED
25	7/22/1926	HURDAT	0	271	NOT NAMED	75	7/23/1959	HURDAT	0	586	DEBRA
26	9/11/1926	HURDAT	0	276	NOT NAMED	76	9/20/1959	HURDAT	0	589	GRACIE
27	8/ 3/1928	HURDAT	0	289	NOT NAMED	77	8/29/1960	HURDAT	0	597	DONNA
28	9/ 6/1928	HURDAT	0	292	NOT NAMED	78	9/14/1960	HURDAT	0	598	ETHEL
29	6/27/1929	HURDAT	0	295	NOT NAMED	79	9/ 3/1961	HURDAT	0	602	CARLA
30	9/22/1929	HURDAT	0	296	NOT NAMED	80	9/10/1961	HURDAT	0	604	ESTHER
31	8/31/1930	HURDAT	0	299	NOT NAMED	81	9/30/1961	HURDAT	0	606	FRANCES
32	8/12/1932	HURDAT	0	310	NOT NAMED	82	8/26/1962	HURDAT	0	611	ALMA
33	7/25/1933	HURDAT	0	324	NOT NAMED	83	10/16/1963	HURDAT	0	623	GINNY
34	8/17/1933	HURDAT	0	327	NOT NAMED	84	8/20/1964	HURDAT	0	629	CLEO
35	8/31/1933	HURDAT	0	331	NOT NAMED	85	8/28/1964	HURDAT	0	630	DORA
36	9/ 8/1933	HURDAT	0	332	NOT NAMED	86	9/28/1964	HURDAT	0	634	HILDA
37	8/29/1935	HURDAT	0	353	NOT NAMED	87	10/ 8/1964	HURDAT	0	635	ISBELL
38	10/30/1935	HURDAT	0	357	NOT NAMED	88	8/27/1965	HURDAT	0	639	BETSY
39	7/27/1936	HURDAT	0	362	NOT NAMED	89	6/ 4/1966	HURDAT	0	643	ALMA
40	9/ 8/1936	HURDAT	0	370	NOT NAMED	90	9/21/1966	HURDAT	0	651	INEZ
41	9/10/1938	HURDAT	0	386	NOT NAMED	91	9/ 8/1967	HURDAT	0	657	DORIA
42	8/ 2/1940	HURDAT	0	397	NOT NAMED	92	6/ 1/1968	HURDAT	0	662	ABBY
43	8/ 5/1940	HURDAT	0	398	NOT NAMED	93	10/13/1968	HURDAT	0	669	GLADYS
44	9/16/1941	HURDAT	0	405	NOT NAMED	94	8/14/1969	HURDAT	0	672	CAMILLE
45	7/30/1944	HURDAT	0	432	NOT NAMED	95	9/ 6/1969	HURDAT	0	676	GERDA
46	9/ 9/1944	HURDAT	0	436	NOT NAMED	96	5/17/1970	HURDAT	0	688	ALMA
47	10/12/1944	HURDAT	0	440	NOT NAMED	97	7/31/1970	HURDAT	0	690	CELIA
48	8/24/1945	HURDAT	0	445	NOT NAMED	98	9/ 8/1970	HURDAT	0	693	ELLA
49	9/12/1945	HURDAT	0	449	NOT NAMED	99	8/20/1971	HURDAT	0	702	DORIA
50	10/ 5/1946	HURDAT	0	456	NOT NAMED	100	9/ 5/1971	HURDAT	0	703	EDITH
101	9/ 3/1971	HURDAT	0	704	FERN						
102	5/23/1972	HURDAT	0	711	ALPHA						
103	6/14/1972	HURDAT	0	712	AGNES						
104	9/ 1/1973	HURDAT	0	722	DELIA						
105	8/29/1974	HURDAT	0	731	CARMEN						
106	8/24/1975	HURDAT	0	739	CAROLINE						
107	9/13/1975	HURDAT	0	741	ELOISE						
108	5/21/1976	HURDAT	0	746	SUBTROP 1						
109	8/ 6/1976	HURDAT	0	748	BELLE						
110	8/29/1977	HURDAT	0	756	ANITA						
111	9/ 3/1977	HURDAT	0	757	BABE						
112	7/ 9/1979	HURDAT	0	775	BOB						
113	8/25/1979	HURDAT	0	777	DAVID						
114	8/29/1979	HURDAT	0	779	FREDERIC						
115	7/31/1980	HURDAT	0	783	ALLEN						
116	8/ 7/1981	HURDAT	0	797	DENNIS						
117	11/12/1981	HURDAT	0	805	SUBTROP 2						
118	6/18/1982	HURDAT	0	807	SUBTROP 1						
119	9/ 9/1982	HURDAT	0	809	CHRIS						
120	8/15/1983	HURDAT	0	812	ALICIA						
121	8/23/1983	HURDAT	0	813	BARRY						
122	9/ 8/1984	HURDAT	0	820	DIANA						
123	8/12/1985	HURDAT	0	832	DANNY						
124	8/28/1985	HURDAT	0	833	ELENA						
125	9/16/1985	HURDAT	0	835	GLORIA						
126	10/26/1985	HURDAT	0	838	JUAN						
127	11/15/1985	HURDAT	0	839	KATE						
128	6/23/1986	HURDAT	0	841	BONNIE						
129	10/ 9/1987	HURDAT	0	852	FLOYD						
130	9/ 7/1988	HURDAT	0	859	FLORENCE						
131	11/17/1988	HURDAT	0	864	KEITH						
132	7/30/1989	HURDAT	0	867	CHANTAL						
133	9/10/1989	HURDAT	0	872	HUGO						
134	10/12/1989	HURDAT	0	874	JERRY						

Database Output Location Selection

The ultimate goal of the tropical storm database was to provide boundary conditions data for any coastal application needing surge elevation and current information for the east and gulf coasts of the United States. In order to accomplish this task and have the database remain tractable with respect to memory requirements, discrete locations for archiving data were defined according to two criteria. First, output locations were selected to correspond to the 340 east and gulf coast WIS stations (Hubertz et al. 1993) with additional locations prescribed for Puerto Rico. The WIS stations are located at every 0.25 degree of latitude and longitude along the coastline in water depths averaging between 10 and 20 m. Spatial coverage extends from the northeast coast

of the United States, along the rim of the Gulf of Mexico, to the base of the Yucatan Peninsula and includes Puerto Rico. This domain is covered by a total of 340 WIS stations. Because this report concentrates on the 8 geographical areas along the U.S. coastline and Puerto Rico, the WIS station coverage was limited to 240 stations along the U.S. coast and Puerto Rico. WIS stations on or below 24 deg east longitude were therefore omitted from the database.

WIS stations are located at variable distances from the shoreline; therefore, additional locations were selected to represent nearshore projections of the WIS stations. The intent was to place these stations on a shore-perpendicular line joining the shore to the nearest WIS station. This procedure resulted in the selection of stations for the full 340-station WIS database and in the selection of an additional 346 stations, for a total of 686 discrete locations at which storm surge elevation and depth-averaged current (U and V) hydrographs could be archived. Locations are summarized in Figures 14 through 17. As mentioned above, nearshore stations below 24 deg longitude were omitted from the database, resulting in the selection of 246 nearshore station counterparts for the 240 WIS stations along the east and gulf coasts of the United States and Puerto Rico, for a total of 486 discrete locations at which surge elevation and current hydrograph information is archived.

Detailed shoreline maps showing the spatial distribution of WIS and nearshore stations and their individual station numbers are included in Appendix A. These labeled station numbers are necessary for locating stations of interest in Appendix B which correspond to specific storm events and for using the cross-indexing of storm events and corresponding surge elevations tabulated in Appendix C.

Included in Appendix A, following the station location maps, are the latitude and longitude of each of the initial 686 station locations, the approximate local depth at each station, and the sum of the eight primary tidal elevation constituents extracted from the DRP tidal database (Westerink, Luettich, and Scheffner 1993b). The sum of these diurnal (K_1,)$_1$, P_1, and Q_1) and semidiurnal (N_2, M_2, S_2, and K_2) constituents provides an indication of the maximum or minimum spring tidal amplitudes for each of the station locations. For example, the surge information contained in the atlas is made with respect to mean sea level (msl). Total surge (tide plus surge) limits can be estimated by adding and subtracting the amplitude data extracted from Appendix A to/from the reported msl surge taken from the plots of Appendix B.

For more detailed analyses requiring total event time series, the full tidal database can be accessed and used to generate a tide corresponding to the simulated event. Details of use of the tidal database are reported in Westerink, Luettich, and Scheffner (1993) and in DRP-TN-13 (1994).

Because this study was initiated to develop a database for the east and gulf coasts of the United States with limited coverage offshore of Puerto Rico, the historic events were selected as events which impacted only these areas of

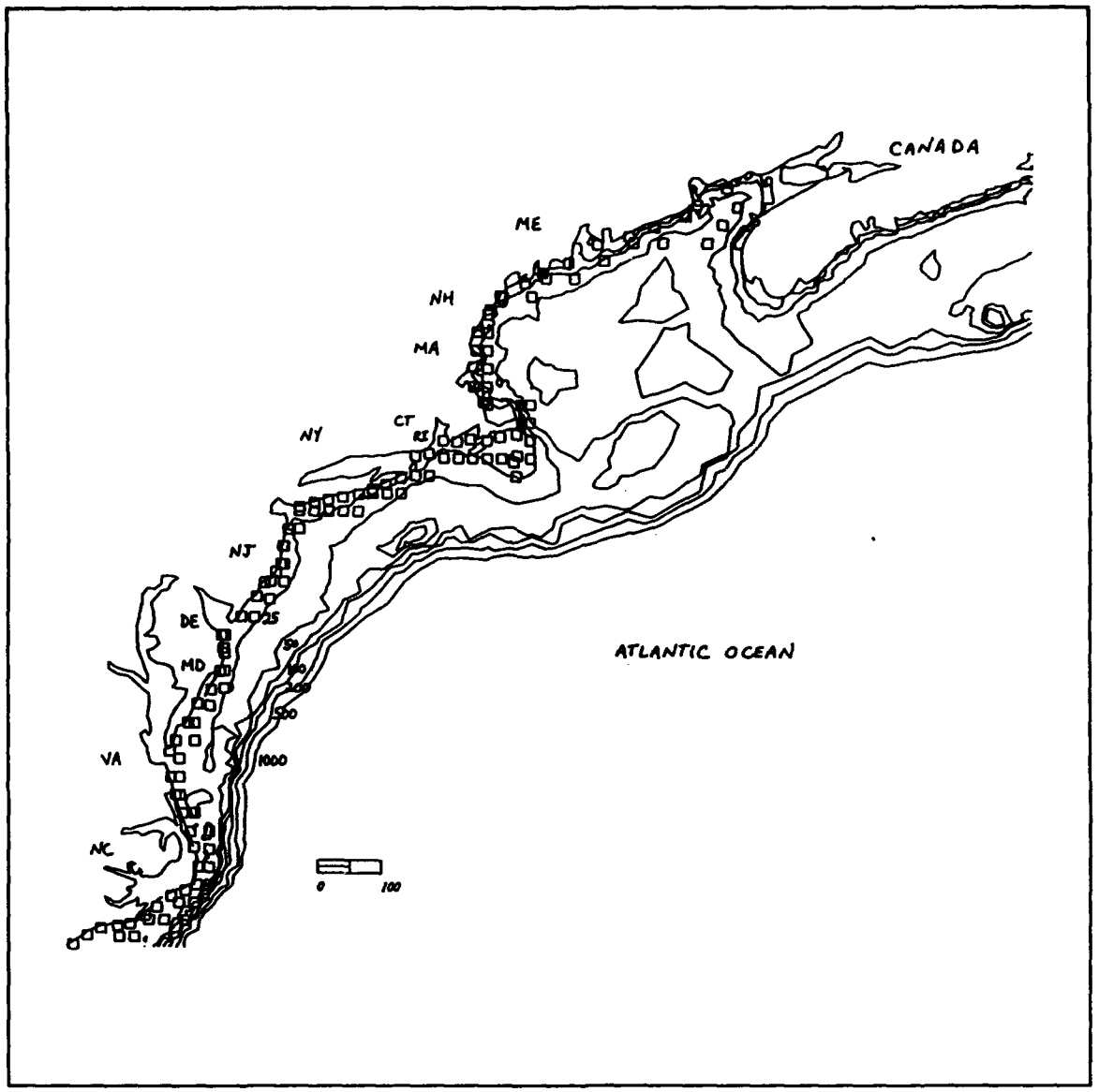


Figure 14. Locations of WIS and coastal stations in the northeastern coastal waters of North America

interest. However, the procedures described in this report can be used to evaluate the effect of any tropical event in the HURDAT database at any location in the full computational domain, including the omitted 200 WIS/nearshore stations along the coast of Mexico and the Yucatan Peninsula shown in Figures 16 and 17. Examples of numerical surge simulation studies requiring a higher spatial resolution than that used in this study are reported by Mark and Scheffner (1994).

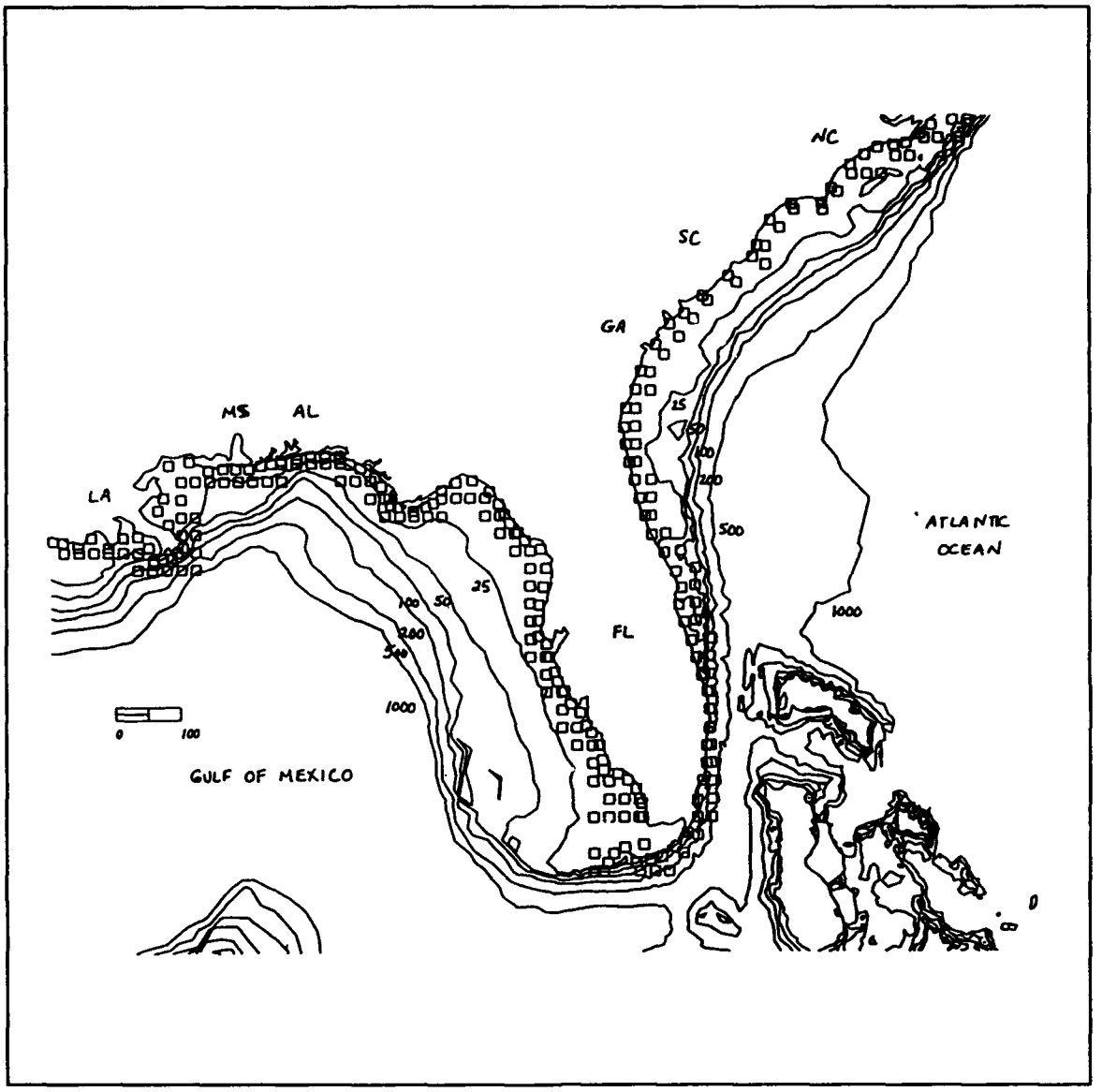


Figure 15. Locations of WIS and coastal stations around the Florida coast and along the southeastern U.S. shoreline

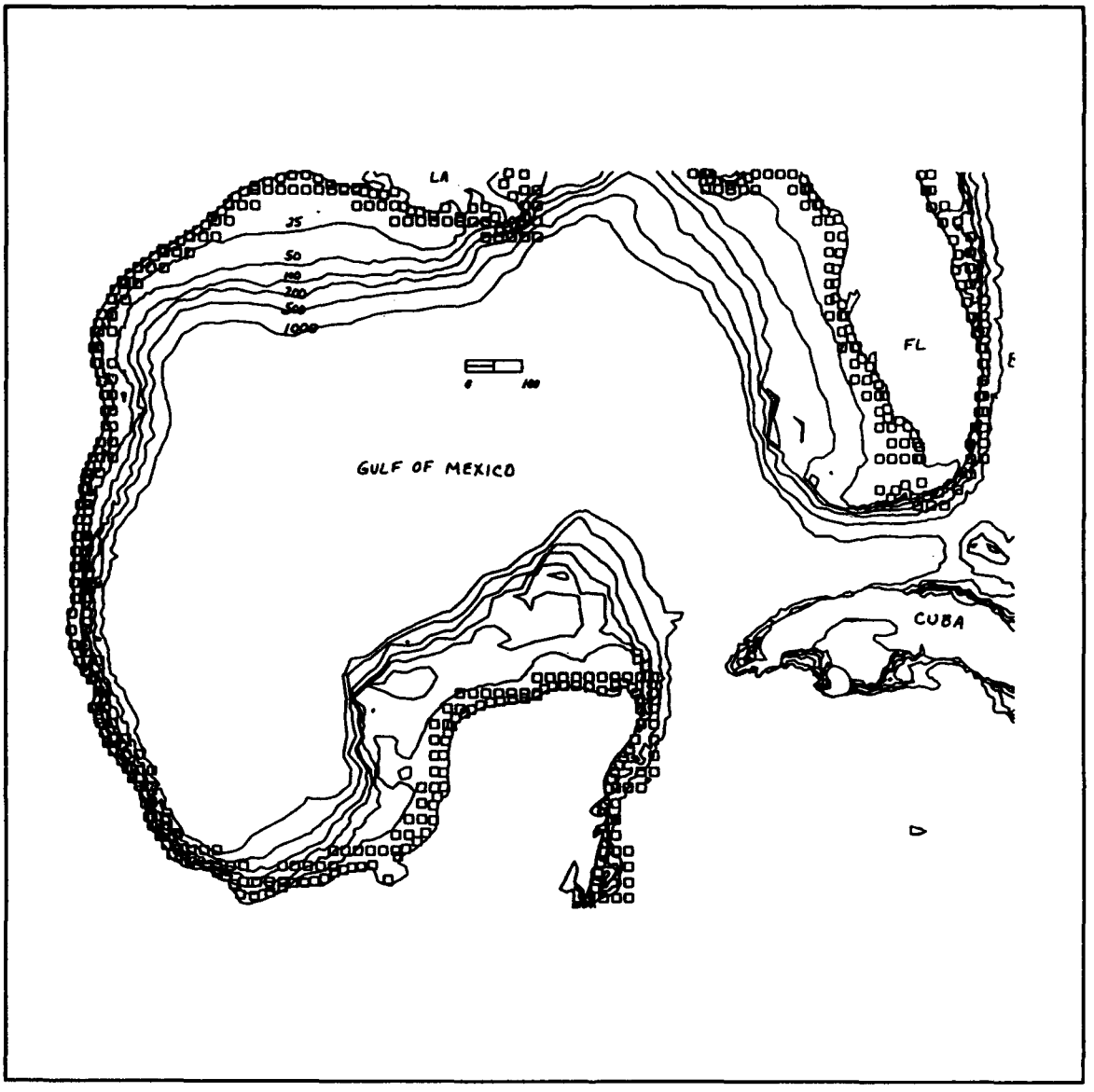


Figure 16. Locations of WIS and coastal stations around the Gulf of Mexico

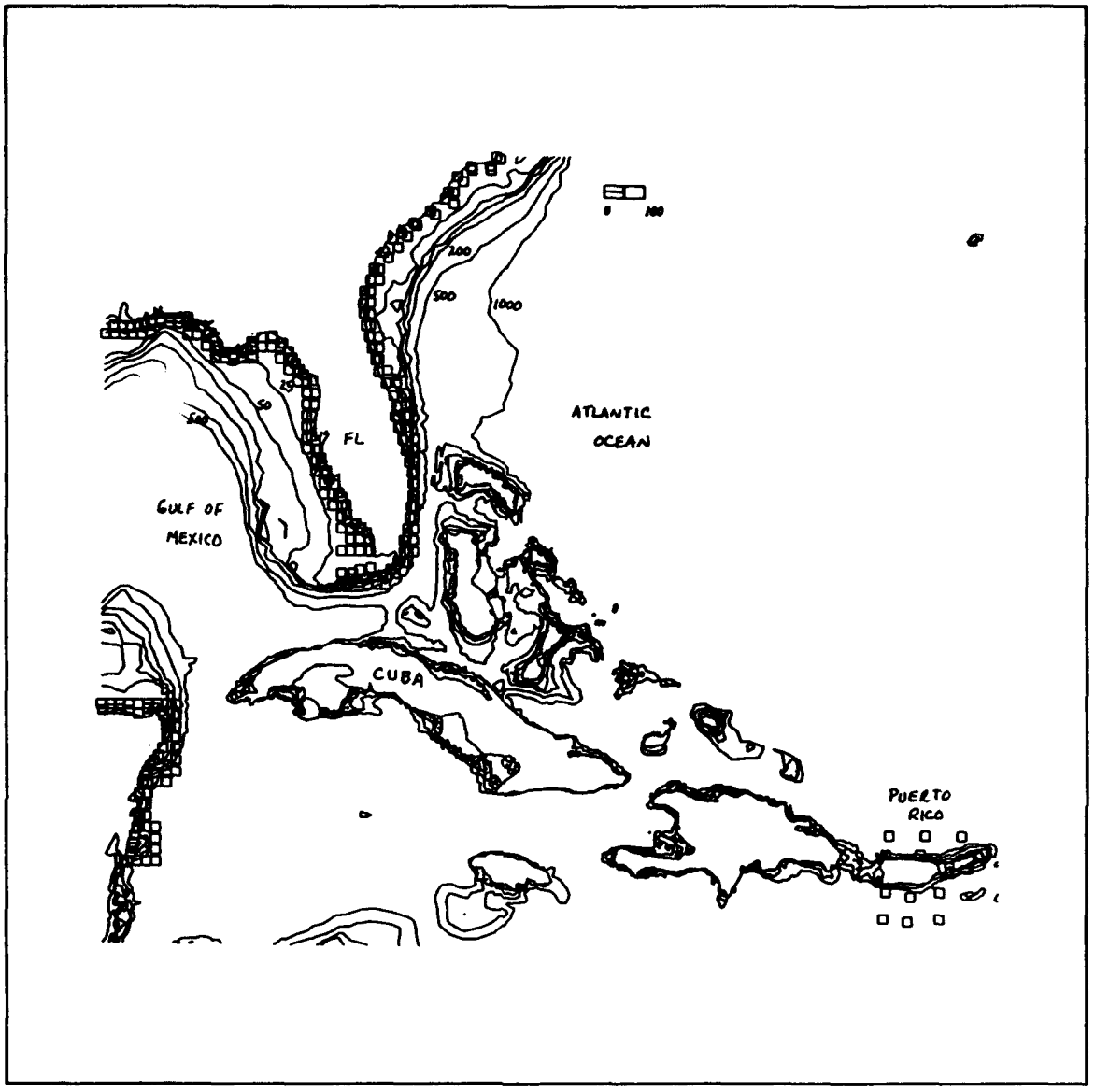


Figure 17. Locations of WIS and coastal stations near Puerto Rico

4 Storm Surge Elevation and Current Database

Surge Maximum Elevation Atlas

All 134 tropical events selected for the tropical storm database were simulated in their entirety, as documented in the HURDAT database. Computed storm surge elevations and depth-averaged velocity components were recorded every 15 min beginning with the value corresponding to 15 min after the start of the hurricane. These data were initially archived for all 486 WIS and nearshore projected stations. Output files with the elevation and velocity station data appropriate for each historical hurricane are in a format consistent with the ADCIRC-2DDI model station output files (Luettich, Westerink, and Scheffner 1992).

Because each hurricane event does not impact every coastal station, the final database was constructed such that surge information was only archived for locations at which a maximum surge elevation of 0.3048 m (1.0 ft) or greater was computed. In order to eliminate possible startup or termination transients or far field discontinuities which might propagate beyond the edge of the nested PBL model in the reported surge values, potential impacted stations were also required to be within a 200-mile radius of the eye of the storm. Maximum surge was selected as the maximum elevation on the surge elevation hydrograph in a ±6-hr window from the time (nearest hour) when the hurricane eye is nearest to the selected station.

The atlas of the nearshore spatial distribution of maximum surge elevations contained in Appendix B was generated as a tool for identifying storms which impacted specific locations along the east and gulf coast areas and offshore of Puerto Rico. A typical component of the atlas is shown in Figure 18 for Hurricane Bonnie, whose track location is shown in Figure 1 and whose HURDAT information is shown in Table 1. This figure contains a summary plot of the total storm track according to the track information contained in the HURDAT database, as well as a landfall or near-landfall map enlargement detailing surge magnitude and distribution. If additional information concerning variability of this reported surge in the presence of tides is required, the 8-constituent spring tide amplitude for each station is included in Appendix A.

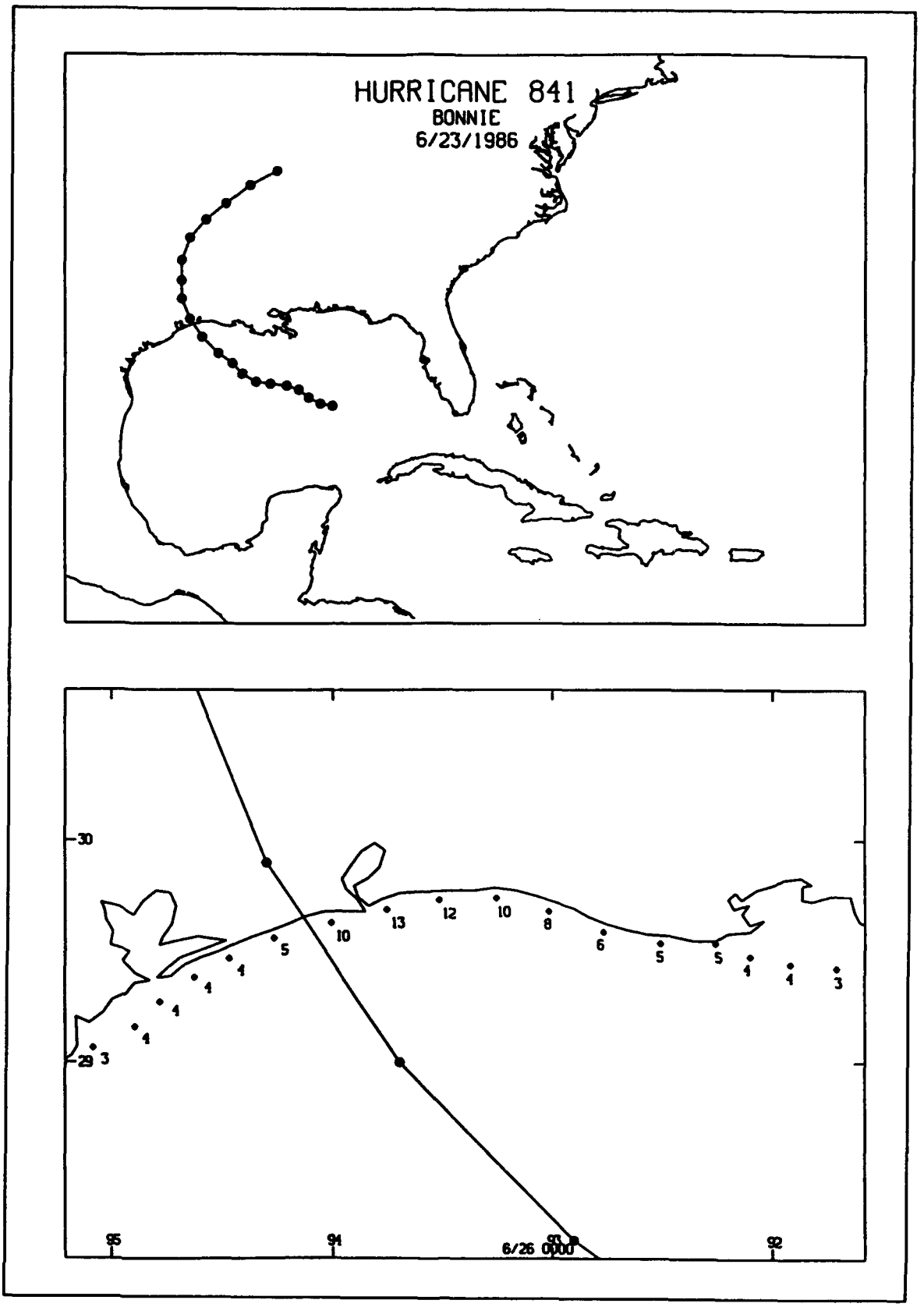


Figure 18. Track and surge atlas for Hurricane Bonnie

In order to maximize the readability by reducing the density of information contained on the plots of Appendix B, surge elevations are reported in decimeters (10 dm = 1 m). For example, the maximum surge for Hurricane Bonnie in Figure 18 is shown to be 13 dm (1.3 m) at the second nearshore station to the east of landfall. From the location maps of Appendix A, this station can be identified as nearshore station No. 539. The reference tables at the end of Appendix A indicate that station No. 539 is located at 93.7569 deg west longitude and 29.6873 deg north latitude and has an approximate spring tide amplitude of 0.8435 m and an approximate depth of 6.5 m.

The summary database of storm-specific maximum surge elevations for the nearshore gauges has been cross-indexed so that the user can determine the spatial alongshore impact of each historic event as well as which historic events impacted a specific WIS/nearshore station. This information is presented in two-sequence tabular form in Appendix C. The first portion of Appendix C contains a title containing the HURDAT storm number and the number of WIS/nearshore stations impacted by that storm event (limited to a minimum surge of 0.3048 m and located within 200 miles of the eye of the event) followed by a tabulation of stations impacted and their respective maximum surge elevations in decimeters. The intended purpose of the indexed surge data presented in Appendix C is to provide a comprehensive listing of storms, their areas of impact, and their intensity as measured by their maximum surge. These data can then be used to identify and access the WIS/nearshore database of tropical events for use as surge elevation and current boundary conditions for evaluating the fate and stability of offshore disposal sites. Although disposal site analysis was the purpose of the creation of the database, the data can readily be used to evaluate any coastal or nearshore submerged feature. Current applications other than site stability include dune erosion modeling and coastal flooding.

An example application of the cross-indexing is presented in Table 4, an extracted example for HURDAT No. 841 (Hurricane Bonnie). As shown, event No. 841 impacted 31 WIS/nearshore stations with station No. 539 showing a maximum surge of 13 dm. The second portion of Appendix C presents a tabulation of events which impacted each specific WIS/nearshore station and the surge produced by each storm. For example, Table 5 presents an example listing for nearshore station 539. As shown in the table, station 539 was impacted by 25 tropical events with HURDAT No. 841 producing a maximum surge elevation of 13 dm.

Table 4
WIS/Nearshore Stations Impacted by HURDAT No. 841

```
HURDAT STORM  841, 0 STATIONS-MAX SURGE   31
133- 3  134- 4  135- 4  136- 4  137- 5  138- 7  139- 8  140- 8  141- 7  142- 6  143- 5  144- 5  145- 5  146- 3  530- 3
531- 4  532- 4  533- 5  534- 5  535- 6  536- 8  537-10  538-12  539-13  540-10  541- 5  542- 4  543- 4  544- 4  545- 4
546- 3
```

Table 5
HURDAT Events Impacting WIS/Nearshore Station No. 539

WIS/NEARSHORE STATION 539, 0 HURDAT STORMS-MAX SURGE 25
5- 4 117-23 183-10 211-36 232-14 295- 4 310-54 324- 5 397-15 405-23 445-11 565-26 586-10 602-22 690- 8
703- 9 704- 5 722-18 731- 6 809-17 812-24 832- 3 841-13 867-16 874-13

The following paragraphs describe the computer-based portion of the database containing the elevation and current hydrographs corresponding to each of the storms and stations contained in Appendices A, B, and C.

Surge Elevation and Current Database

The storm elevation and current hydrograph database for both nearshore and WIS stations is available through CERC. The database consists of 134 separate files, each containing the height and U and V velocity components at 15-min increments for the WIS and nearshore stations located offshore of the U.S. east and Gulf of Mexico coasts and for selected locations offshore of Puerto Rico

Each file begins with header information containing the HURDAT storm number, start time, duration of the event in hours, hydrograph start time (storm start + 15 min), number of points, and time interval between points. The identification data is followed by sequential files corresponding to each WIS or nearshore station. Each station contains sequential listings of time series of the surface elevation (m), the U velocity (east in m/sec), and the V velocity (north in m/sec). Each storm file contains the stations referenced in Appendix C. The example header file and station file corresponding to nearshore station No. 539 are shown in Table 6. A plot of the data in Table 6 is shown in Figure 19.

As evidenced by the Appendices, Table 6, and Figure 19, the tropical event database described in this report is highly informative, easily assessable, and useful for a variety of preliminary or detailed coastal evaluations of storm intensity and/or storm impact. This database represents a unique assembly of offshore and nearshore elevation and current time series data which are not available from any single source.

Table 6
Database Representation of HURDAT Storm 841, Nearshore Station No. 539

HURRDAT STORM NUMBER: 841
STORM START TIME (YR/MO/DAY/HOUR): 1986/ 6/23/18. HRS = 114
HYDROGRAPH START TIME (YR/MO/DAY/HOUR): 1986/ 6/23/18.25, PTS = 456 AT 15.0 MIN INCR
STATION: 539 LONGITUDE,LATITUDE: -93.7570 29.6870
SURFACE ELEVATION (M)

0.001	0.001	0.002	0.003	0.004	0.005	0.006	0.008	0.009	0.011	0.012	0.014	0.016	0.019	0.022	0.025
0.028	0.032	0.036	0.040	0.043	0.047	0.052	0.057	0.061	0.064	0.067	0.069	0.071	0.073	0.075	0.078
0.081	0.083	0.086	0.088	0.091	0.094	0.096	0.098	0.101	0.103	0.106	0.108	0.110	0.113	0.115	0.118
0.119	0.120	0.121	0.121	0.121	0.121	0.122	0.122	0.123	0.125	0.126	0.128	0.130	0.133	0.135	0.137
0.138	0.140	0.141	0.142	0.143	0.143	0.143	0.144	0.143	0.143	0.143	0.142	0.142	0.141	0.140	0.139
0.138	0.137	0.136	0.135	0.133	0.132	0.130	0.128	0.126	0.124	0.122	0.119	0.117	0.116	0.114	0.112
0.110	0.109	0.108	0.107	0.106	0.106	0.106	0.106	0.107	0.108	0.109	0.111	0.112	0.114	0.115	0.116
0.118	0.119	0.120	0.120	0.121	0.122	0.123	0.124	0.124	0.126	0.127	0.128	0.130	0.132	0.135	0.137
0.139	0.142	0.145	0.149	0.152	0.156	0.160	0.164	0.168	0.173	0.176	0.180	0.184	0.188	0.193	0.197
0.202	0.207	0.211	0.216	0.220	0.225	0.229	0.233	0.237	0.240	0.243	0.247	0.250	0.254	0.256	0.259
0.261	0.263	0.266	0.269	0.271	0.274	0.276	0.278	0.280	0.282	0.283	0.284	0.285	0.286	0.288	0.289
0.291	0.294	0.296	0.298	0.301	0.303	0.306	0.309	0.312	0.315	0.317	0.319	0.321	0.324	0.326	0.328
0.329	0.331	0.332	0.334	0.336	0.338	0.339	0.340	0.340	0.340	0.340	0.340	0.340	0.339	0.338	0.337
0.337	0.338	0.340	0.340	0.341	0.341	0.342	0.342	0.343	0.344	0.345	0.346	0.348	0.351	0.353	0.356
0.359	0.362	0.366	0.373	0.381	0.388	0.395	0.401	0.406	0.413	0.421	0.429	0.439	0.451	0.463	0.478
0.494	0.511	0.533	0.557	0.584	0.618	0.661	0.708	0.762	0.826	0.897	0.972	1.049	1.121	1.187	1.244
1.286	1.304	1.299	1.278	1.242	1.193	1.133	1.069	1.003	0.938	0.877	0.817	0.763	0.715	0.673	0.634
0.599	0.569	0.543	0.519	0.497	0.477	0.459	0.444	0.431	0.420	0.409	0.400	0.391	0.385	0.380	0.377
0.375	0.373	0.368	0.360	0.351	0.340	0.329	0.318	0.308	0.297	0.286	0.276	0.265	0.255	0.244	0.233
0.220	0.207	0.195	0.182	0.168	0.153	0.138	0.121	0.102	0.083	0.063	0.043	0.024	0.006	-0.011	-0.025
-0.036	-0.044	-0.049	-0.052	-0.051	-0.048	-0.042	-0.032	-0.020	-0.005	0.011	0.028	0.045	0.060	0.075	0.089
0.102	0.114	0.124	0.132	0.138	0.142	0.144	0.143	0.141	0.137	0.131	0.123	0.114	0.104	0.094	0.083
0.072	0.062	0.051	0.040	0.030	0.020	0.011	0.002	-0.005	-0.011	-0.015	-0.018	-0.020	-0.020	-0.019	-0.016
-0.013	-0.008	-0.002	0.004	0.012	0.020	0.029	0.038	0.047	0.056	0.065	0.074	0.081	0.088	0.094	0.098
0.100	0.100	0.099	0.096	0.091	0.086	0.080	0.073	0.066	0.059	0.052	0.045	0.039	0.033	0.027	0.022
0.017	0.011	0.006	0.001	-0.004	-0.009	-0.012	-0.015	-0.016	-0.017	-0.016	-0.015	-0.013	-0.011	-0.008	-0.004
0.000	0.005	0.010	0.015	0.020	0.026	0.030	0.035	0.038	0.041	0.043	0.044	0.044	0.044	0.042	0.040
0.037	0.033	0.028	0.023	0.018	0.012	0.006	0.000	-0.006	-0.012	-0.018	-0.023	-0.028	-0.033	-0.037	-0.040
-0.043	-0.045	-0.046	-0.047	-0.047	-0.046	-0.045	-0.044								

U (EAST) VELOCITY (M/SEC)

-0.004	-0.008	-0.013	-0.017	-0.021	-0.025	-0.029	-0.033	-0.036	-0.039	-0.042	-0.045	-0.047	-0.050	-0.052	-0.055
-0.057	-0.060	-0.063	-0.065	-0.068	-0.071	-0.073	-0.075	-0.077	-0.080	-0.083	-0.085	-0.087	-0.089	-0.090	-0.092
-0.093	-0.094	-0.095	-0.096	-0.097	-0.098	-0.099	-0.099	-0.099	-0.099	-0.099	-0.099	-0.098	-0.098	-0.098	-0.097
-0.097	-0.097	-0.098	-0.098	-0.099	-0.100	-0.101	-0.102	-0.103	-0.103	-0.104	-0.104	-0.104	-0.105	-0.105	-0.106
-0.106	-0.107	-0.108	-0.108	-0.109	-0.110	-0.112	-0.113	-0.114	-0.114	-0.115	-0.115	-0.116	-0.116	-0.116	-0.115
-0.115	-0.115	-0.115	-0.115	-0.115	-0.115	-0.116	-0.116	-0.117	-0.117	-0.118	-0.119	-0.120	-0.121	-0.122	-0.123
-0.124	-0.125	-0.126	-0.127	-0.128	-0.129	-0.129	-0.129	-0.130	-0.130	-0.130	-0.131	-0.131	-0.132	-0.133	-0.133
-0.134	-0.135	-0.136	-0.138	-0.139	-0.140	-0.141	-0.142	-0.143	-0.144	-0.144	-0.145	-0.145	-0.145	-0.145	-0.145
-0.145	-0.145	-0.144	-0.144	-0.144	-0.144	-0.144	-0.144	-0.144	-0.144	-0.144	-0.144	-0.144	-0.145	-0.145	-0.145
-0.146	-0.146	-0.146	-0.147	-0.147	-0.148	-0.148	-0.149	-0.150	-0.151	-0.151	-0.152	-0.152	-0.152	-0.152	-0.152
-0.152	-0.152	-0.152	-0.152	-0.152	-0.152	-0.152	-0.152	-0.153	-0.153	-0.154	-0.154	-0.154	-0.155	-0.155	-0.155
-0.155	-0.155	-0.155	-0.155	-0.155	-0.155	-0.155	-0.155	-0.155	-0.156	-0.156	-0.156	-0.156	-0.156	-0.156	-0.156
-0.156	-0.156	-0.156	-0.156	-0.156	-0.156	-0.157	-0.157	-0.158	-0.158	-0.159	-0.160	-0.160	-0.161	-0.161	-0.162
-0.163	-0.163	-0.164	-0.166	-0.167	-0.169	-0.171	-0.173	-0.175	-0.178	-0.181	-0.184	-0.187	-0.191	-0.195	-0.199
-0.203	-0.208	-0.214	-0.221	-0.228	-0.236	-0.245	-0.255	-0.266	-0.279	-0.292	-0.306	-0.322	-0.340	-0.361	-0.382
-0.407	-0.436	-0.466	-0.498	-0.530	-0.563	-0.593	-0.622	-0.648	-0.670	-0.689	-0.705	-0.706	-0.688	-0.662	-0.632
-0.595	-0.552	-0.508	-0.464	-0.425	-0.394	-0.365	-0.333	-0.302	-0.274	-0.245	-0.215	-0.184	-0.152	-0.120	-0.086
-0.052	-0.017	0.017	0.048	0.076	0.101	0.121	0.137	0.150	0.159	0.166	0.170	0.172	0.173	0.174	0.174
0.173	0.168	0.163	0.156	0.149	0.142	0.135	0.130	0.125	0.122	0.120	0.119	0.120	0.122	0.125	0.128
0.131	0.134	0.136	0.137	0.137	0.136	0.133	0.130	0.126	0.122	0.117	0.112	0.107	0.102	0.098	0.093
0.088	0.083	0.078	0.073	0.068	0.063	0.059	0.056	0.052	0.050	0.047	0.045	0.042	0.040	0.038	0.036
0.033	0.030	0.027	0.023	0.019	0.014	0.008	0.003	-0.002	-0.007	-0.011	-0.015	-0.017	-0.019	-0.020	-0.019
-0.018	-0.016	-0.013	-0.009	-0.005	-0.001	0.004	0.008	0.012	0.016	0.020	0.022	0.024	0.026	0.027	0.027
0.027	0.026	0.025	0.023	0.022	0.020	0.019	0.018	0.017	0.017	0.017	0.018	0.020	0.022	0.024	0.026
0.029	0.031	0.033	0.035	0.037	0.040	0.043	0.045	0.049	0.052	0.056	0.060	0.063	0.066	0.069	0.072

(Continued)

Table 6 (Concluded)

0.073	0.074	0.075	0.076	0.076	0.076	0.076	0.076	0.077	0.078	0.079	0.080	0.082	0.083	0.084	0.085
0.086	0.087	0.087	0.088	0.088	0.087	0.087	0.086	0.085	0.084	0.083	0.082	0.082	0.081	0.081	0.081
0.081	0.082	0.083	0.084	0.085	0.086	0.088	0.089	0.091	0.093	0.094	0.095	0.096	0.097	0.098	0.098
0.098	0.098	0.097	0.097	0.096	0.095	0.095	0.094								
V (NORTH) VELOCITY (M/SEC)															
-0.002	-0.004	-0.006	-0.008	-0.010	-0.012	-0.013	-0.015	-0.017	-0.018	-0.020	-0.021	-0.022	-0.023	-0.024	-0.025
-0.026	-0.027	-0.028	-0.030	-0.031	-0.031	-0.032	-0.033	-0.034	-0.036	-0.038	-0.039	-0.040	-0.040	-0.041	-0.041
-0.041	-0.041	-0.042	-0.042	-0.043	-0.043	-0.044	-0.044	-0.044	-0.044	-0.043	-0.043	-0.043	-0.043	-0.043	-0.043
-0.043	-0.043	-0.044	-0.044	-0.045	-0.045	-0.046	-0.046	-0.046	-0.046	-0.046	-0.046	-0.046	-0.046	-0.046	-0.047
-0.047	-0.048	-0.048	-0.049	-0.049	-0.050	-0.051	-0.051	-0.052	-0.052	-0.053	-0.053	-0.053	-0.053	-0.053	-0.053
-0.053	-0.053	-0.053	-0.053	-0.054	-0.054	-0.054	-0.054	-0.055	-0.055	-0.056	-0.056	-0.056	-0.057	-0.057	-0.057
-0.058	-0.058	-0.059	-0.059	-0.059	-0.059	-0.059	-0.059	-0.059	-0.059	-0.059	-0.059	-0.059	-0.059	-0.060	-0.060
-0.061	-0.061	-0.062	-0.062	-0.063	-0.063	-0.064	-0.064	-0.065	-0.065	-0.065	-0.065	-0.064	-0.064	-0.064	-0.064
-0.064	-0.063	-0.063	-0.063	-0.063	-0.063	-0.062	-0.062	-0.062	-0.062	-0.062	-0.062	-0.062	-0.062	-0.062	-0.062
-0.062	-0.062	-0.063	-0.063	-0.063	-0.063	-0.064	-0.064	-0.065	-0.065	-0.065	-0.066	-0.066	-0.066	-0.066	-0.066
-0.066	-0.066	-0.066	-0.066	-0.066	-0.066	-0.066	-0.066	-0.067	-0.067	-0.068	-0.068	-0.068	-0.068	-0.068	-0.068
-0.068	-0.067	-0.067	-0.067	-0.068	-0.067	-0.067	-0.067	-0.067	-0.067	-0.068	-0.068	-0.068	-0.068	-0.068	-0.068
-0.068	-0.068	-0.068	-0.068	-0.068	-0.068	-0.069	-0.070	-0.070	-0.071	-0.071	-0.071	-0.072	-0.072	-0.073	-0.072
-0.072	-0.072	-0.072	-0.074	-0.075	-0.075	-0.076	-0.077	-0.078	-0.079	-0.081	-0.082	-0.082	-0.084	-0.085	-0.087
-0.089	-0.091	-0.092	-0.094	-0.096	-0.101	-0.106	-0.110	-0.115	-0.120	-0.124	-0.130	-0.135	-0.142	-0.149	-0.157
-0.165	-0.175	-0.185	-0.195	-0.204	-0.210	-0.215	-0.222	-0.224	-0.224	-0.225	-0.227	-0.224	-0.218	-0.211	-0.204
-0.202	-0.201	-0.195	-0.186	-0.178	-0.174	-0.168	-0.158	-0.145	-0.133	-0.120	-0.106	-0.090	-0.073	-0.057	-0.040
-0.023	-0.005	0.011	0.026	0.038	0.049	0.058	0.065	0.070	0.074	0.075	0.076	0.078	0.079	0.080	0.081
0.079	0.075	0.070	0.065	0.061	0.057	0.054	0.051	0.049	0.047	0.046	0.045	0.045	0.046	0.047	0.047
0.047	0.048	0.049	0.049	0.048	0.046	0.044	0.042	0.039	0.037	0.034	0.033	0.031	0.030	0.030	0.030
0.030	0.030	0.030	0.030	0.030	0.029	0.030	0.030	0.031	0.031	0.031	0.030	0.029	0.027	0.026	0.024
0.022	0.020	0.018	0.014	0.011	0.007	0.003	-0.001	-0.005	-0.008	-0.011	-0.014	-0.016	-0.017	-0.017	-0.017
-0.016	-0.015	-0.014	-0.012	-0.010	-0.007	-0.004	-0.001	0.002	0.004	0.007	0.009	0.012	0.013,	0.015	0.016
0.017	0.017	0.018	0.018	0.018	0.018	0.018	0.017	0.017	0.017	0.017	0.017	0.017	0.018	0.018	0.018
0.018	0.018	0.018	0.018	0.018	0.018	0.019	0.020	0.021	0.022	0.024	0.026	0.028	0.029	0.030	0.031
0.032	0.032	0.032	0.033	0.033	0.033	0.034	0.034	0.035	0.036	0.037	0.038	0.039	0.040	0.041	0.042
0.043	0.043	0.044	0.044	0.044	0.043	0.043	0.042	0.041	0.040	0.039	0.038	0.037	0.037	0.036	0.035
0.035	0.035	0.035	0.035	0.035	0.036	0.036	0.037	0.038	0.039	0.039	0.040	0.041	0.042	0.042	0.043
0.043	0.043	0.044	0.044	0.044	0.044	0.044	0.044								

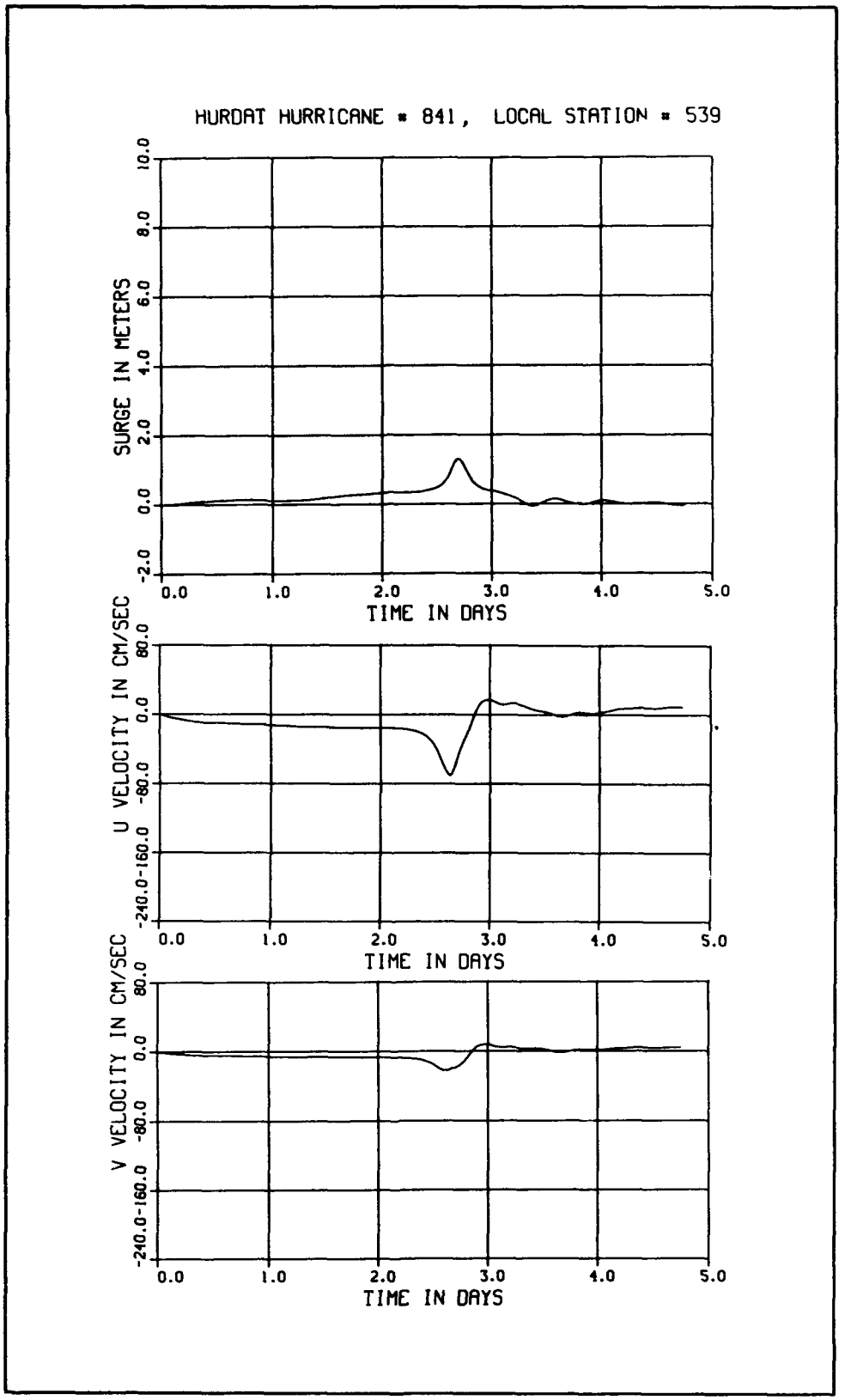


Figure 19. Hydrograph time series plot of Table 4

5 Conclusions

This report describes a database of tropical storm surge elevation and current hydrograph time series which can be used as boundary conditions for evaluating the fate and stability of dredged material disposed in open water. The data were numerically generated in response to 134 historically based tropical storms which impacted the east and gulf coasts of the United States. Because tides are not included in the simulations and storm parameters were not optimized to prototype conditions, the selected storms are not intended to be hindcasts of specific events. Rather, the simulated events are intended to approximate a number of historically based storms in order to generate a database of responses which are realistic in magnitude, duration, and shape.

The database described in this report is unique in that it provides realistic data for 486 discrete locations along the east and gulf coasts of the United States as well as for selected locations around the island of Puerto Rico. In addition to the hydrograph database, this report includes an atlas of storm track propagation for the 134 historically based events and their spatial peak surge elevations archived at up to 486 impacted locations. The events used in the simulations were selected from the 104-year HURDAT database of storm track information.

The potential use of such a database goes far beyond the testing of disposal site stability. The data reported herein can be used to provide offshore or nearshore boundary conditions for any type of coastal modeling or analysis requiring elevation or current data. Examples of its use have been demonstrated in dune/berm erosion studies as well as in studies of the relationship between storm surge elevation and frequency of occurrence.

Cross-referencing tables are provided such that locations impacted by each storm event are itemized according to station number and storm-induced peak surge elevation. Also, each of the 486 stations is referenced according to storm events which impacted it and the peak surge corresponding to those events. Through cross-referencing, design events can be selected for detailed analysis, and event frequency information can be obtained for subsequent frequency analyses. The full database can then be accessed to develop time series boundary conditions for use in any coastal design and analysis requiring time series of tropical storm surge data. The following paragraphs summarize

the basis for the storm simulations and the procedures required to develop this unique database.

A viable approach to forecasting storm surge heights along the eastern U.S. and gulf coasts is to rely on information regarding past hurricanes, their associated storm surge, and their spatial impact. Estimations of storm surge intensity expected from some future hurricane can be made by referencing a database containing historically based storm surge elevation and current data. Such a database would necessarily include a time history of storm surge heights and currents from a large sampling of historically based hurricanes at many spatially distributed points.

In this work, a database of storm surge elevations and depth-averaged velocity values is generated from the numerical simulation of multiple hurricanes. The ADCIRC-2DDI hydrodynamic model was used for these storm surge simulations and has been demonstrated to produce accurate predictions of both the primary storm surge and resonant modes excited by the storm. Simulation accuracy was enhanced through the use of a very large computational domain which encompassed the western North Atlantic Ocean, the Caribbean Sea, and the Gulf of Mexico.

Because of the size of the domain, open-ocean boundary conditions were specified in the mid-Atlantic Ocean. This simple boundary condition specification, far removed from influences of the continental shelf, minimized the influence of boundary condition specification on storm surge generation in the coastal region. Basin resonant modes and basin-to-basin interactions are therefore accurately reproduced through use of this domain. Computationally, the ADCIRC model is coupled with the physically realistic PBL wind model. As a result, model simulations lead to computed surge characteristics which are consistent with recorded prototype data.

The finite element formulation implemented in the ADCIRC hydrodynamic model facilitates use of such a large computational domain. Flexibility of the finite element method leads to easy incorporation of coastline detail and nodal densities which can range from three to four orders of magnitude in spatial resolution. This wide variation in nodal density arises due to hydrodynamic considerations of surge propagating from deep open water to the coast zone. These considerations require high grid resolution in shallow coastal areas, in regions of complex coastlines and/or bathymetric change, and in regions of significant storm surge caused by, for example, focusing effects and coarse discretizations in the deep ocean where processes occur gradually.

The efficiency of the finite element method leads to a discrete problem, associated with the large domain, which remains well within computational limits. A preprocessor is applied to the ADCIRC model such that it is optimized for speed when running on a vector supercomputer such as the CRAY-YMP 6128. The 22,711-node grid and 686 elevation and velocity stations have memory requirements of 6.16 MegaWords (MW), which are also set by

the preprocessor. The CPU time utilized for an average storm length of 11 days is 2.3 hr.

The tropical storm database for the east and Gulf of Mexico coasts has been completed and serves as a source of boundary conditions for support of dredging activities as well as any other coastal zone application requiring storm surge data. Two major conclusions are reached following completion of this project. First, the accuracy, flexibility, and ease of applicability of this numerical approach of coupling the HURDAT data, the PBL model, the tidal database, and the ADCIRC hydrodynamic model on a continental-scale, high-resolution grid has been demonstrated. Results imply that an application to real-time predictions of storm propagation should be pursued. Second, the primary goal of the project has greatly exceeded original expectations by representing a very comprehensive and realistic database of storm data which can be used for a great variety of applications in coastal engineering.

6 Recommendations

As concluded above, the tropical storm database is highly successful in providing surge elevation and current data which are realistically representative of historic events that have impacted the east and gulf coasts of the United States. However, it has also been stated that rigorous verification of the simulations to prototype data were not conducted due to limitations in time and funding. The primary recommendation of this report is that these verification efforts be conducted. The resulting product would be not only a database of realistic representations of historic events, but a database of verified hindcasts of historic events as well.

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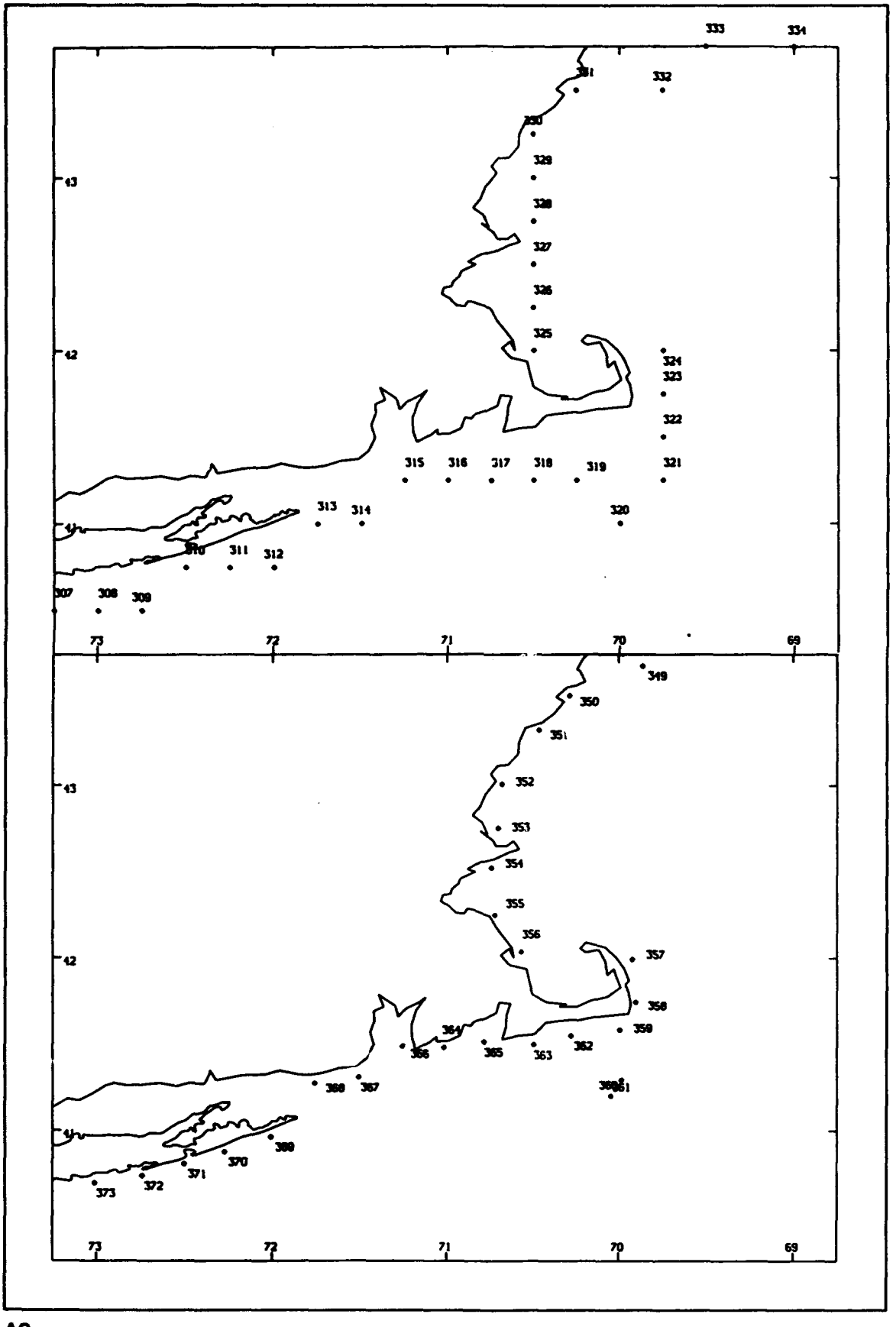
Appendix A
Storm Surge
Database Locations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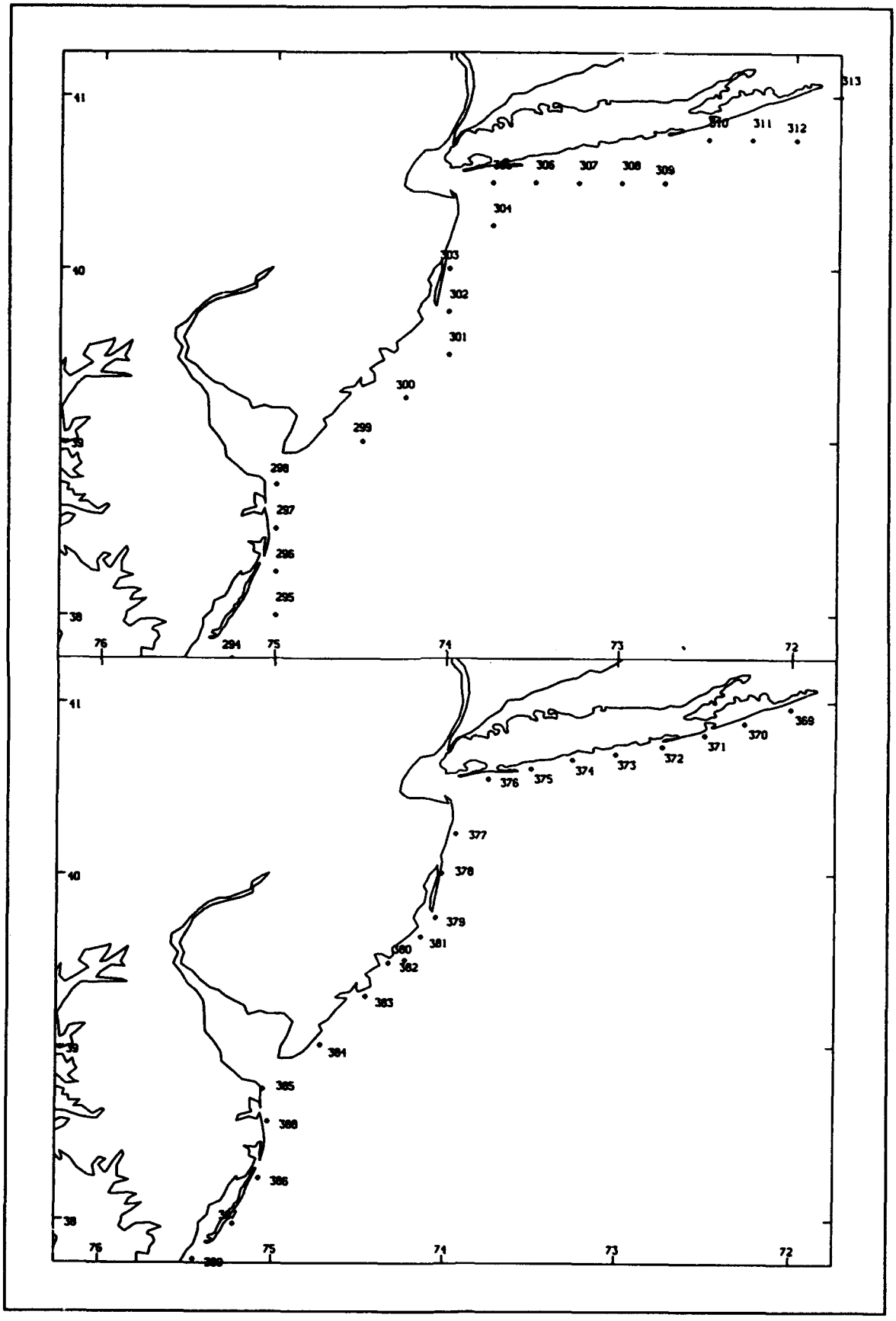
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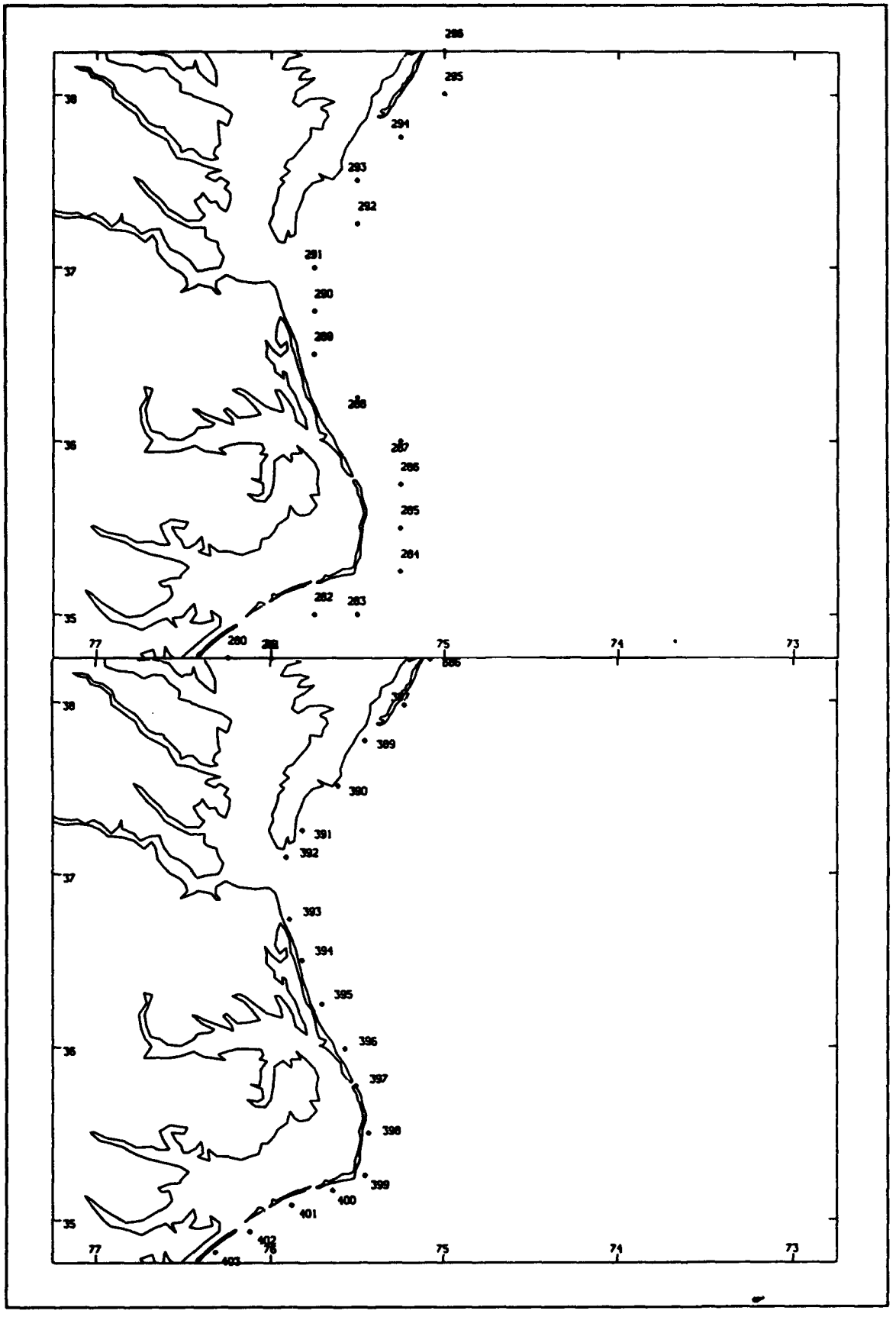
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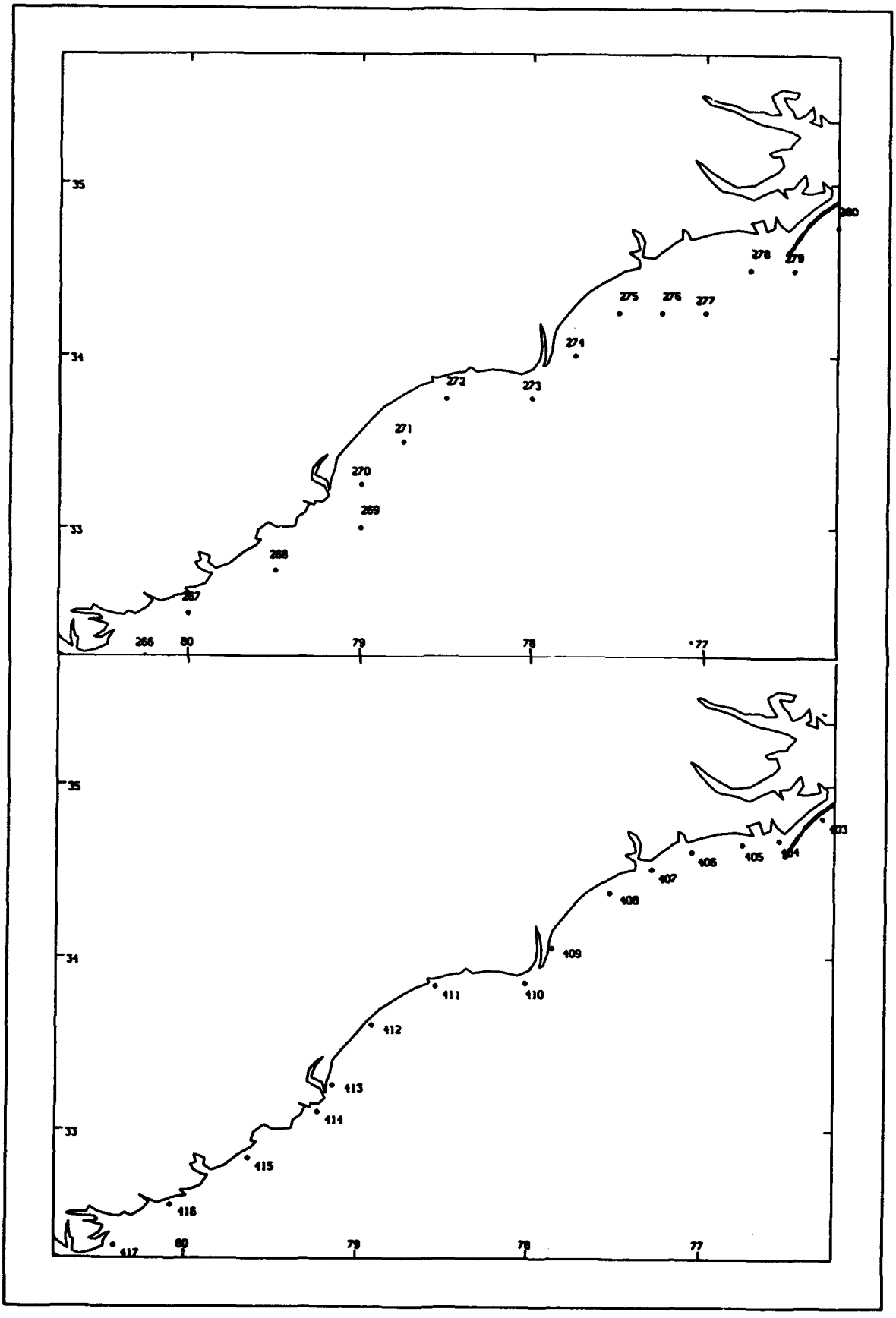
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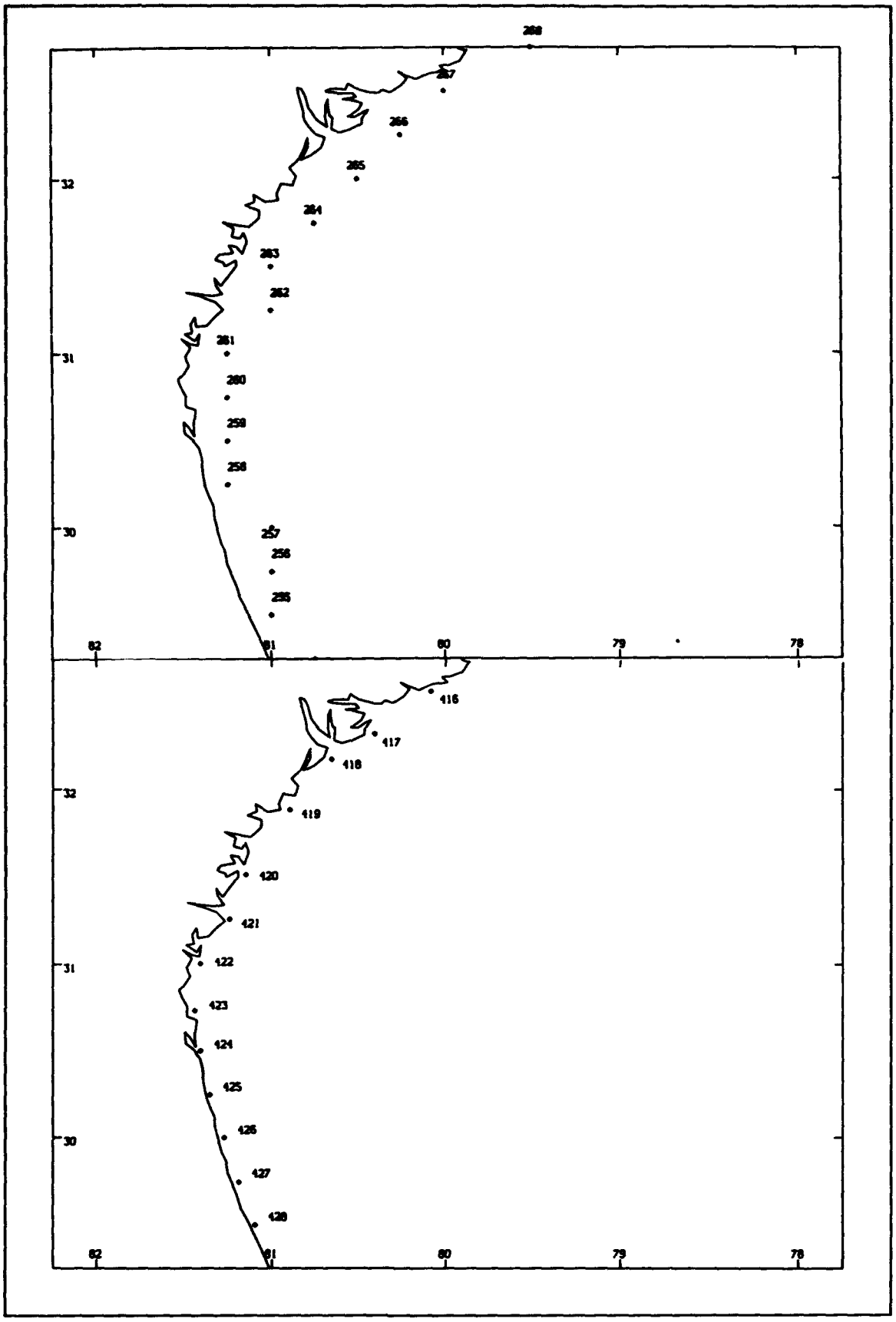
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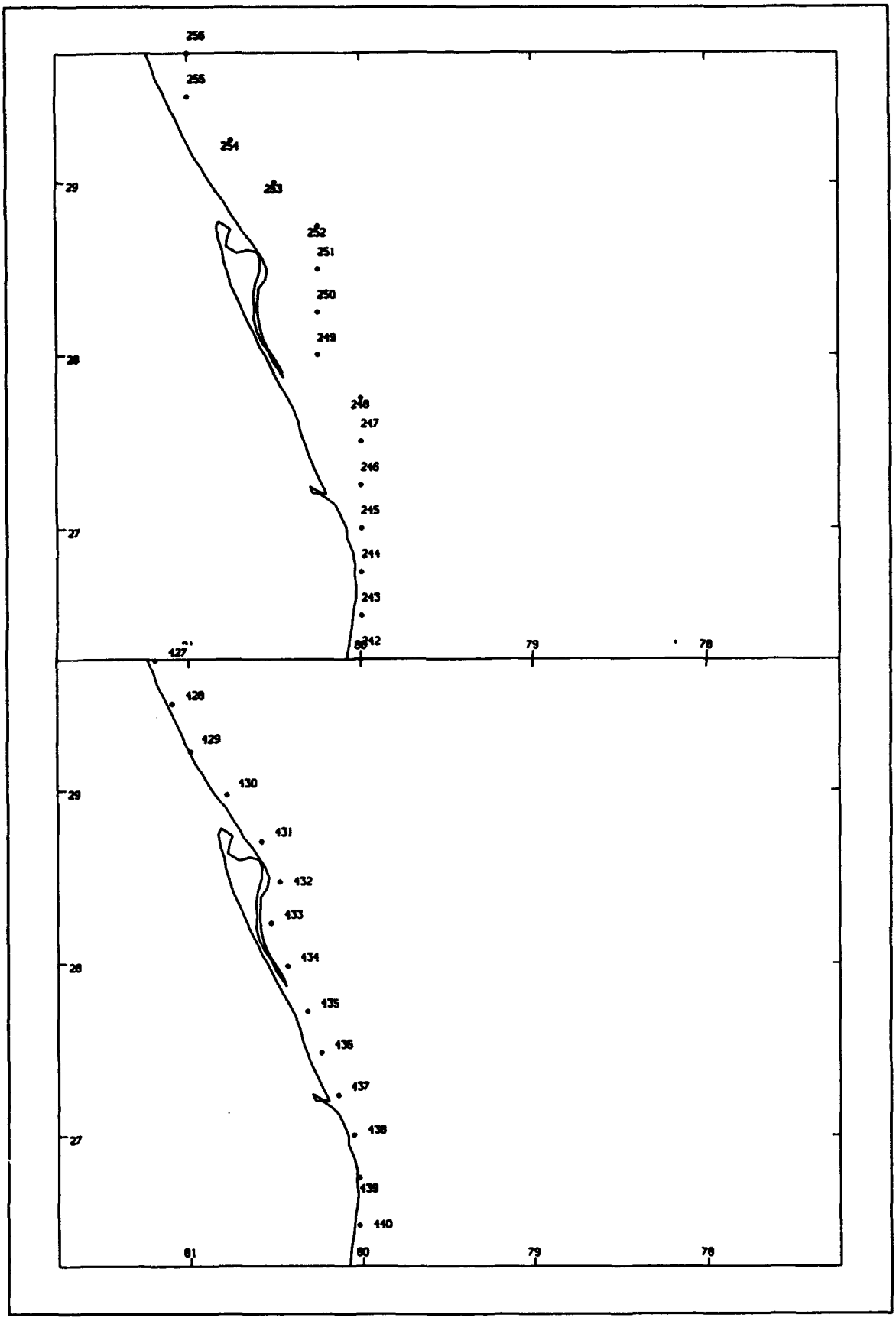
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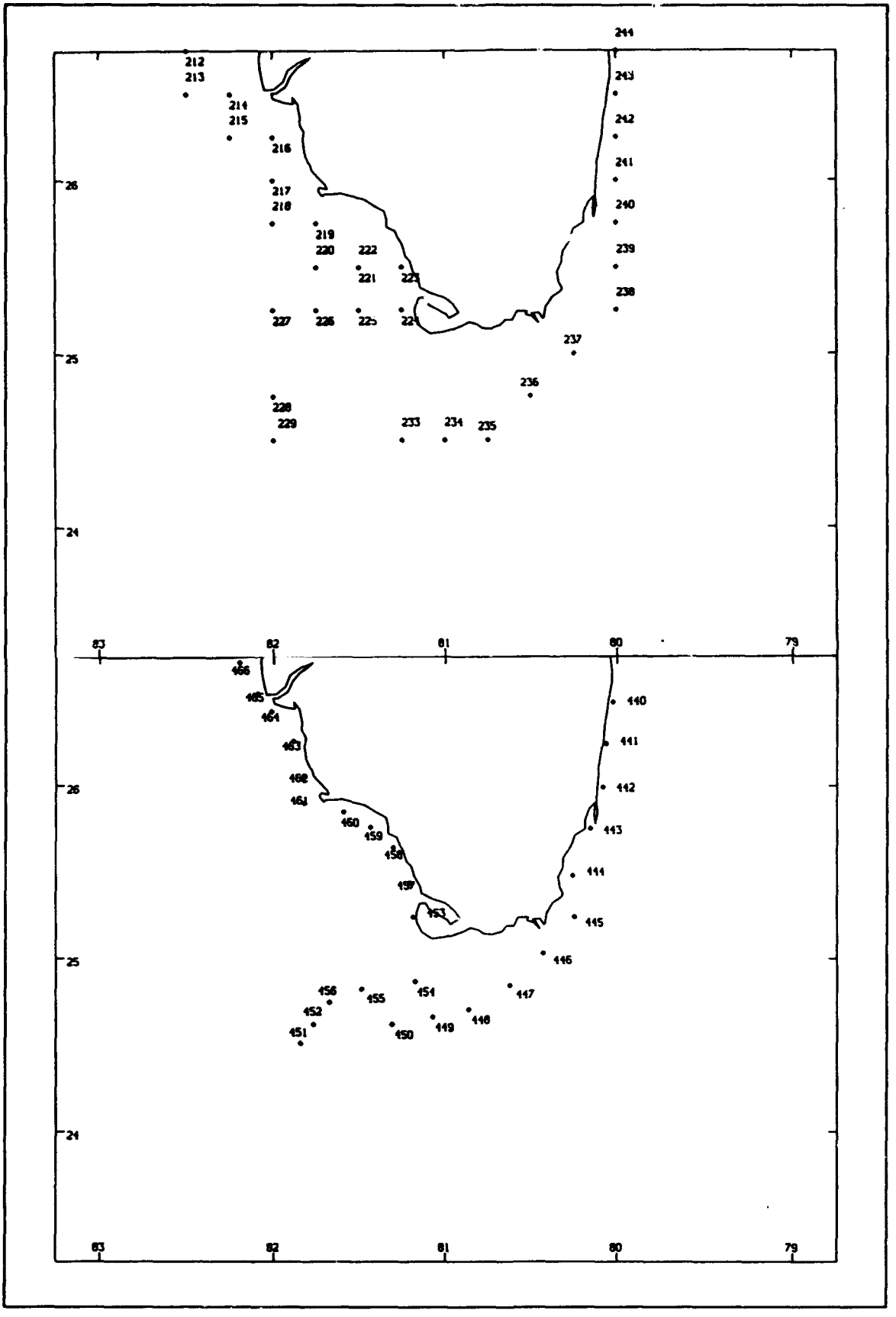
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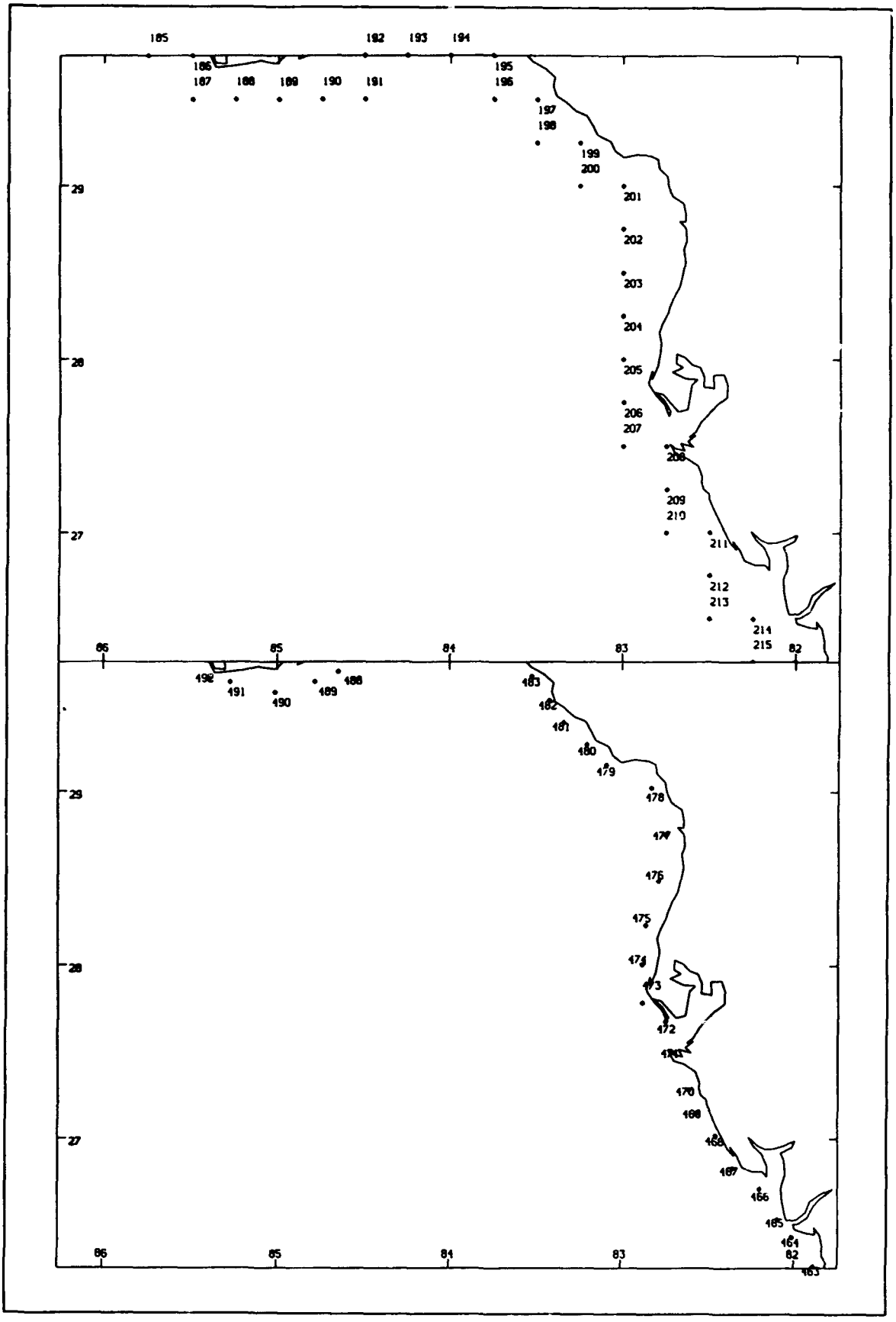
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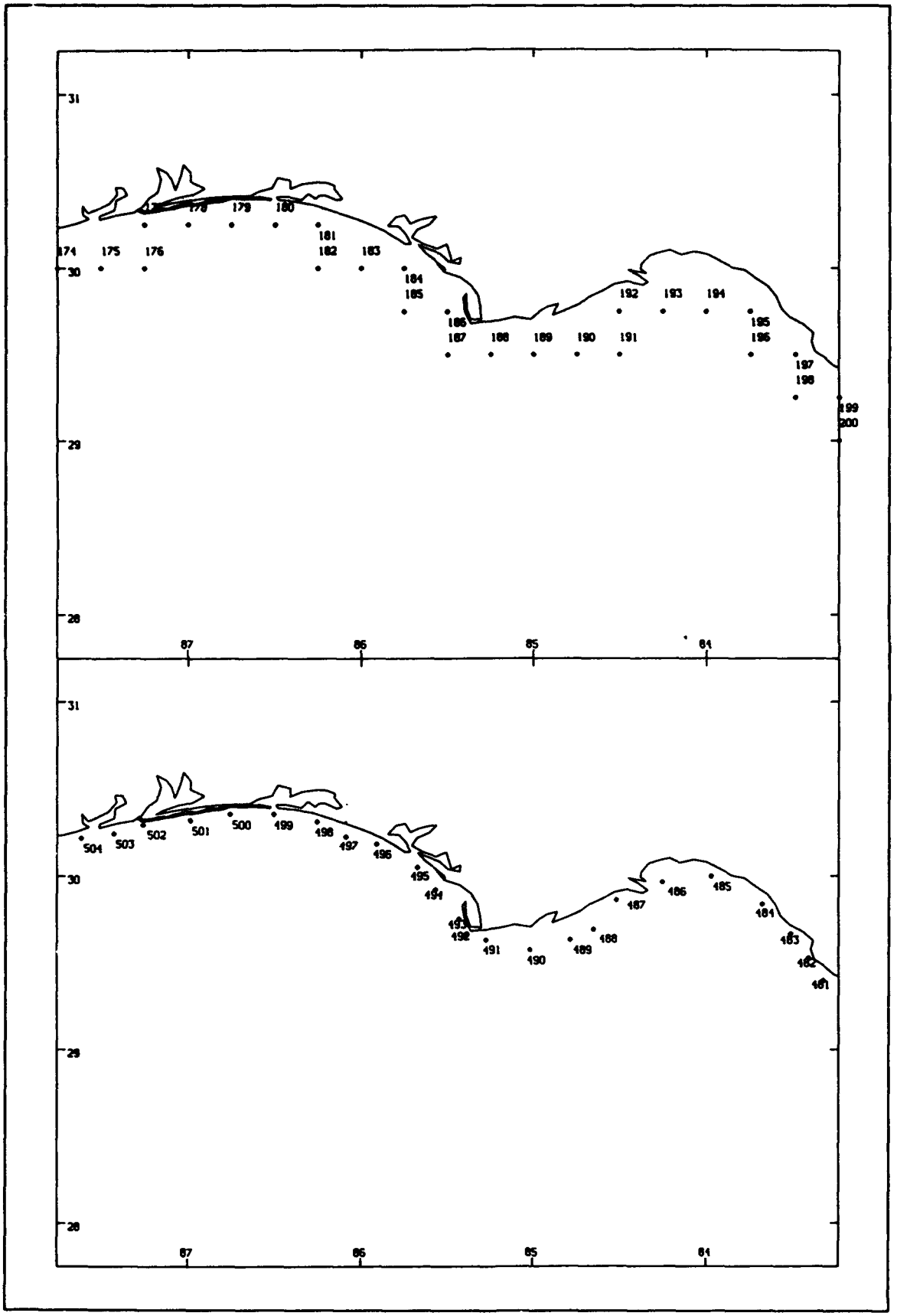
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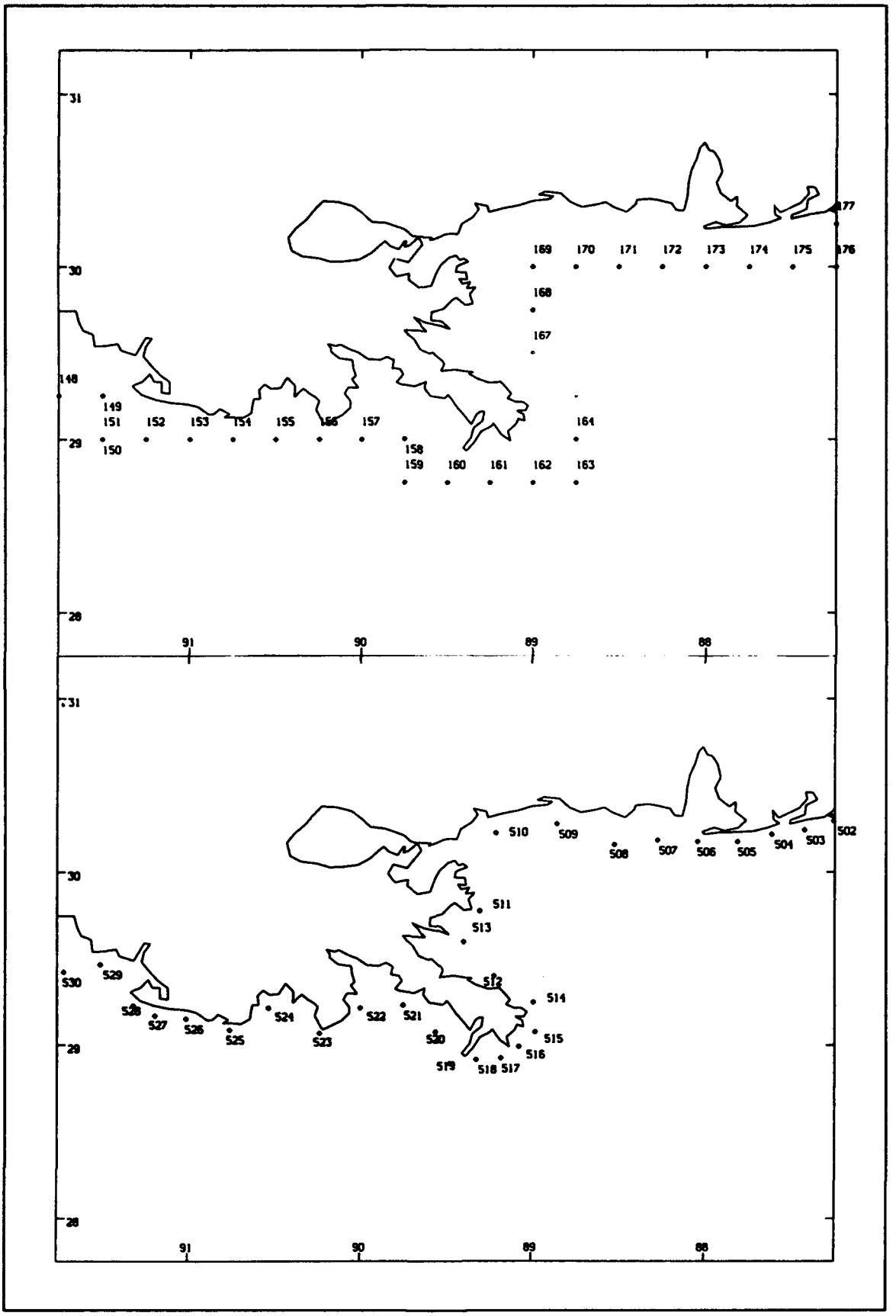
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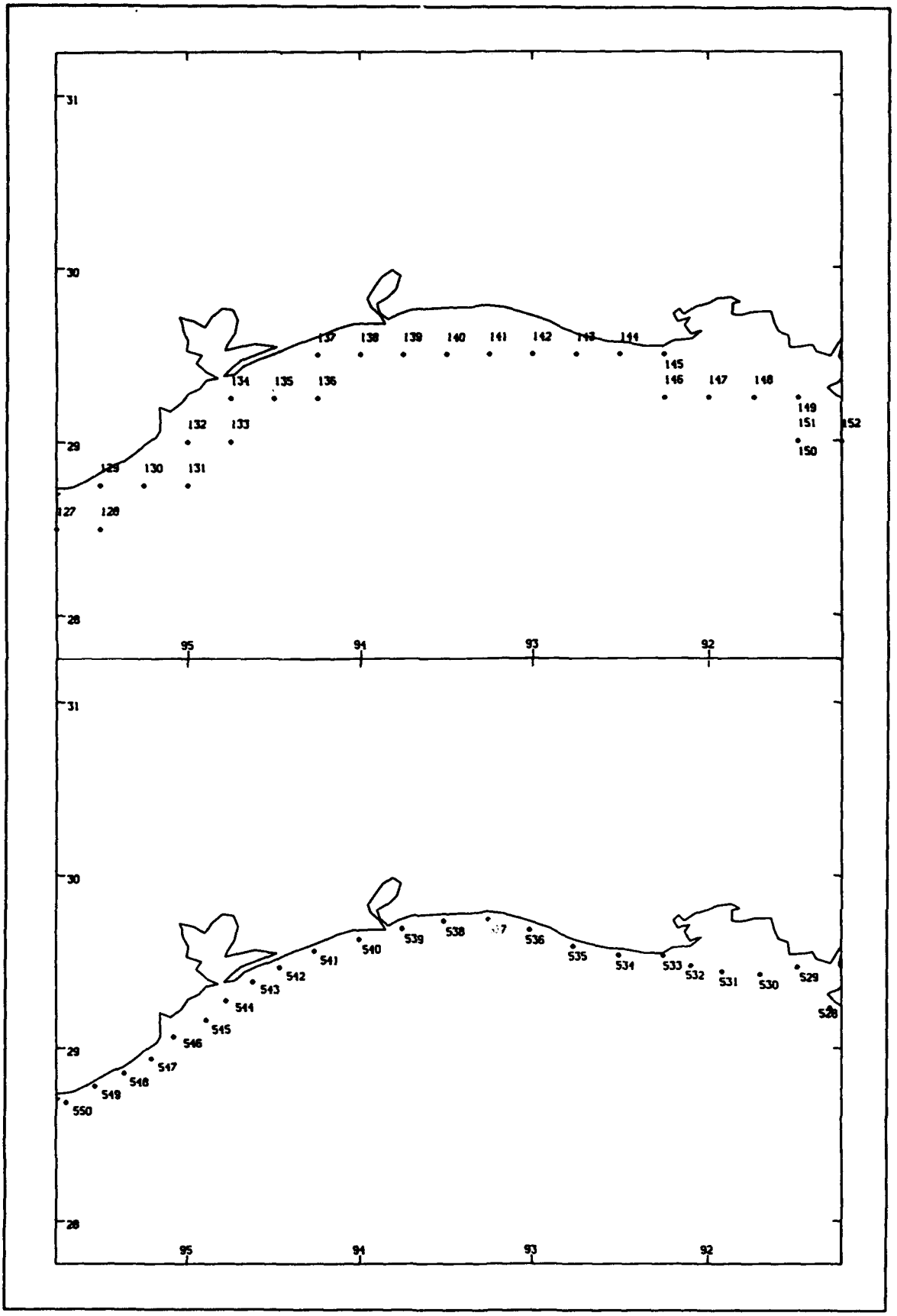
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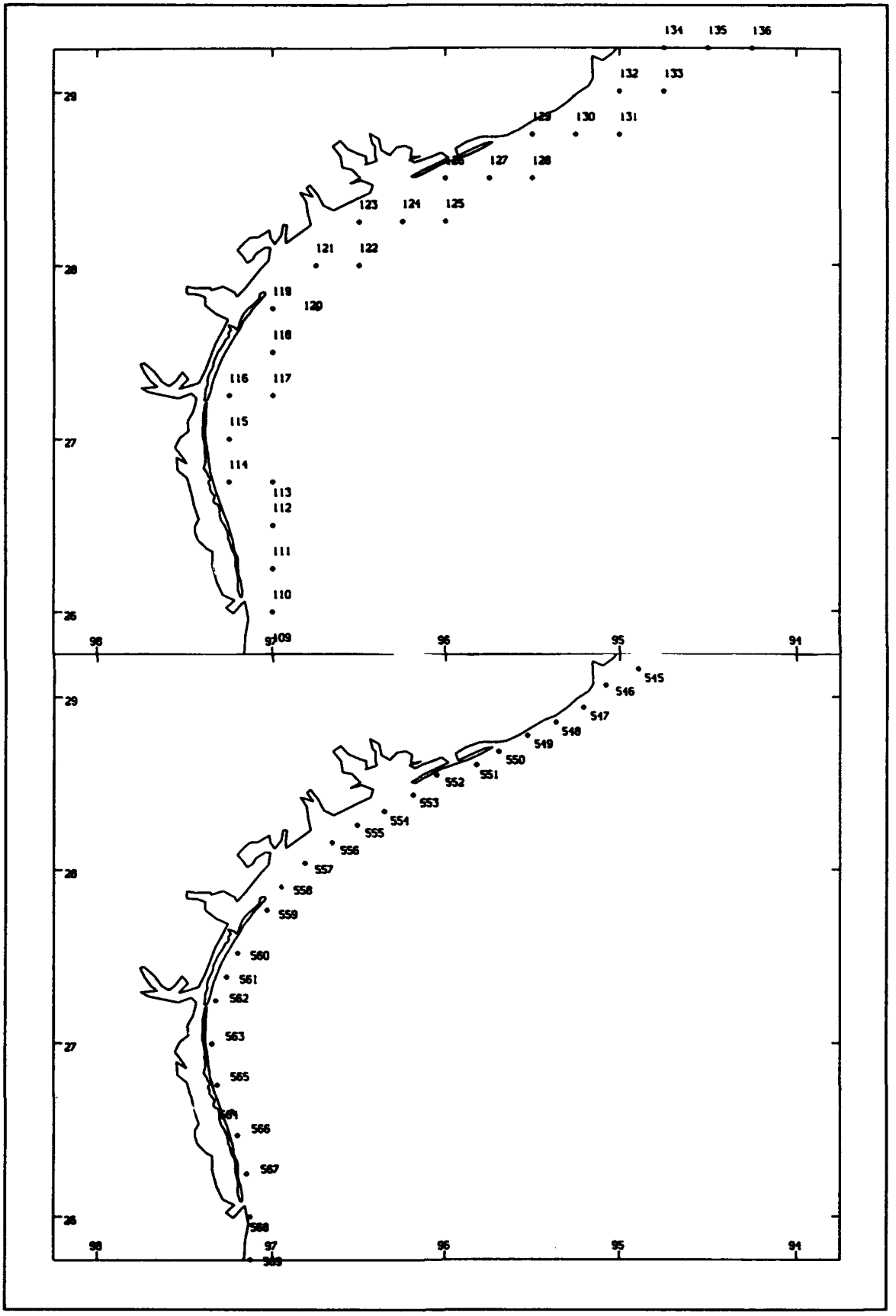
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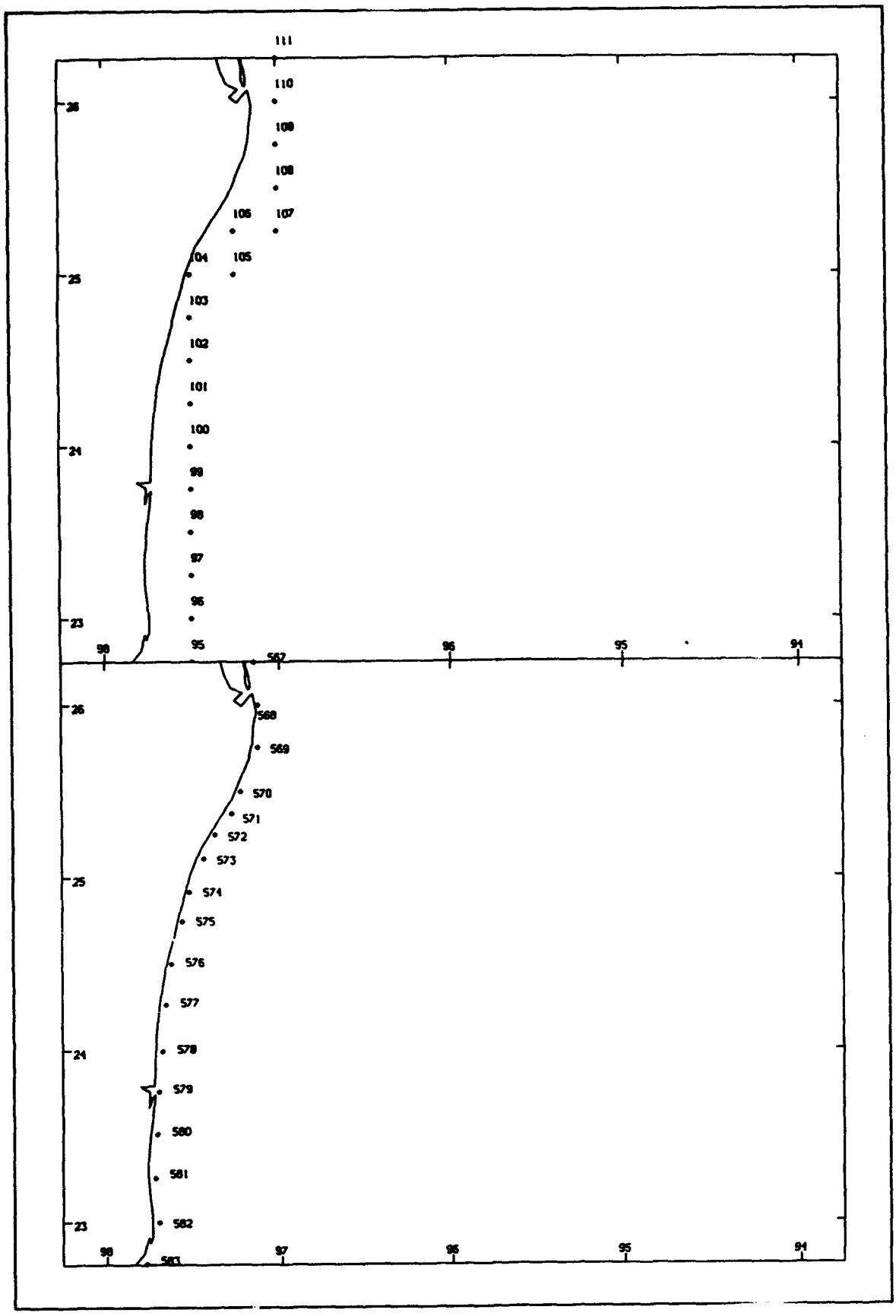
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1	-87.50000	18.25000	0.24071	1083.30407	61	-93.50000	18.75000	0.57614	107.49063
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164	-88.75000	29.00000	0.44897	283.22394	224	-81.25000	25.25000	1.06397	6.59514
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179	-86.75000	30.25000	0.47743	17.33022	239	-80.00000	25.50000	0.70920	307.72525
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250	-80.25000	28.25000	1.06973	22.92878	310	-72.50000	40.75000	1.11959	18.91235
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256	-81.00000	29.75000	1.36472	14.68920	316	-71.00000	41.25000	1.03526	28.38094
257	-81.00000	30.00000	1.40218	22.61907	317	-70.75000	41.25000	0.99754	28.48081
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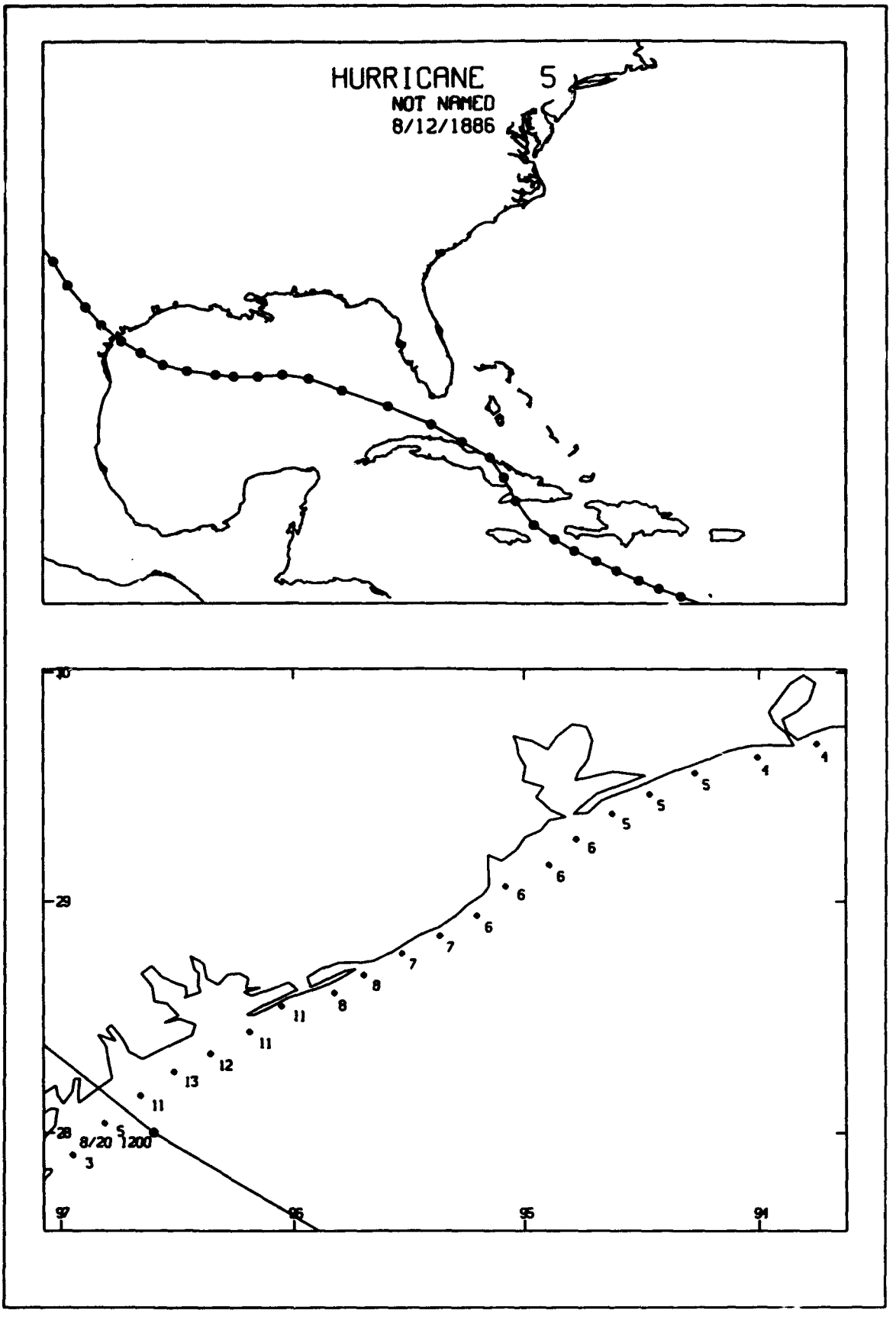
261	-81.25000	31.00000	1.81572	9.03258	321	-69.75000	41.25000	1.27038	21.08047
262	-81.00000	31.25000	1.81088	13.23841	322	-69.75000	41.50000	1.74725	18.24321
263	-81.00000	31.50000	1.91384	5.83565	323	-69.75000	41.75000	2.16005	151.35227
264	-80.75000	31.75000	1.85110	13.86511	324	-69.75000	42.00000	2.27178	136.76999
265	-80.50000	32.00000	1.76598	12.73749	325	-70.50000	42.00000	2.76019	33.59379
266	-80.25000	32.25000	1.67615	11.61116	326	-70.50000	42.25000	2.67893	49.38024
267	-80.00000	32.50000	1.57164	6.79457	327	-70.50000	42.50000	2.68002	83.76588
268	-79.50000	32.75000	1.37620	7.28214	328	-70.50000	42.75000	2.70681	73.30242
269	-79.00000	33.00000	1.31319	15.20433	329	-70.50000	43.00000	2.73401	55.46145
270	-79.00000	33.25000	1.41349	7.04329	330	-70.50000	43.25000	2.77832	16.80141
271	-78.75000	33.50000	1.47264	13.76855	331	-70.25000	43.50000	2.80929	35.72626
272	-78.50000	33.75000	1.52773	5.41423	332	-69.75000	43.50000	2.74785	90.38075
273	-78.00000	33.75000	1.33786	8.93493	333	-69.50000	43.75000	2.78486	72.31306
274	-77.75000	34.00000	1.32415	13.32062	334	-69.00000	43.75000	2.74354	81.83887
275	-77.50000	34.25000	1.36122	15.35050	335	-68.50000	44.00000	2.74202	76.50475
276	-77.25000	34.25000	1.32136	19.96642	336	-68.00000	44.25000	2.84567	41.25164
277	-77.00000	34.25000	1.27991	24.59756	337	-67.50000	44.25000	2.90070	154.54115
278	-76.75000	34.50000	1.24515	11.51537	338	-66.75000	44.25000	3.13972	162.51951
279	-76.50000	34.50000	1.12205	12.34345	339	-66.50000	44.50000	3.44461	119.15928
280	-76.25000	34.75000	1.04350	17.64180	340	-66.25000	44.75000	3.72378	102.93123
281	-76.00000	34.75000	1.01038	18.89925	341	-66.43120	45.01330	3.68059	60.73047
282	-75.75000	35.00000	1.02463	11.77654	342	-66.93190	44.77440	3.47482	49.09544
283	-75.50000	35.00000	0.96919	56.61379	343	-67.11970	44.62090	3.20331	38.22764
284	-75.25000	35.25000	0.93859	13.93316	344	-67.65170	44.46730	2.93394	35.47218
285	-75.25000	35.50000	0.97052	19.20730	345	-68.07940	44.33930	2.87539	14.26974
286	-75.25000	35.75000	1.00114	15.41961	346	-68.61140	44.21980	2.98275	4.45104
287	-75.25000	36.00000	1.04045	15.87342	347	-69.11200	43.97240	2.85914	20.34657
288	-75.50000	36.25000	1.12614	26.95326	348	-69.56060	43.82730	2.82086	23.48587
289	-75.75000	36.50000	1.18439	16.77814	349	-69.86310	43.68230	2.82063	32.63158
290	-75.75000	36.75000	1.23656	12.56597	350	-70.28660	43.51160	2.81406	30.87783
291	-75.75000	37.00000	1.29340	12.21153	351	-70.46390	43.31340	2.78846	13.96346
292	-75.50000	37.25000	1.25147	18.87737	352	-70.68300	43.00820	2.76044	20.96130
293	-75.50000	37.50000	1.26033	16.68353	353	-70.70380	42.75220	2.74542	19.22725
294	-75.25000	37.75000	1.17963	17.79298	354	-70.74560	42.52190	2.73261	7.93366
295	-75.00000	38.00000	1.10003	14.44976	355	-70.72470	42.24880	2.72752	18.84435
296	-75.00000	38.25000	1.09014	14.97713	356	-70.56820	42.03350	2.75216	35.88025
297	-75.00000	38.50000	1.11357	9.93167	357	-69.92150	41.99290	2.35701	101.39977
298	-75.00000	38.75000	1.18012	16.57511	358	-69.90070	41.74540	2.22928	33.89022
299	-74.50000	39.00000	1.19828	20.17986	359	-69.99450	41.58330	1.98567	17.58449
300	-74.25000	39.25000	1.18631	20.46480	360	-70.04670	41.19930	0.71934	11.34936

361	-69.98410	41.29320	1.20430	7.32467	421	-81.24360	31.26120	1.98353	7.45236
362	-70.27620	41.34920	1.51361	9.63091	422	-81.41030	31.00320	1.86087	7.97518
363	-70.49320	41.49800	1.04882	9.66556	423	-81.44180	30.73210	1.77406	9.81089
364	-71.01480	41.48090	1.07416	6.88422	424	-81.41030	30.30180	1.63056	12.77158
365	-70.78730	41.31580	1.04833	4.11988	425	-81.35830	30.24380	1.56540	12.07084
366	-71.25670	41.48940	1.12957	11.93973	426	-81.27490	29.99840	1.46645	9.45657
367	-71.38710	41.31030	1.08421	9.13896	427	-81.19140	29.74240	1.39919	8.20193
368	-71.75740	41.27610	1.11034	12.04487	428	-81.09750	29.49490	1.31611	13.07588
369	-72.00980	40.96130	1.04753	14.23940	429	-80.99320	29.22190	1.23902	8.48677
370	-72.27060	40.87660	1.07707	15.36353	430	-80.78460	28.97450	1.16189	26.39380
371	-72.50010	40.88770	1.10459	7.54891	431	-80.58640	28.70140	1.11273	39.15709
372	-72.74000	40.73940	1.16117	15.25719	432	-80.48210	28.47100	1.09448	31.85317
373	-73.01120	40.69480	1.22735	4.52870	433	-80.53420	28.23210	1.09950	22.58488
374	-73.26160	40.66260	1.30182	8.34313	434	-80.44040	27.98470	1.08134	4.81430
375	-73.50130	40.61130	1.35915	7.22802	435	-80.32560	27.72020	1.04525	11.94174
376	-73.75190	40.55170	1.43862	6.31868	436	-80.24220	27.48130	1.08766	19.53987
377	-73.93960	40.23660	1.35258	23.44222	437	-80.14830	27.23380	0.97442	23.18322
378	-74.02310	40.00560	1.32112	9.44854	438	-80.05440	27.00350	0.94484	125.88493
379	-74.05440	39.74970	1.23222	7.71691	439	-80.02310	26.75660	0.91264	152.11141
380	-74.23170	39.50220	1.18937	10.59515	440	-80.02310	26.48300	0.86465	204.40266
381	-74.13990	39.64030	1.19661	6.08524	441	-80.06480	26.24410	0.83138	230.17018
382	-74.32770	39.48690	1.21114	8.79494	442	-80.08360	25.99360	0.79271	287.65061
383	-74.46330	39.29060	1.20779	15.00212	443	-80.15660	25.75470	0.76289	108.45420
384	-74.72400	39.00910	1.24581	13.28891	444	-80.26090	25.48170	0.73199	40.32579
385	-75.05780	38.75310	1.16663	13.82566	445	-80.25050	25.24280	0.69759	68.14329
386	-75.07870	38.24110	1.09034	17.20496	446	-80.42780	25.02950	0.67924	51.07578
387	-75.22470	37.97660	1.14572	11.34994	447	-80.62600	24.84180	0.65247	53.49263
388	-75.02660	38.56540	1.12914	6.96878	448	-80.86600	24.70520	0.62726	63.88128
389	-75.45420	37.77180	1.22306	9.09935	449	-81.07460	24.66260	0.61608	53.75541
390	-75.61070	37.50730	1.28414	15.27416	450	-81.31450	24.61990	0.59135	22.00973
391	-75.81930	37.25140	1.33697	9.48430	451	-81.84650	24.50900	0.54742	63.87351
392	-75.91320	37.09780	1.27196	10.08260	452	-81.77350	24.61990	0.61826	7.09301
393	-75.89230	36.73940	1.24851	9.09746	453	-81.18930	25.24280	0.99856	6.22511
394	-75.81930	36.50050	1.18831	18.39321	454	-81.17890	24.86740	0.65591	10.00000
395	-75.70460	36.24450	1.13973	21.94600	455	-81.49180	24.82470	0.72053	9.35665
396	-75.56900	35.98860	1.07515	22.43738	456	-81.67960	24.74790	0.72823	6.33658
397	-75.50640	35.77530	1.06050	18.05406	457	-81.21020	25.43900	1.18823	9.68001
398	-75.43340	35.50220	0.94772	18.02855	458	-81.30410	25.64380	1.24792	9.75398
399	-75.45420	35.25480	0.95664	12.79837	459	-81.43970	25.76330	1.25473	7.49198
400	-75.64200	35.16940	1.04183	10.70924	460	-81.59610	25.84860	1.26375	6.46800
401	-75.88190	35.08410	1.04358	8.88613	461	-81.82560	25.89980	1.11403	7.35192
402	-76.12180	34.93050	1.02663	12.38570	462	-81.83610	26.04480	1.09211	7.75943
403	-76.32000	34.81110	1.03526	14.33101	463	-81.88820	26.25810	1.07346	7.00047
404	-76.56830	34.68480	1.11501	4.00000	464	-82.01340	26.42880	1.05278	4.54119
405	-76.77690	34.65920	1.28085	5.25161	465	-82.09680	26.53120	1.03584	4.35721
406	-77.05860	34.61650	1.34371	4.31018	466	-82.20110	26.71040	1.00453	4.08060
407	-77.28800	34.51420	1.37111	5.15924	467	-82.35760	26.82980	0.89790	6.13735
408	-77.52800	34.37760	1.38871	6.57148	468	-82.45150	27.01750	0.85499	9.58011
409	-77.86180	34.05340	1.34378	6.46414	469	-82.56620	27.14550	0.83231	7.73172
410	-78.01820	33.84860	1.36435	4.98439	470	-82.60800	27.28200	0.82493	6.51408
411	-78.53980	33.83160	1.56003	4.15450	471	-82.69140	27.49540	0.88046	7.24685
412	-78.91530	33.60970	1.54912	5.07736	472	-82.74360	27.67450	0.86230	5.28059
413	-79.14480	33.25990	1.47266	4.52648	473	-82.87920	27.78550	0.81239	7.01239
414	-79.22820	33.10630	1.40213	5.93698	474	-82.87920	28.00730	0.86959	4.82782
415	-79.63510	32.83330	1.43475	4.42688	475	-82.85830	28.22910	0.93646	5.72665
416	-80.08360	32.56020	1.62767	4.83498	476	-82.78530	28.48510	1.05428	4.70247
417	-80.40700	32.32130	1.79601	5.07786	477	-82.74360	28.74960	1.14135	4.22868
418	-80.65730	32.17630	1.91974	7.35852	478	-82.82700	29.02270	1.18406	4.00000
419	-80.89930	31.88400	1.97525	7.48781	479	-83.08780	29.15070	1.06982	4.42390
420	-81.14970	31.51710	1.99759	4.62982	480	-83.20250	29.27010	1.00185	6.57466

481	-83.33820	29.39810	0.97664	4.33283	541	-94.26800	29.55940	0.80518	7.26330
482	-83.42160	29.32610	0.96488	5.39546	542	-94.44620	29.46590	0.77906	8.69280
483	-83.32380	29.66560	0.96983	4.08602	543	-94.62270	29.38020	0.75625	8.92538
484	-83.68030	29.83620	0.98041	4.00000	544	-94.77910	29.26930	0.72232	6.18646
485	-83.97240	29.99840	0.97321	4.17113	545	-94.89390	29.15830	0.68577	5.96351
486	-84.25400	29.96420	0.92165	4.00000	546	-95.08160	29.06450	0.64670	6.22300
487	-84.51480	29.86180	0.77537	4.90797	547	-95.20680	28.93650	0.62196	8.32424
488	-84.65040	29.69120	0.66064	9.17065	548	-95.36330	28.85120	0.60240	7.46256
489	-84.78600	29.63130	0.60235	7.71686	549	-95.53020	28.77440	0.58953	7.05370
490	-85.01550	29.57170	0.47848	10.21824	550	-95.69710	28.68050	0.58449	9.95758
491	-85.27630	29.63130	0.43007	10.62268	551	-95.82220	28.60370	0.58211	8.89922
492	-85.40130	29.65710	0.43588	10.82530	552	-96.03170	28.54400	0.58339	5.66321
493	-85.43270	29.75090	0.44577	13.28019	553	-96.18730	28.43310	0.58360	7.79468
494	-85.56840	29.92160	0.47090	8.65476	554	-96.35420	28.33920	0.58640	6.48372
495	-85.67270	30.04930	0.47557	16.73547	555	-96.51070	28.26240	0.58935	9.86670
496	-85.91260	30.18610	0.48170	11.67495	556	-96.65670	28.16000	0.59122	6.51313
497	-86.08990	30.22870	0.48260	11.72675	557	-96.81320	28.04040	0.59368	7.17376
498	-86.25680	30.31410	0.48264	15.80560	558	-96.94880	27.90410	0.59504	11.36989
499	-86.30720	30.35670	0.48223	7.44859	559	-97.03230	27.76750	0.59481	11.41375
500	-86.75750	30.35670	0.47989	4.00000	560	-97.20130	27.51710	0.59616	16.56866
501	-86.98700	30.32260	0.47560	5.16741	561	-97.26380	27.38060	0.59601	18.54263
502	-87.25820	30.29700	0.47410	4.99382	562	-97.32640	27.24410	0.59600	14.79189
503	-87.42510	30.24580	0.47305	4.00000	563	-97.34730	26.99660	0.59620	10.23547
504	-87.61290	30.22020	0.47381	4.89127	564	-97.23250	26.60410	0.58652	18.88150
505	-87.81110	30.17750	0.48915	7.19450	565	-97.31600	26.75770	0.59058	9.34019
506	-88.04060	30.17750	0.50807	9.62408	566	-97.20130	26.46760	0.58451	15.36964
507	-88.27000	30.18610	0.51331	11.14936	567	-97.14910	26.24580	0.58057	10.27488
508	-88.52040	30.16050	0.52077	11.58761	568	-97.12820	25.99830	0.57528	17.70817
509	-88.85420	30.27990	0.57338	8.46330	569	-97.12820	25.75090	0.57371	21.59974
510	-89.20880	30.22870	0.60466	10.00000	570	-97.23250	25.49490	0.57682	13.27157
511	-89.30270	29.77650	0.54224	9.36547	571	-97.28470	25.36690	0.57810	9.68638
512	-89.21930	29.40110	0.48781	9.87133	572	-97.37860	25.24750	0.58092	13.56232
513	-89.39660	29.39730	0.53064	9.00000	573	-97.44120	25.11100	0.58205	12.54217
514	-88.98980	29.24750	0.44689	25.13547	574	-97.52460	24.91470	0.58249	11.88430
515	-88.97940	29.07680	0.44148	65.54721	575	-97.56630	24.74410	0.58176	17.62198
516	-89.07320	28.99150	0.44131	49.61583	576	-97.62890	24.49660	0.58158	14.53671
517	-89.17760	28.92330	0.44271	81.31105	577	-97.66020	24.25770	0.58185	10.00000
518	-89.32360	28.91470	0.44260	49.64664	578	-97.68110	23.99320	0.58170	10.00000
519	-89.48010	28.88910	0.44754	30.03929	579	-97.70200	23.75430	0.58101	10.00000
520	-89.56350	29.07680	0.45384	20.05766	580	-97.71240	23.50690	0.58150	10.00000
521	-89.75130	29.23040	0.46266	9.55403	581	-97.72280	23.25090	0.58270	10.00000
522	-90.00160	29.21340	0.46487	6.98934	582	-97.70200	22.99490	0.58284	10.00000
523	-90.24150	29.06830	0.47008	9.18662	583	-97.77500	22.75600	0.58943	10.00000
524	-90.53360	29.21340	0.50082	8.96870	584	-97.78540	22.48850	0.58980	10.00000
525	-90.76310	29.08540	0.51362	8.78566	585	-97.75410	22.24960	0.58867	10.00000
526	-91.01350	29.14980	0.55416	6.63064	586	-97.63940	21.99360	0.58478	9.85660
527	-91.19080	29.16690	0.58888	5.38724	587	-97.51420	21.82300	0.58188	24.13206
528	-91.31600	29.22660	0.62024	4.62138	588	-97.40990	21.69500	0.57950	43.45647
529	-91.50370	29.46550	0.64680	6.71694	589	-97.28470	21.50730	0.57881	72.41601
530	-91.71230	29.42280	0.62417	4.00000	590	-97.37860	21.24280	0.58955	5.68672
531	-91.92100	29.43990	0.66267	4.00000	591	-97.28470	21.06360	0.58740	11.94729
532	-92.09830	29.47400	0.68786	4.43894	592	-97.18040	20.84170	0.58540	14.50605
533	-92.25480	29.53380	0.68941	4.14046	593	-97.11780	20.68820	0.58504	12.87444
534	-92.36510	29.53380	0.72280	6.21479	594	-97.00310	20.55160	0.58391	8.08001
535	-92.76590	29.58500	0.76384	7.57567	595	-96.84660	20.40660	0.58195	16.18778
536	-93.01620	29.67880	0.80926	6.49206	596	-96.74230	20.27860	0.58104	62.45900
537	-93.25620	29.73850	0.83335	7.12591	597	-96.62730	20.12500	0.58074	22.14655
538	-93.51690	29.73000	0.84829	4.86125	598	-96.49190	20.00560	0.58006	58.96570
539	-93.75690	29.68730	0.84330	6.47503	599	-96.40850	19.86050	0.57975	164.51245
540	-94.00720	29.62760	0.82655	5.76917	600	-96.37510	19.72950	0.58043	60.50679

601	-96.32290	19.51620	0.58206	63.35385	661	-86.85770	20.76200	0.23566	367.10316
602	-96.24990	19.37970	0.58212	32.15370	662	-86.97240	20.59980	0.23368	245.12282
603	-96.10390	19.20910	0.58278	19.90533	663	-87.08710	20.48040	0.23257	222.29669
604	-95.97870	19.07220	0.58546	10.00000	664	-87.18100	20.35240	0.23214	306.35775
605	-95.87440	18.91900	0.58646	6.22850	665	-87.26450	20.24150	0.23192	203.54039
606	-95.60320	18.80800	0.58142	15.85453	666	-87.32710	20.13910	0.23177	308.83932
607	-95.38410	18.76540	0.57895	12.72837	667	-87.45220	19.74660	0.23221	195.20707
608	-95.18590	18.73980	0.57708	55.37567	668	-87.33830	19.49920	0.23350	870.71967
609	-95.00860	18.64590	0.57744	13.92816	669	-87.42090	19.25170	0.23427	434.61507
610	-94.83130	18.58620	0.57871	12.65114	670	-87.44180	19.13230	0.23474	532.27000
611	-94.68520	18.45820	0.58125	25.51054	671	-87.49400	18.98720	0.23520	649.70260
612	-94.56010	18.29610	0.58665	16.17870	672	-87.55650	18.81660	0.23589	415.54425
613	-94.29930	18.27030	0.58771	13.77297	673	-87.59830	18.65440	0.23763	144.47537
614	-93.99480	18.33020	0.58301	19.20938	674	-87.62960	18.53500	0.23894	338.63765
615	-93.74640	18.40700	0.58055	35.05565	675	-87.66090	18.40700	0.23956	843.86680
616	-93.53780	18.47530	0.57976	36.28874	676	-87.37920	19.98350	0.23181	378.43125
617	-93.31870	18.48380	0.58488	11.85975	677	-87.76520	18.24490	0.24013	773.93933
618	-93.12060	18.50940	0.58898	9.14687	678	-87.08790	18.58330	0.49774	404.27068
619	-92.92240	18.56060	0.59209	11.11320	679	-86.14520	18.58330	0.50164	1139.71741
620	-92.72420	18.65440	0.59435	6.35100	680	-85.33720	18.41810	0.45575	42.02773
621	-92.53640	18.69710	0.60171	5.67848	681	-85.60650	17.75710	0.19403	2067.98358
622	-92.37990	18.73120	0.62837	5.76869	682	-86.41460	17.64690	0.20894	2175.83681
623	-92.18170	18.73980	0.65601	5.74575	683	-87.08790	17.75710	0.20644	1207.13351
624	-91.96270	18.77390	0.74668	4.00000	684	-87.13530	17.15120	0.21693	4936.20115
625	-91.66020	18.54350	0.86515	10.00000	685	-86.48190	17.09610	0.21384	4717.23585
626	-91.46200	18.91040	0.79884	4.15532	686	-85.60650	17.15120	0.20535	4720.42891
627	-91.30550	19.02990	0.80746	7.00435					
628	-91.09690	19.14930	0.83324	7.26849					
629	-90.93000	19.28580	0.85081	5.37122					
630	-90.77350	19.48210	0.86089	9.08812					
631	-90.78400	19.72100	0.85078	6.73598					
632	-90.70050	19.84900	0.86864	6.89730					
633	-90.56490	20.01110	0.87129	8.19085					
634	-90.38580	20.23300	0.85900	9.34557					
635	-90.38580	20.50600	0.81192	6.90820					
636	-90.53360	20.73640	0.77164	4.76293					
637	-90.49190	20.85580	0.75102	4.00153					
638	-90.40940	20.97530	0.71543	4.22241					
639	-90.34580	21.10330	0.65626	7.05203					
640	-90.13810	21.18010	0.62670	6.35380					
641	-90.03290	21.23980	0.61006	5.15709					
642	-89.85360	21.30800	0.59485	7.41674					
643	-89.65740	21.35070	0.58582	5.77973					
644	-89.44960	21.37630	0.58262	4.32783					
645	-89.22970	21.40190	0.57807	5.33343					
646	-88.98980	21.41900	0.58036	7.80404					
647	-88.61010	21.36400	0.59204	5.44933					
648	-88.75610	21.46160	0.58880	9.00727					
649	-88.45360	21.60670	0.58913	6.07509					
650	-88.23460	21.62370	0.58454	6.62223					
651	-88.00510	21.62370	0.57276	6.89477					
652	-87.75470	21.58960	0.58344	6.05262					
653	-87.50440	21.52990	0.60074	6.43543					
654	-87.24360	21.64930	0.49038	10.00000					
655	-87.07670	21.64930	0.42078	10.00000					
656	-86.90980	21.58110	0.31948	10.00000					
657	-86.75330	21.23980	0.25075	38.87175					
658	-86.76380	21.39340	0.27577	18.38125					
659	-86.83680	21.48720	0.31090	10.00000					
660	-86.74290	21.00940	0.24074	190.57320					

Appendix B
Historic Storm Event Tracks and Simulated Maximum Surge Elevation


HURRICANE 5
NOT NAMED
8/12/1886
30
29
28
97
96
95
94
8/20 1200
3
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13
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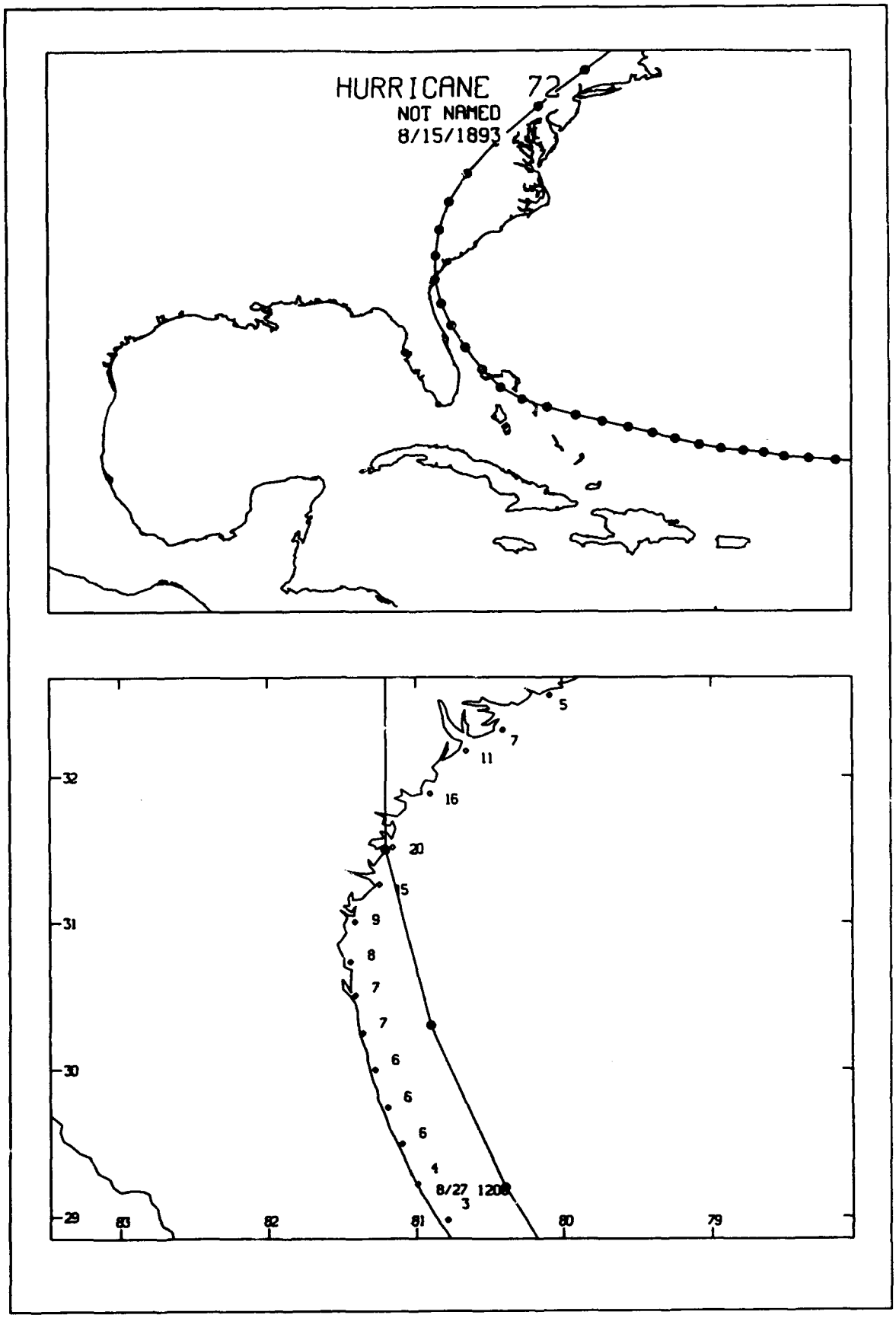
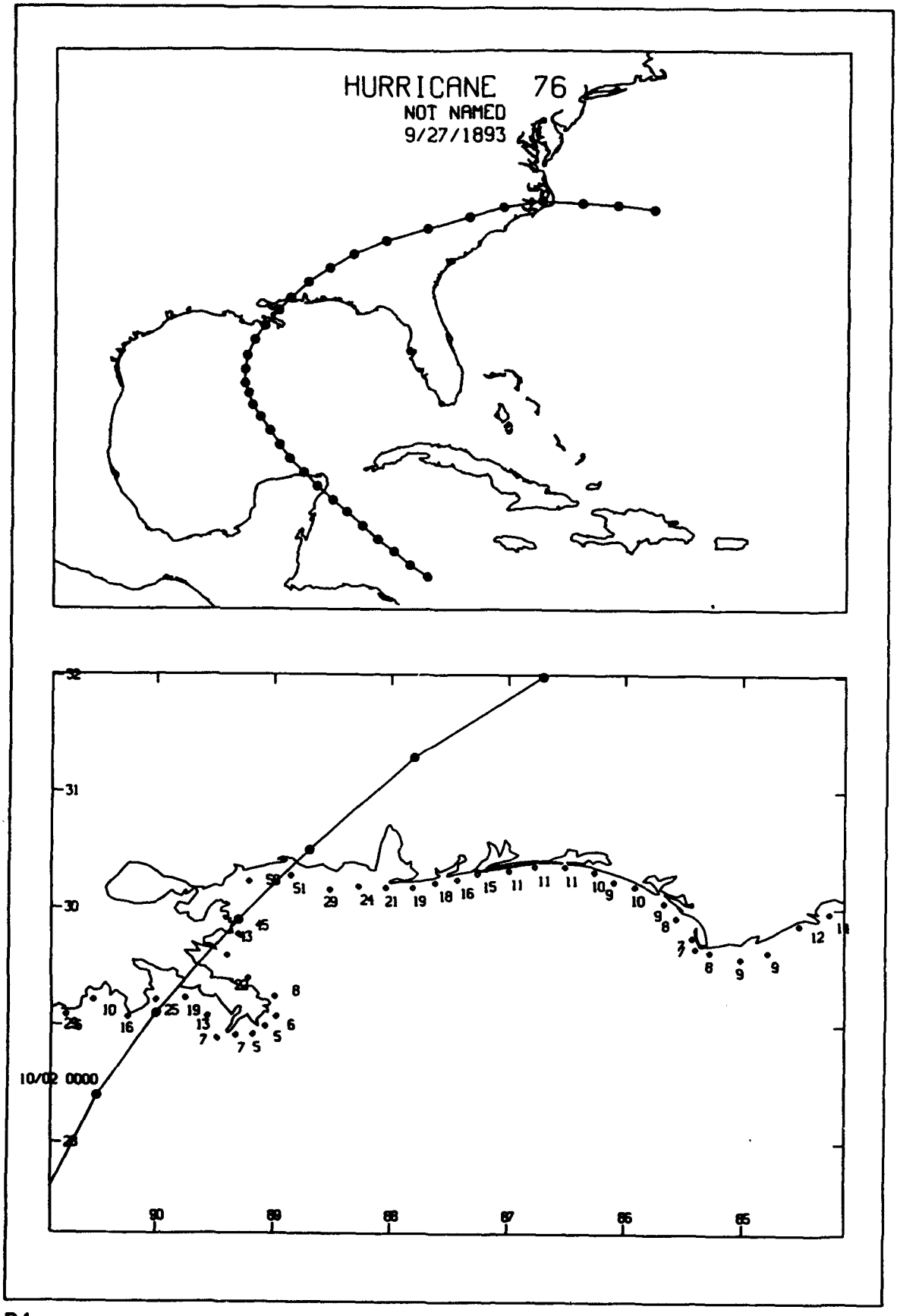
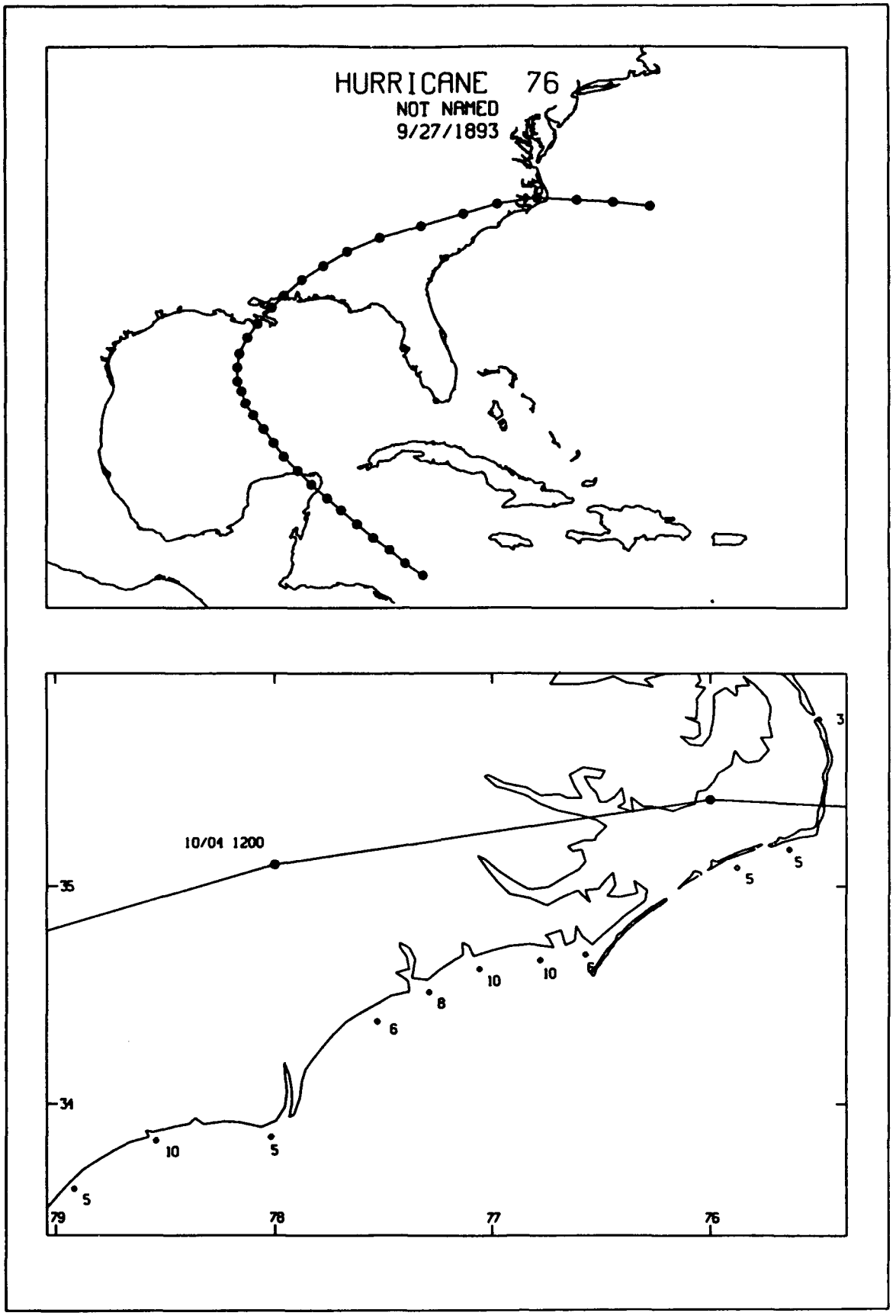
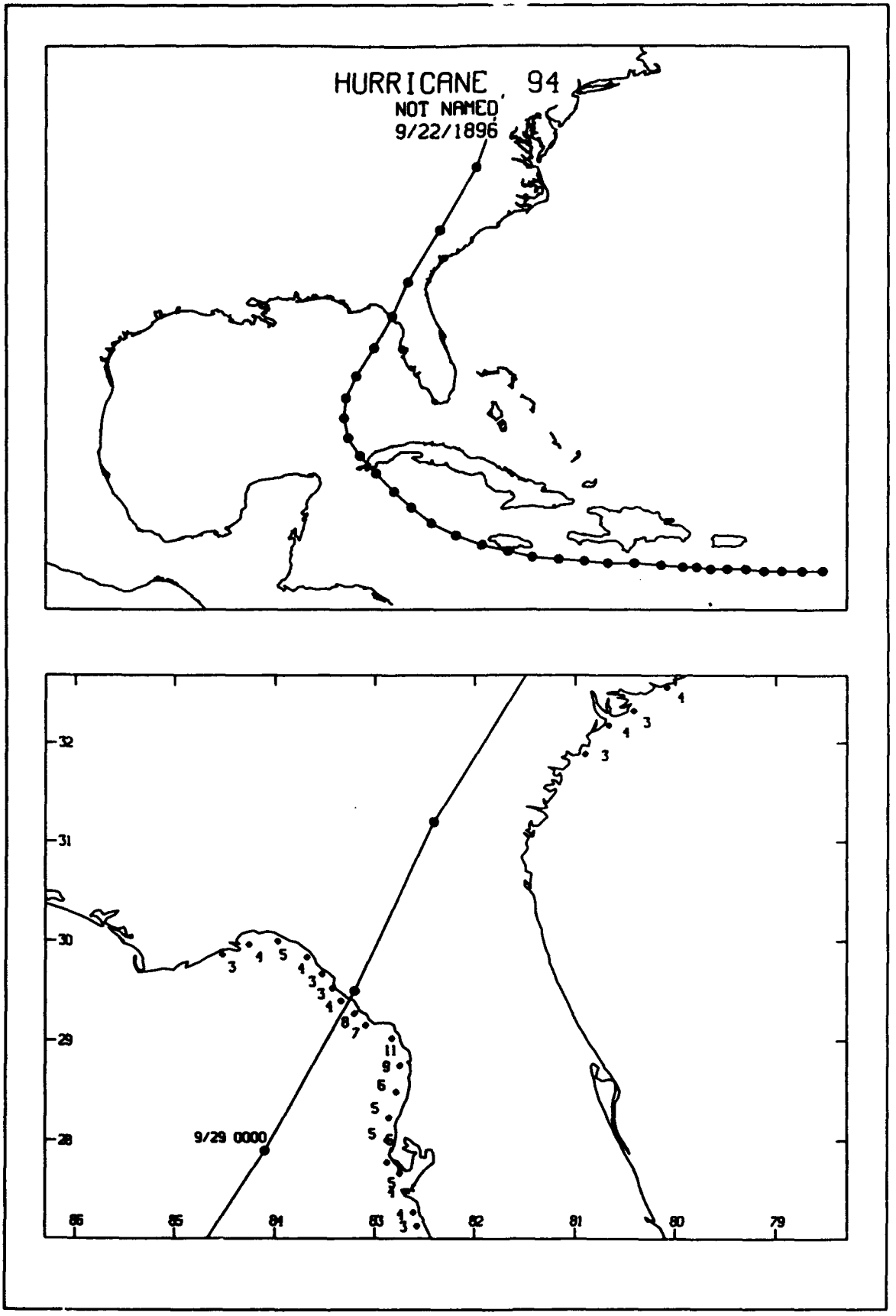
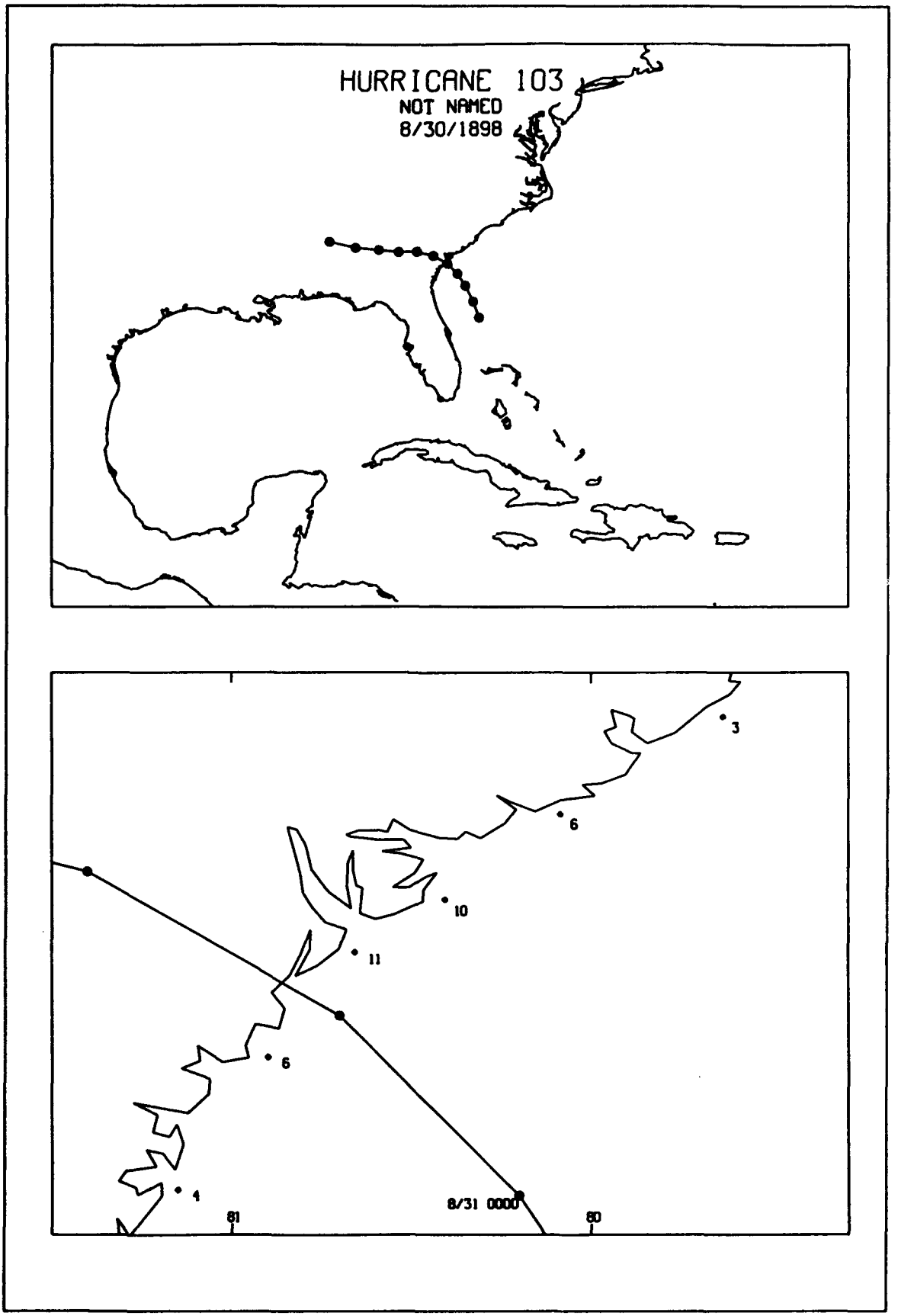
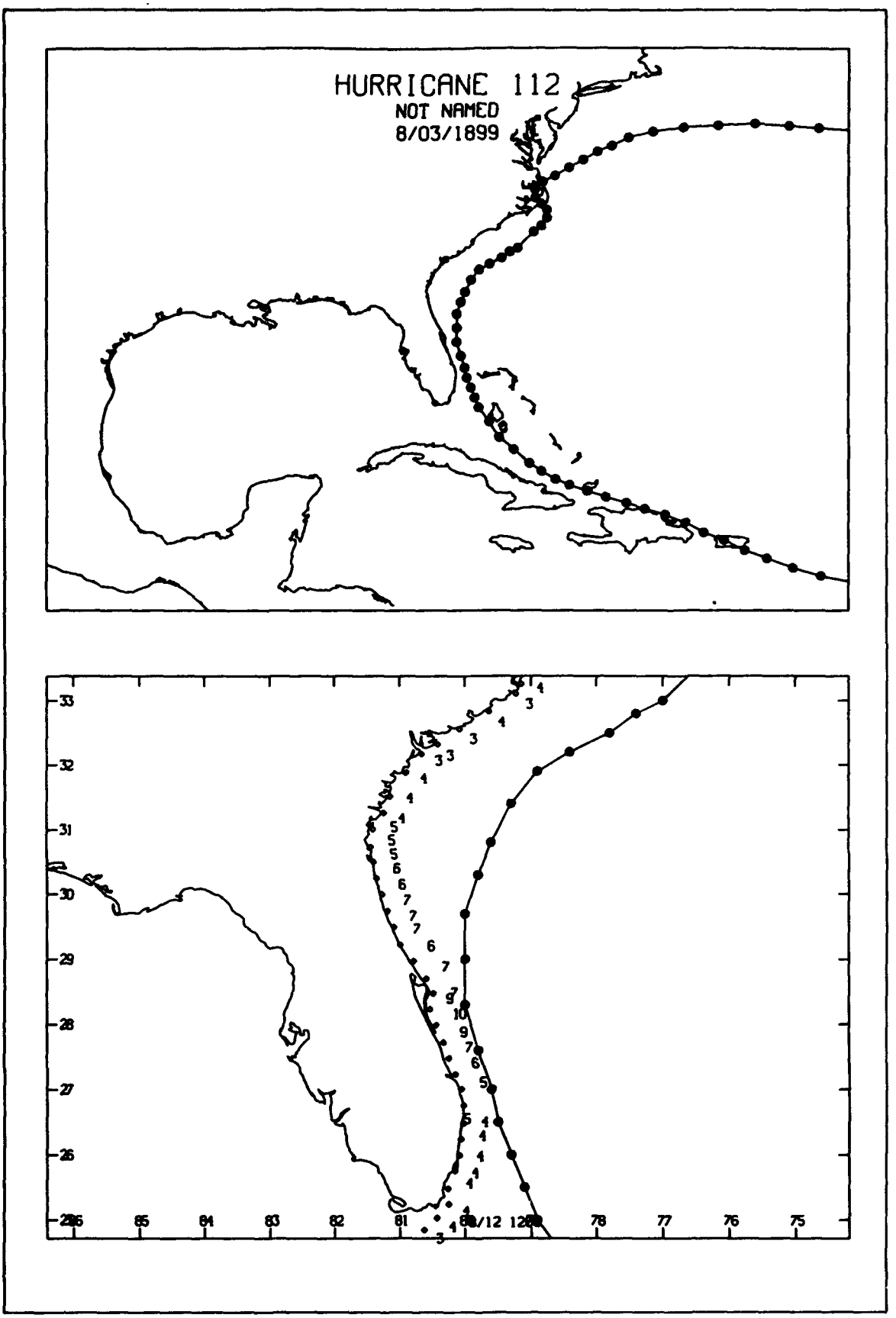

HURRICANE 72
NOT NAMED
8/15/1893
5
7
11
16
20
15
9
8
7
7
6
6
6
4
8/27 1200
3
32
31
30
29
83
82
81
80
79

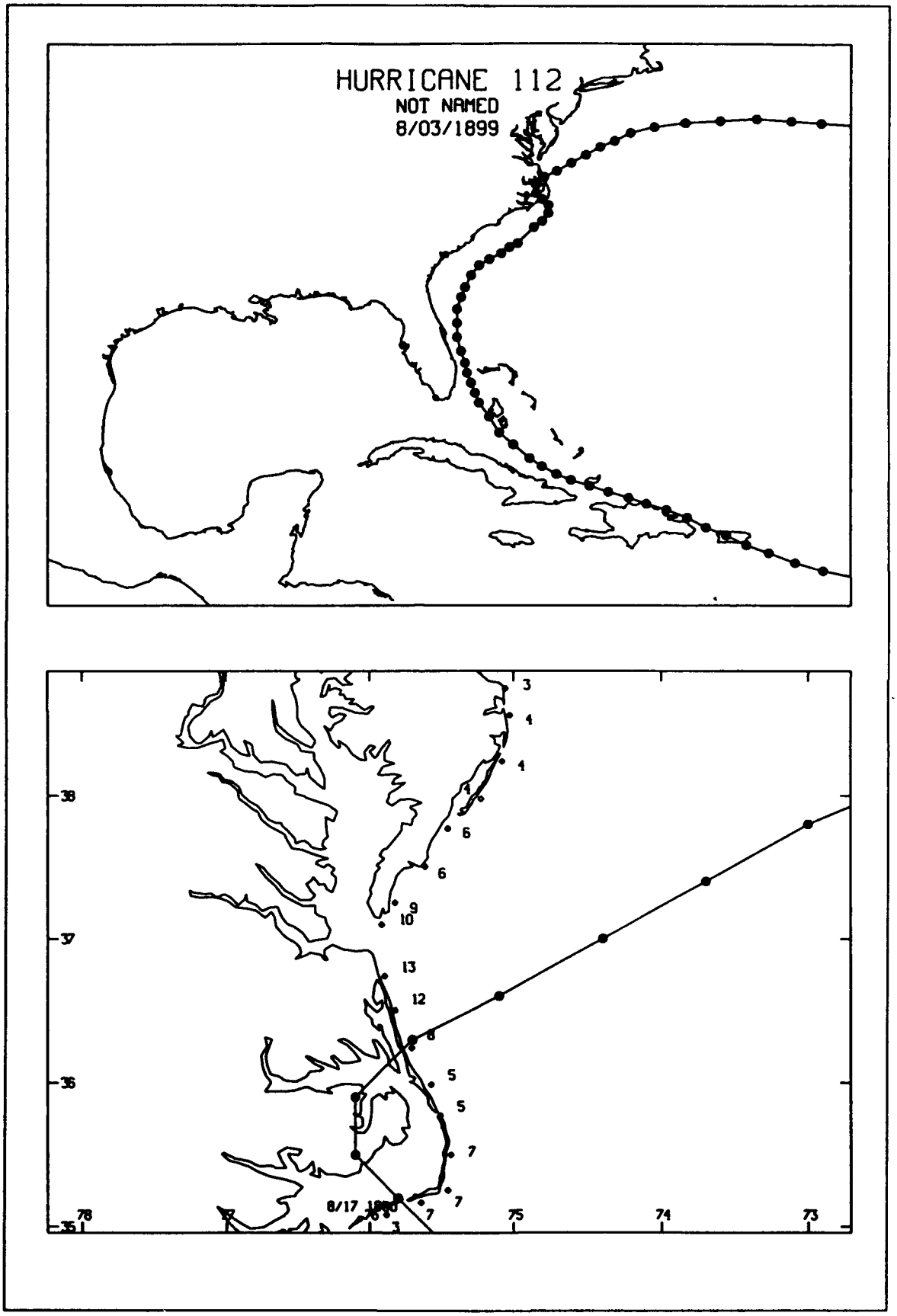

HURRICANE 76
NOT NAMED
9/27/1893
32
31
30
10/02 0000
90
89
88
87
86
85


HURRICANE 76
NOT NAMED
9/27/1893
10/04 1200
35
34
79
78
77
76
3
5
5
6
10
10
8
6
10
5
5


HURRICANE 94
NOT NAMED
9/22/1896
9/29 0000
32
31
30
29
28
86
85
84
83
82
81
80
79


HURRICANE 103
NOT NAMED
8/30/1898
3
6
10
11
6
1
8/31 0000
81
80


HURRICANE 112
NOT NAMED
8/03/1899
33
32
31
30
29
28
27
26
86
85
84
83
82
81
78
77
76
75


HURRICANE 112
NOT NAMED
8/03/1899
38
37
36
35
78
75
74
73
8/17
3
4
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6
6
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12
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7
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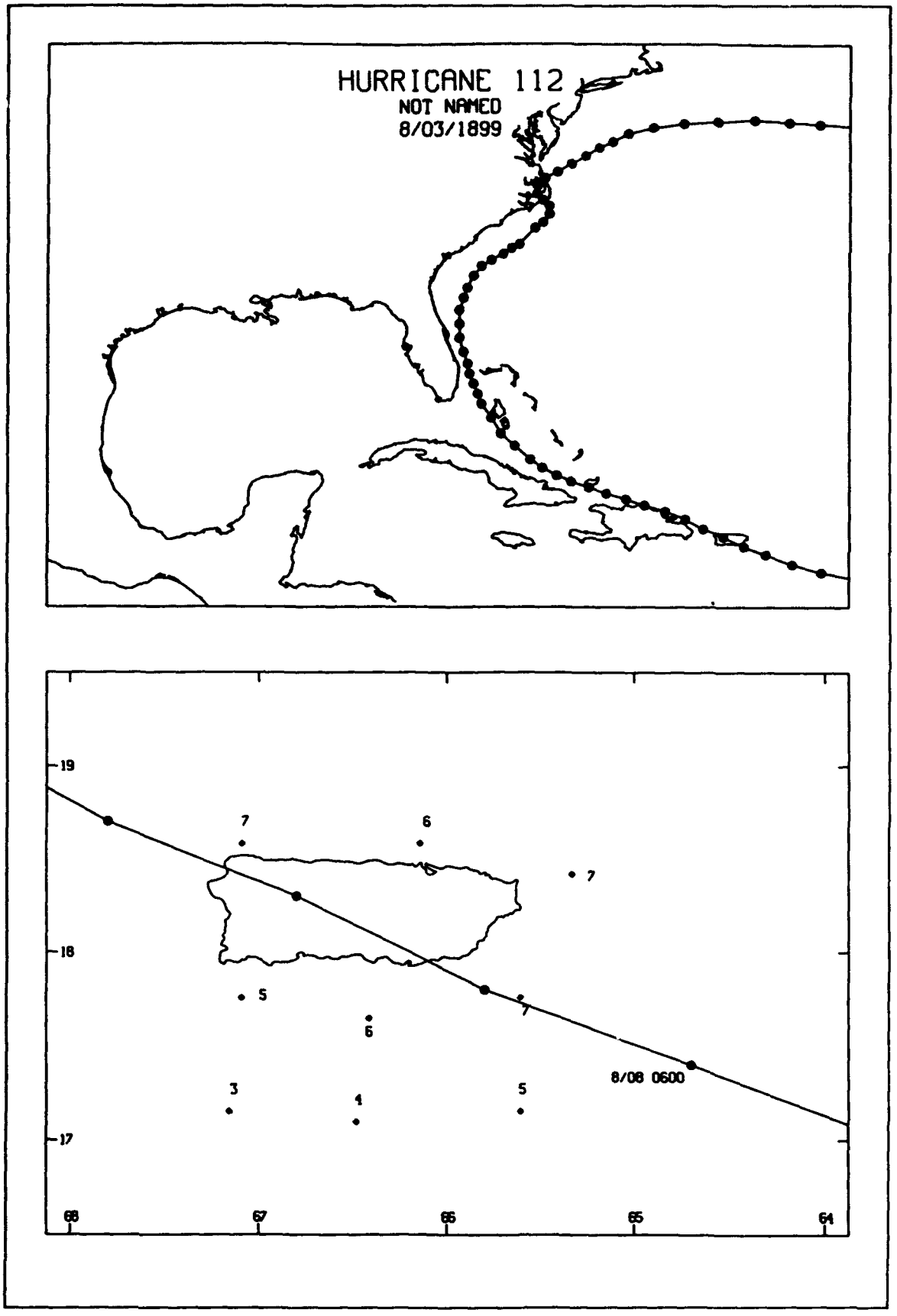
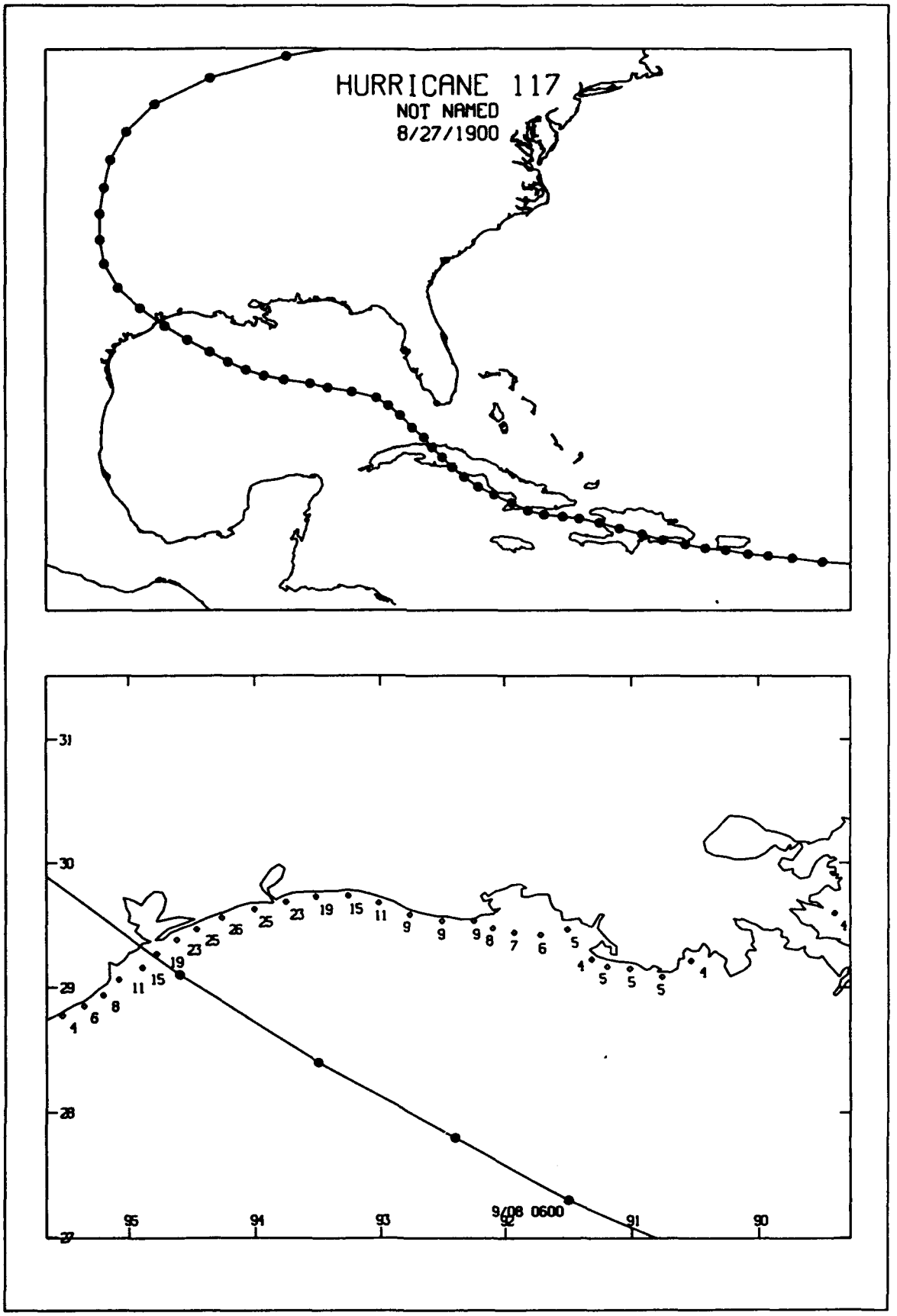
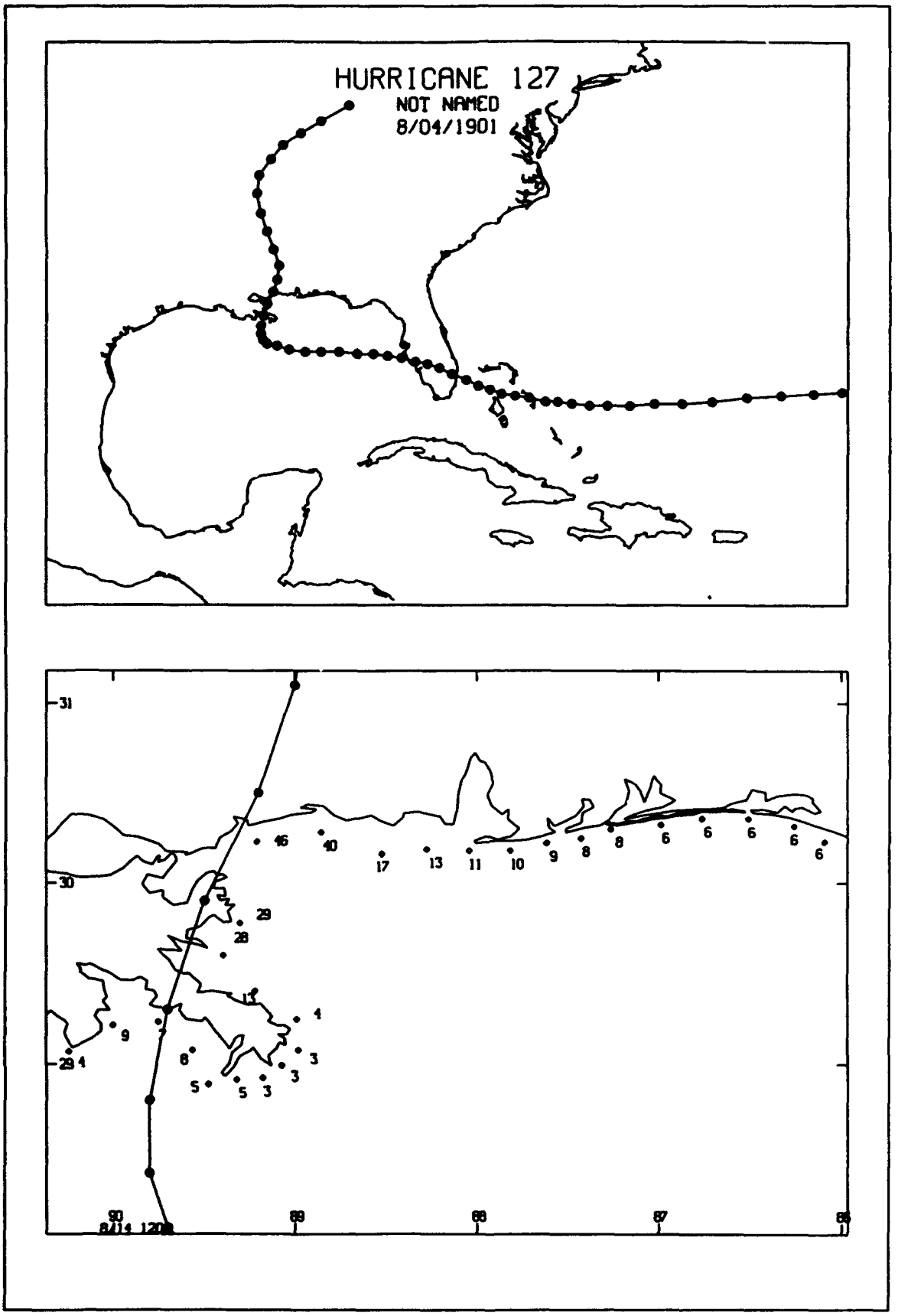
7


HURRICANE 112
NOT NAMED
8/03/1899
19
18
17
7
6
7
5
6
3
4
5
8/08 0600
68
67
66
65
64


HURRICANE 117
NOT NAMED
8/27/1900
31
30
29
28
27
95
94
93
92
91
90
9/08 0600


HURRICANE 127
NOT NAMED
8/04/1901
31
30
29
90
89
88
87
46
40
17
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11
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9
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8
6
6
6
6
6
29
28
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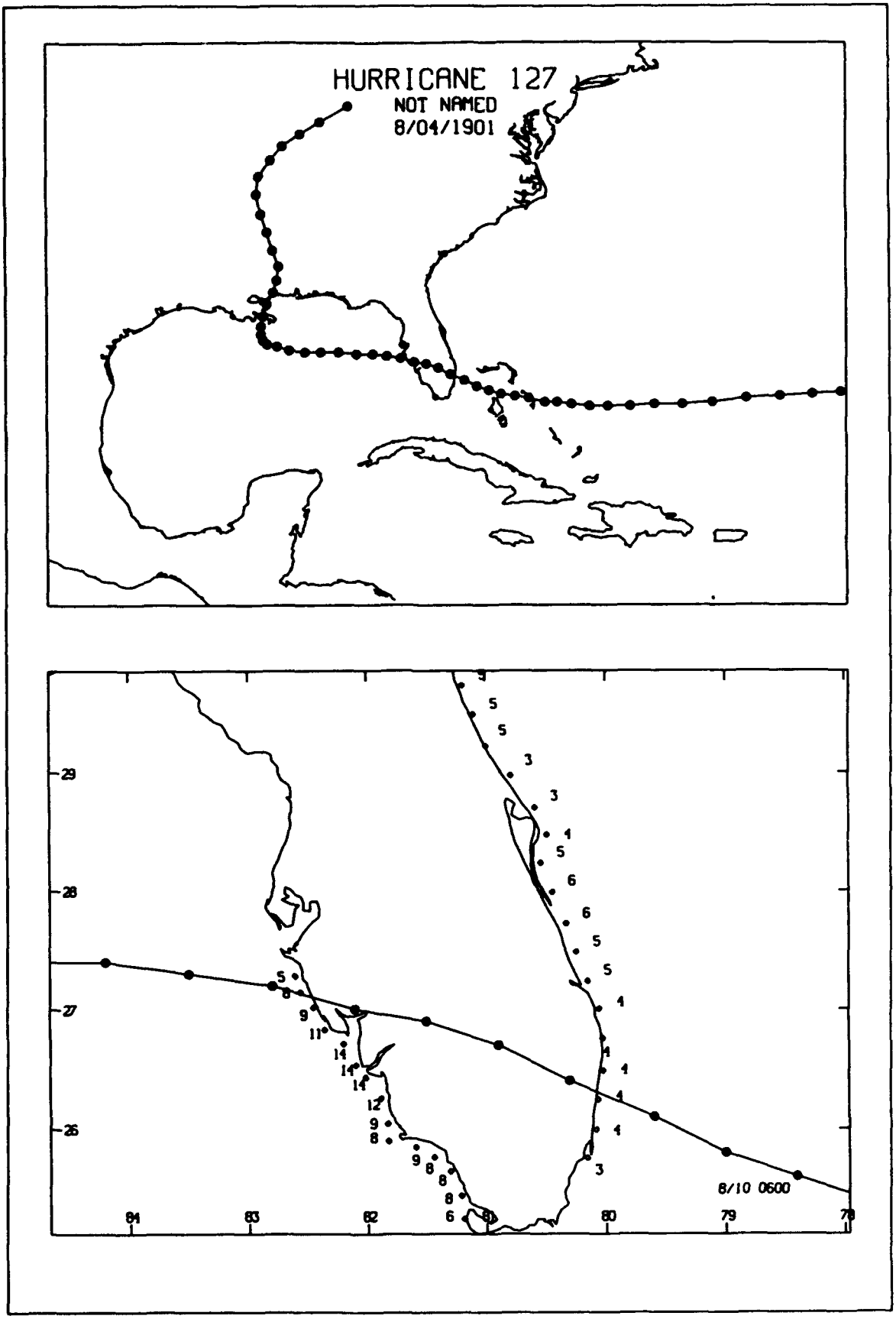
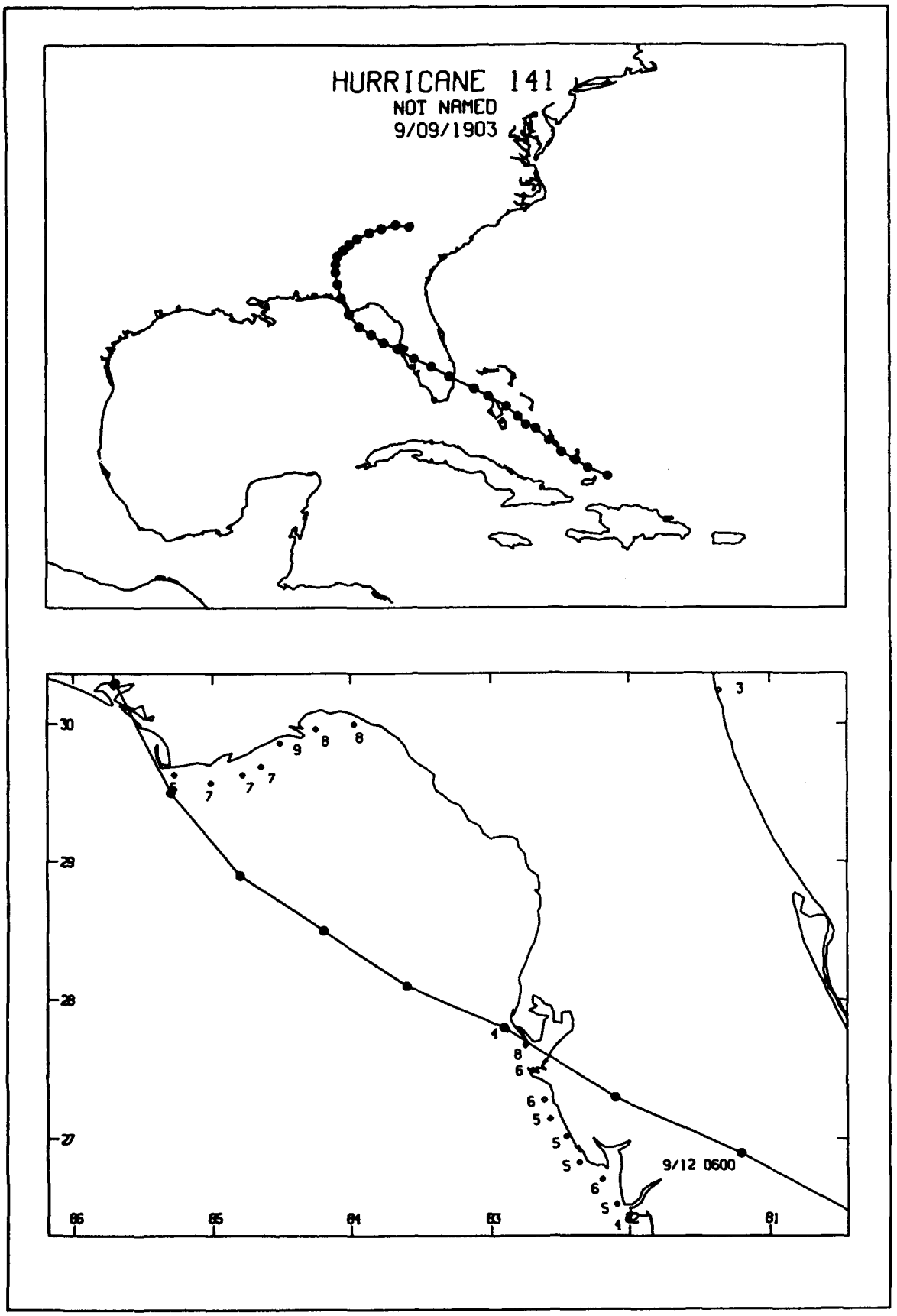
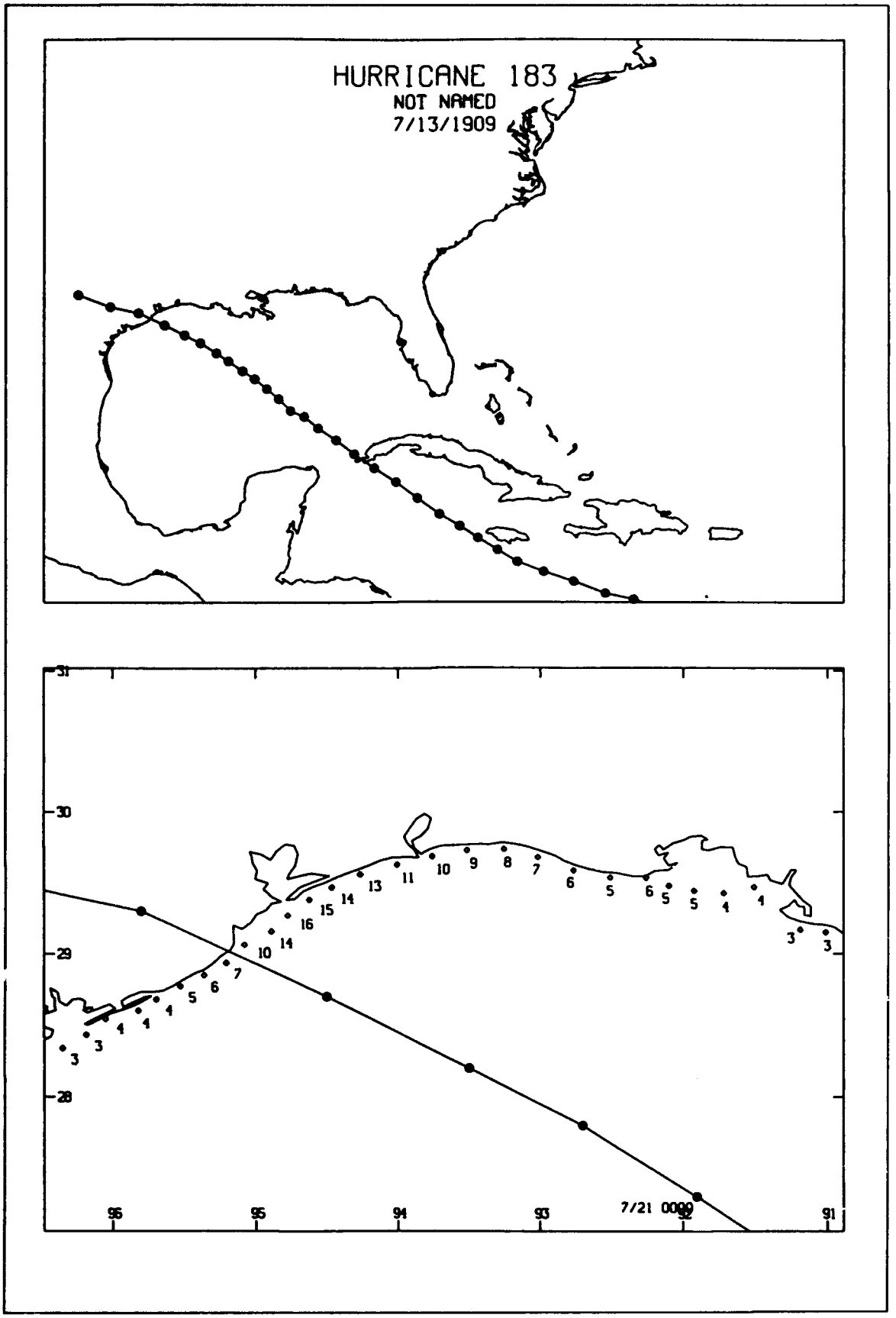
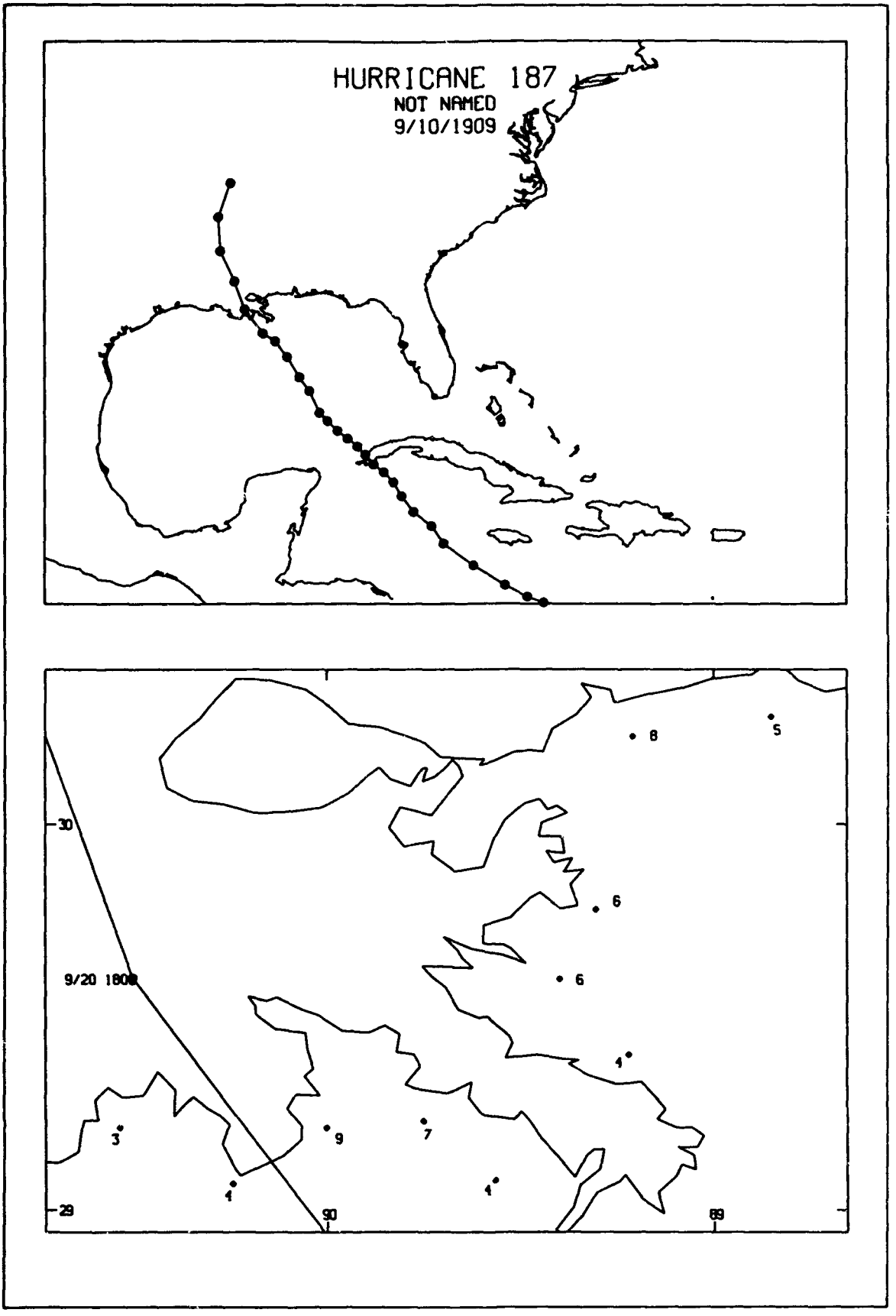
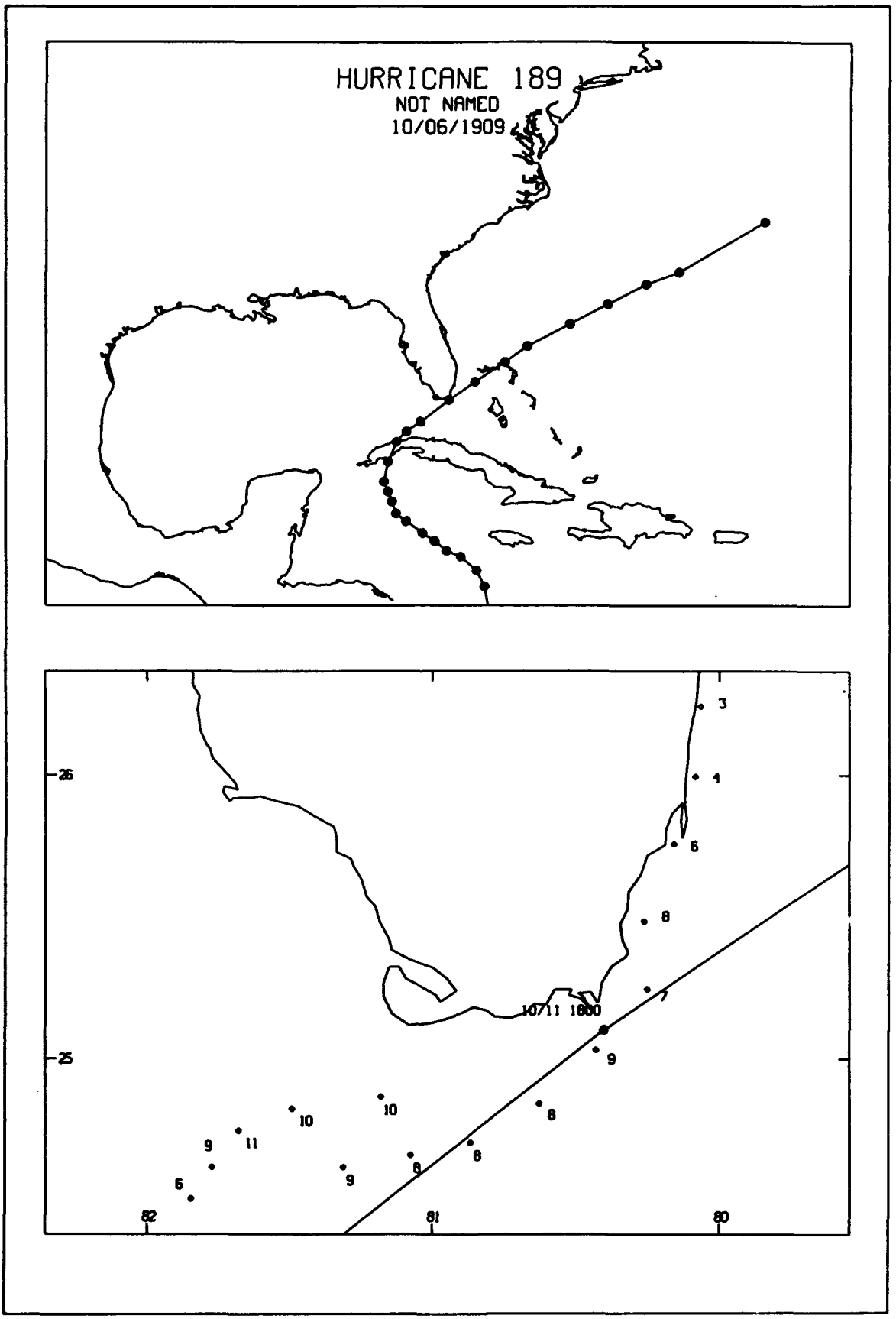
4
3
3

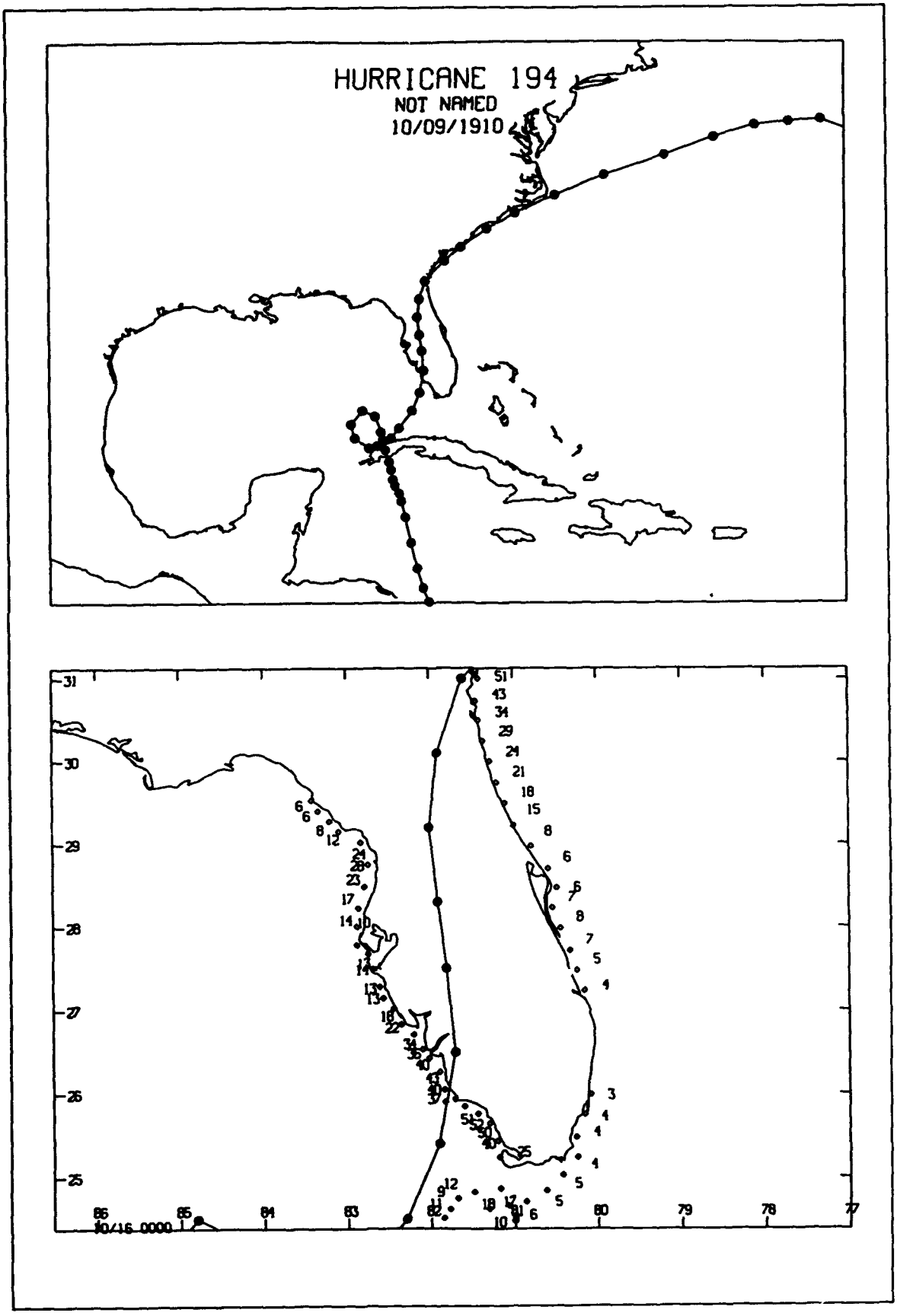

HURRICANE 127
NOT NAMED
8/04/1901
29
28
27
26
84
83
82
81
80
79
78
8/10 0600

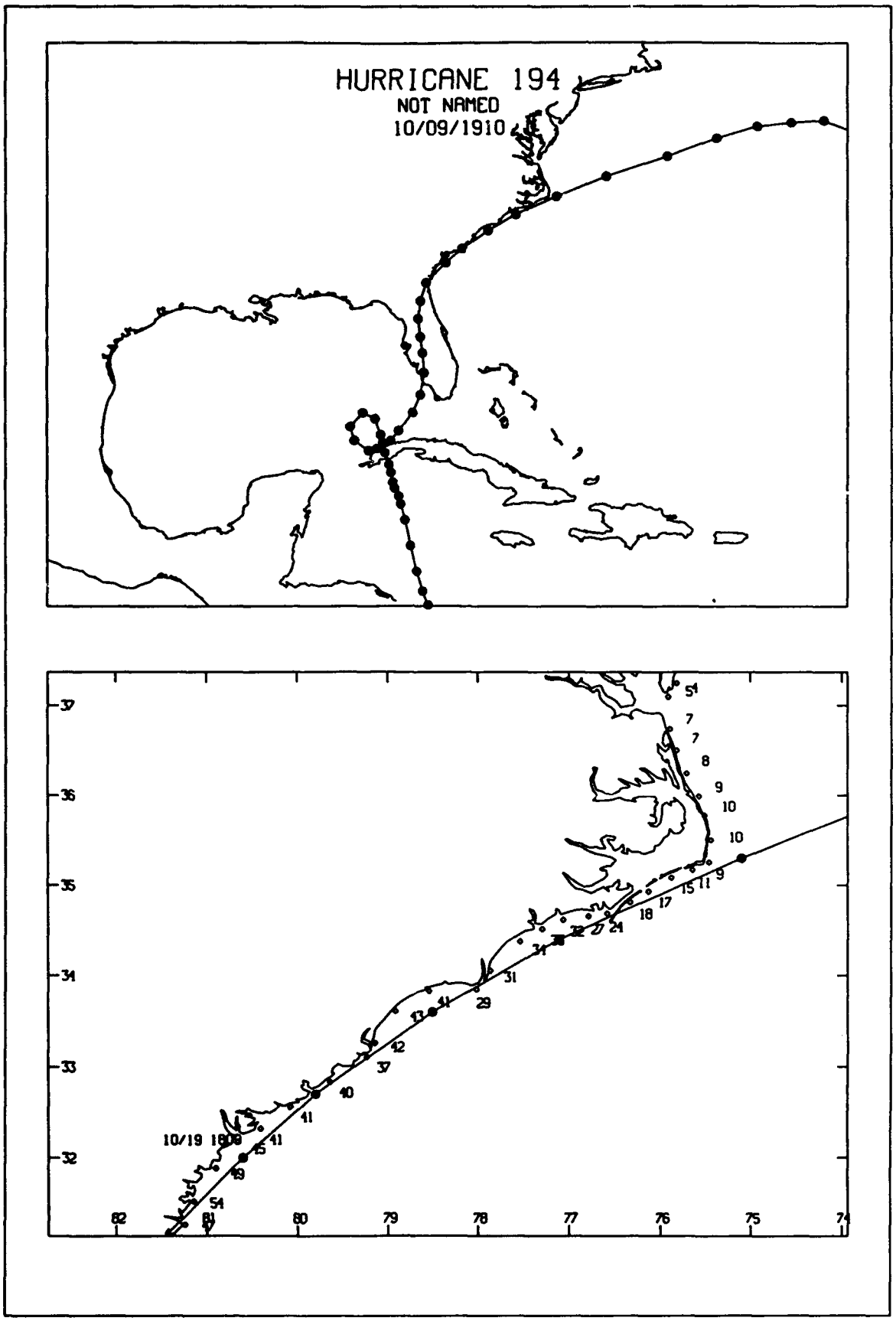

HURRICANE 141
NOT NAMED
9/09/1903
30
29
28
27
86
85
84
83
82
81
9/12 0600

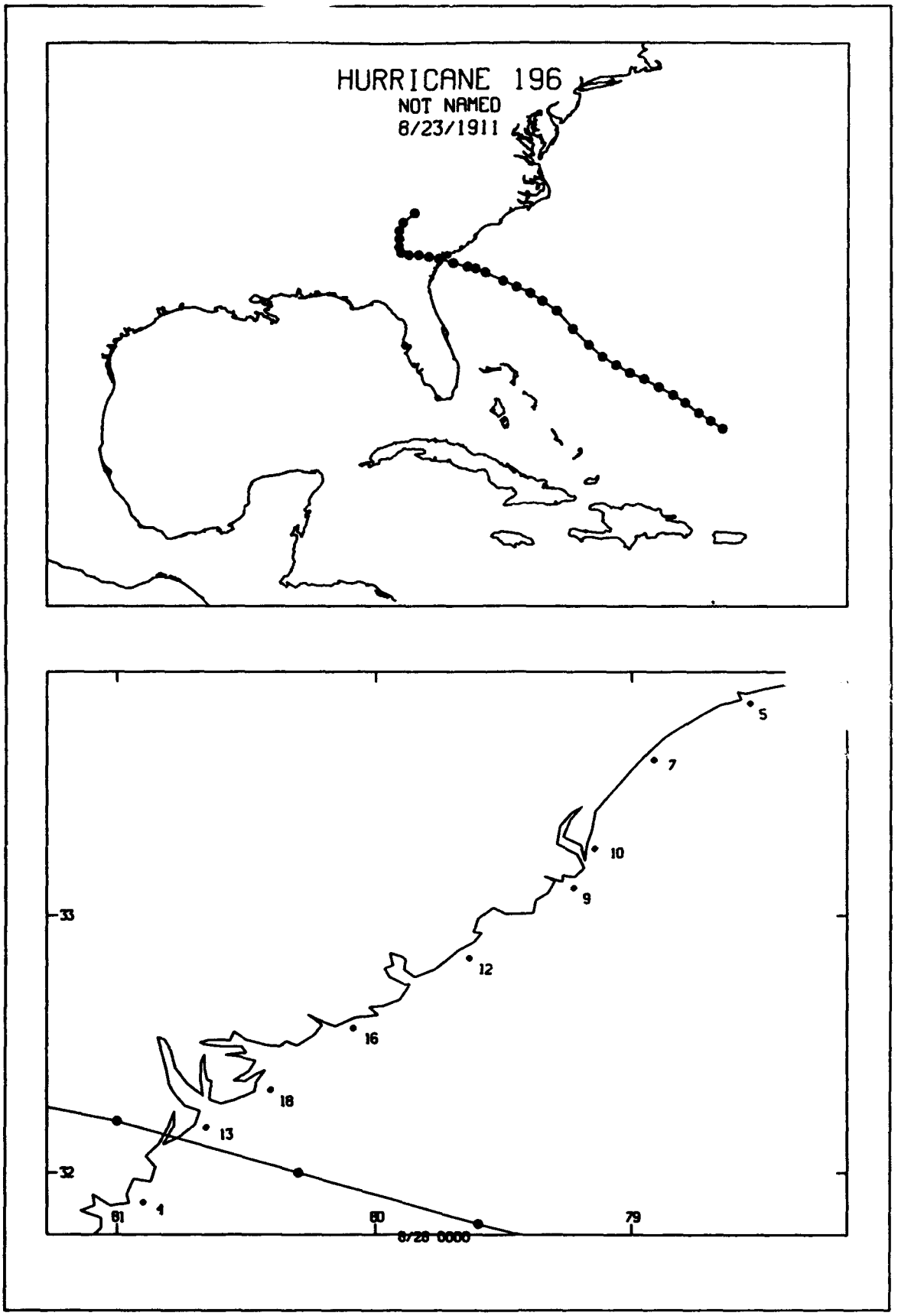

HURRICANE 183
NOT NAMED
7/13/1909
31
30
29
28
96
95
94
93
7/21 0000
91

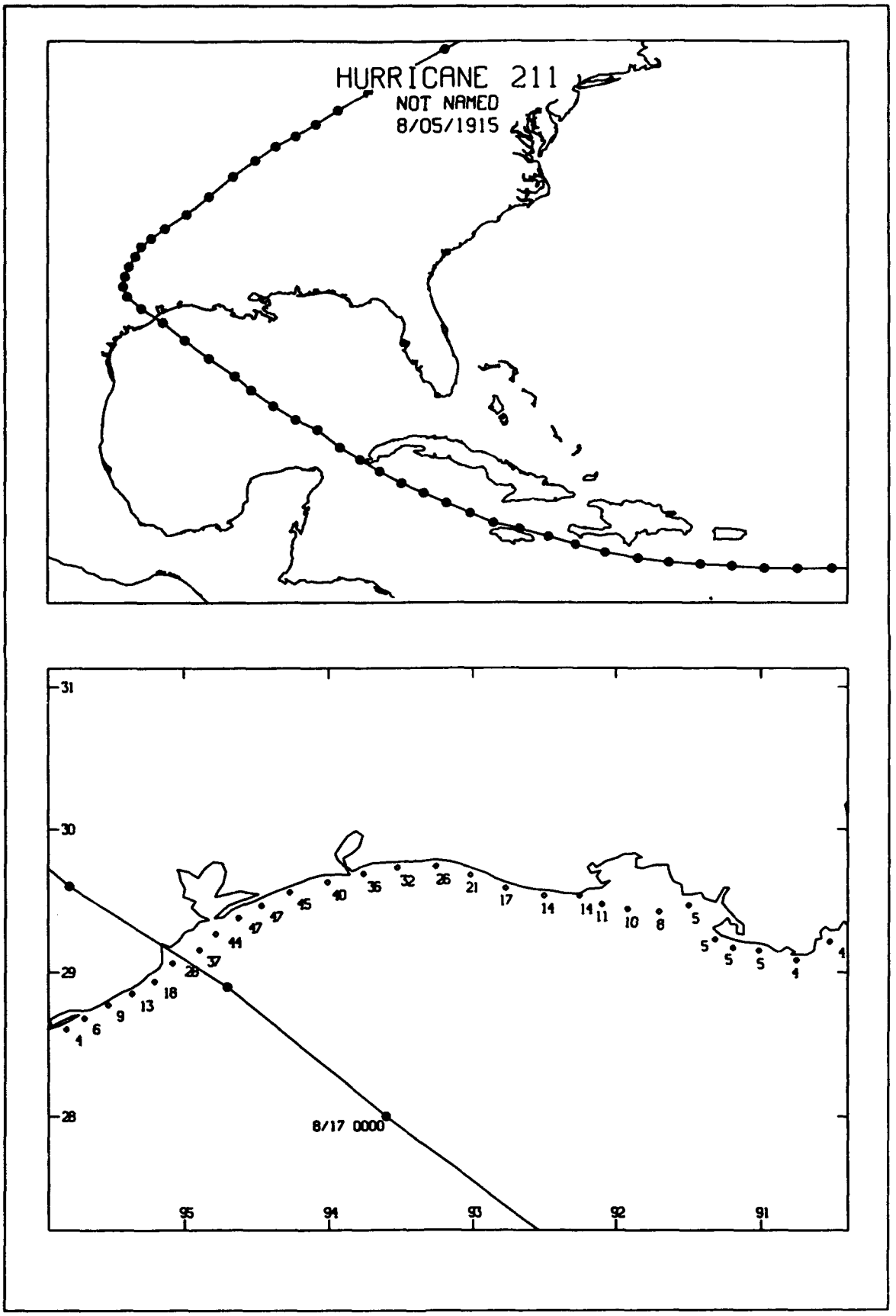

HURRICANE 187
NOT NAMED
9/10/1909
8
5
30
6
9/20 1800
6
4
3
9
7
4
29
90
89


HURRICANE 189
NOT NAMED
10/06/1909
26
25
82
81
80
10/11 1800
3
4
6
8
7
9
8
8
6
9
10
10
11
9
6


HURRICANE 194
NOT NAMED
10/09/1910
31
30
29
28
27
26
25
86
85
84
83
82
81
80
79
78
77
10/16 0000


HURRICANE 194
NOT NAMED
10/09/1910
37
36
35
34
33
32
82
81
80
79
78
77
76
75
74
10/19 1800


HURRICANE 196
NOT NAMED
8/23/1911
5
7
10
9
12
16
18
13
4
33
32
81
80
79
8/28 0000


HURRICANE 211
NOT NAMED
8/05/1915
31
30
29
28
95
94
93
92
91
8/17 0000
4
6
9
13
18
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37
44
47
47
45
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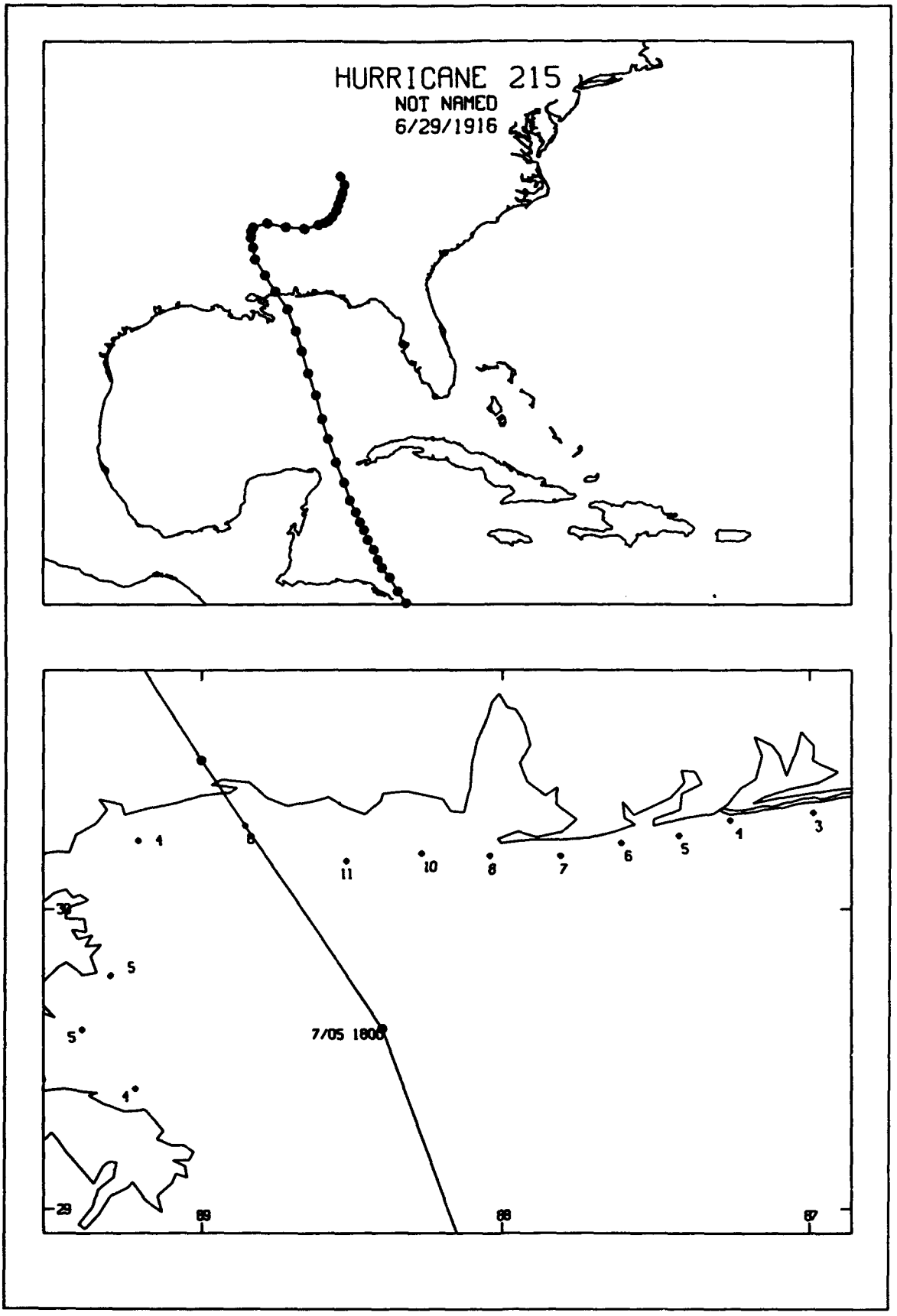
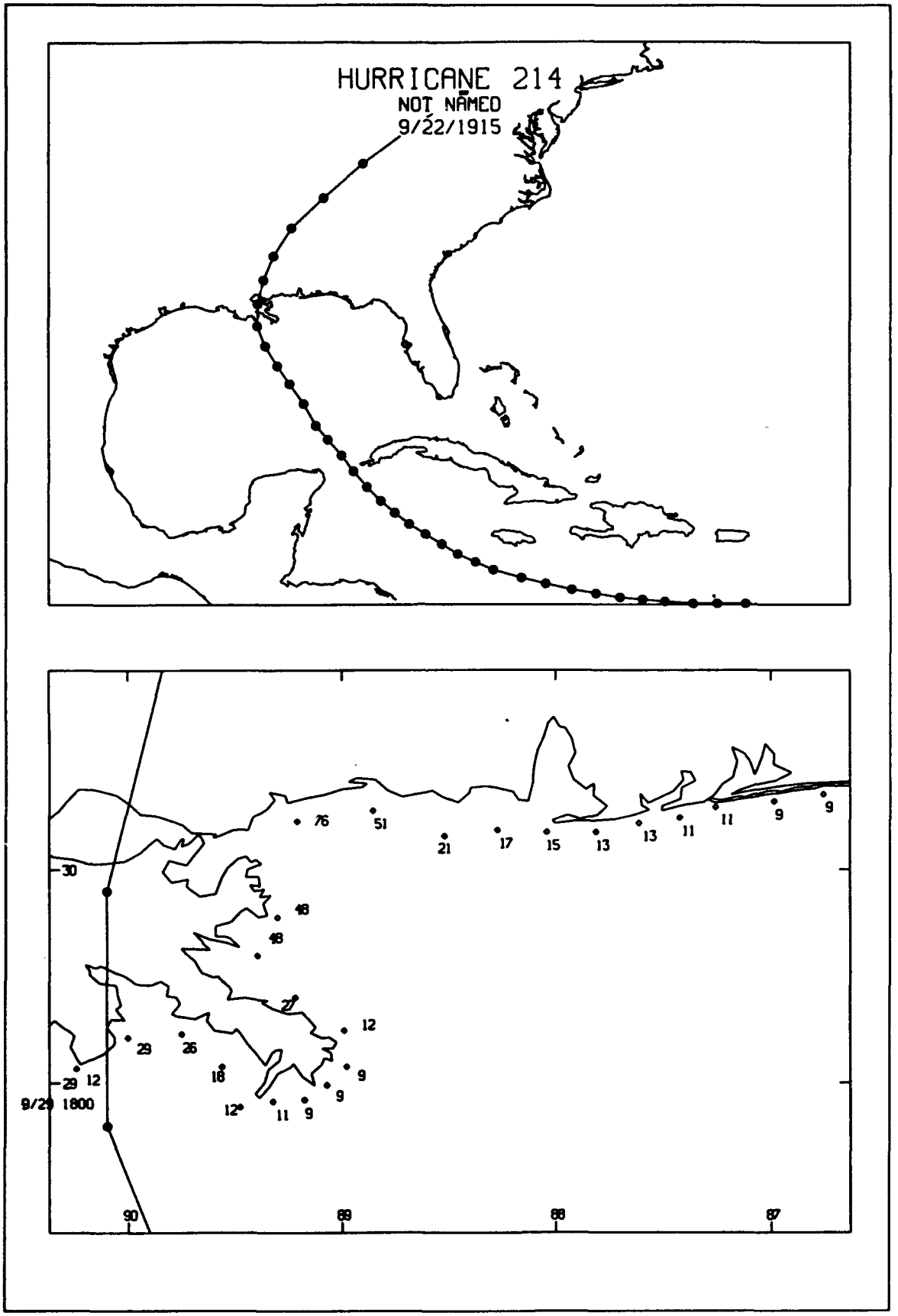
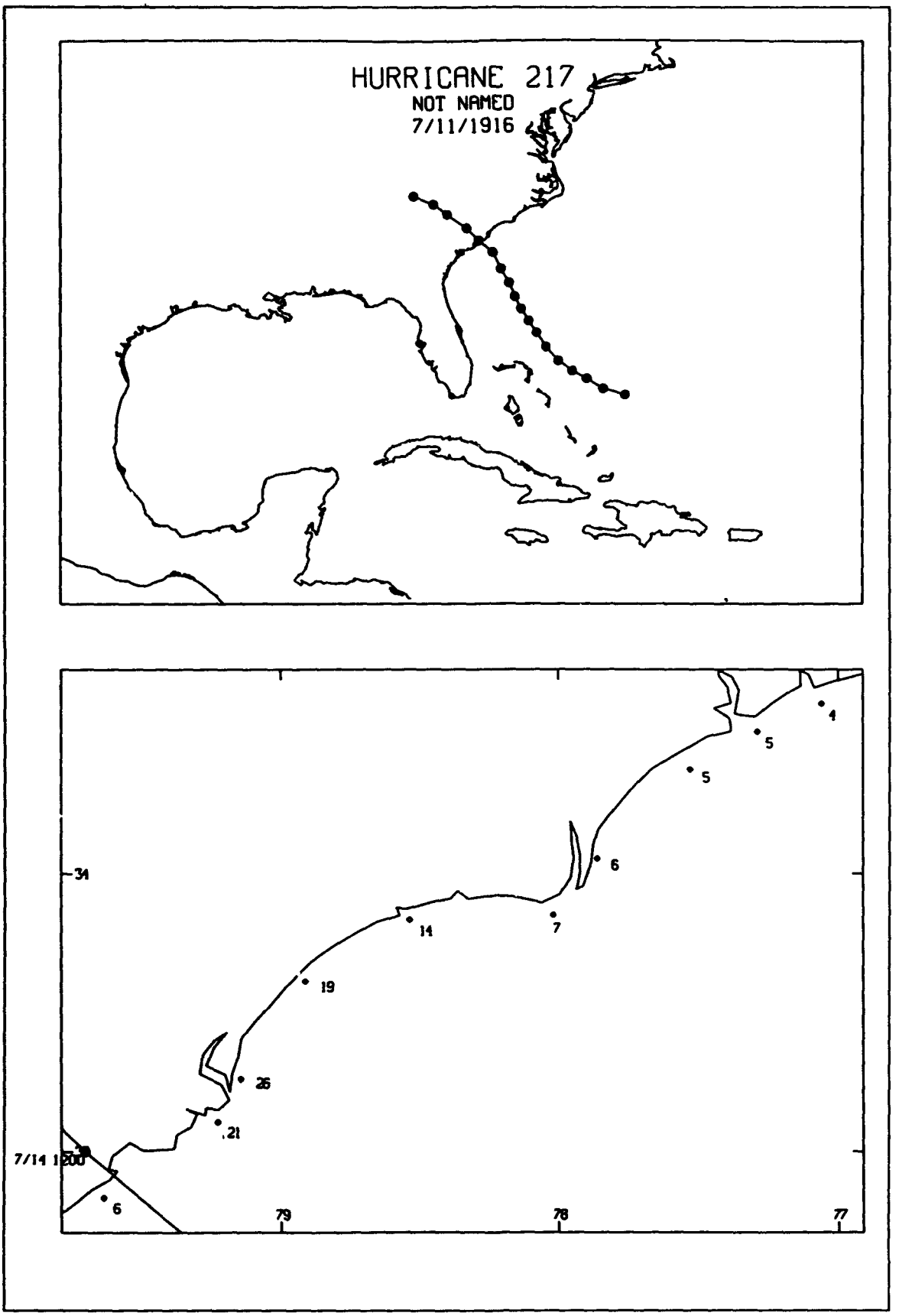
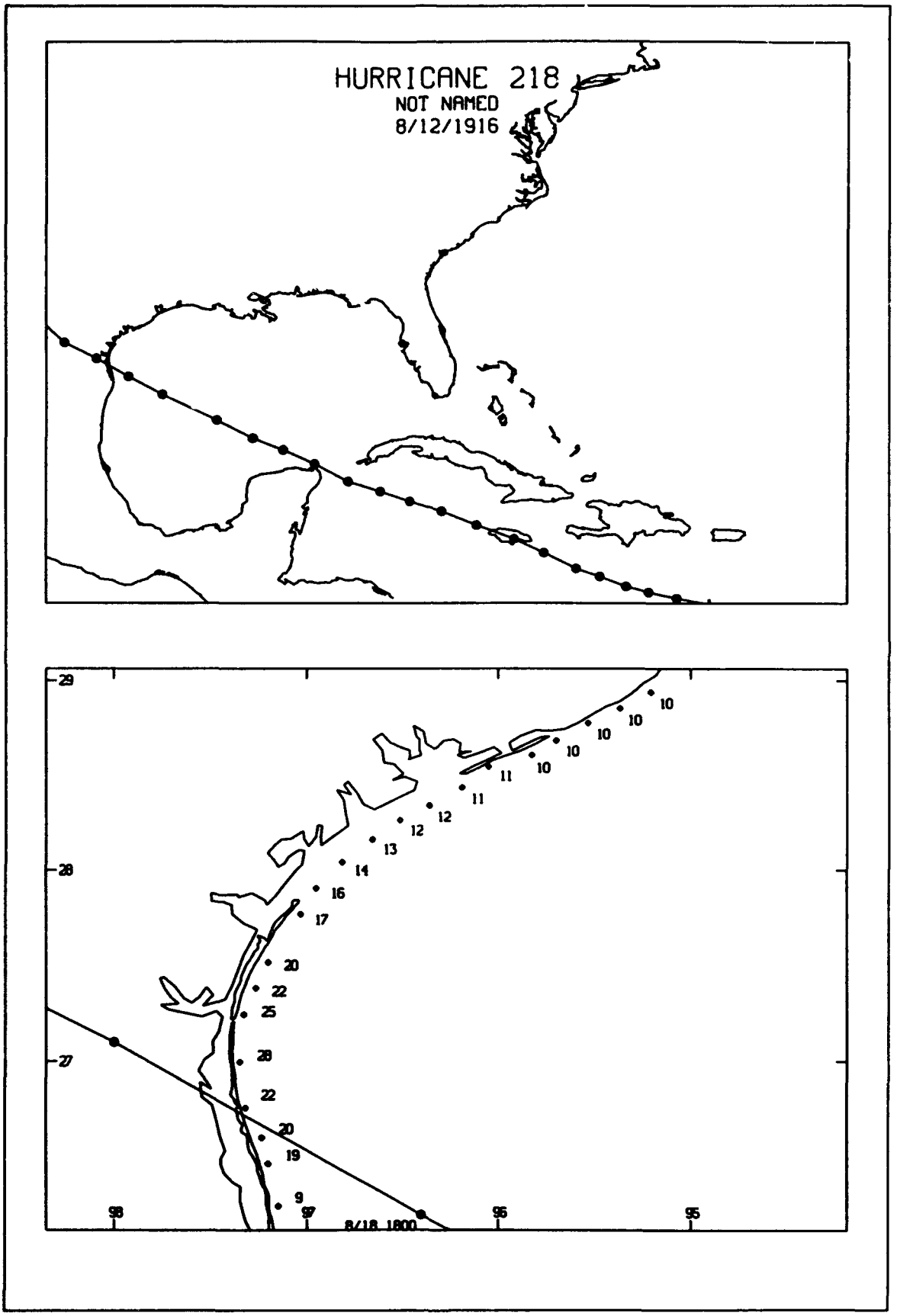
5
4


HURRICANE 215
NOT NAMED
6/29/1916
7/05 1800
30
29
89
88
87


HURRICANE 214
NOT NAMED
9/22/1915
76
51
21
17
15
13
13
11
11
9
9
30
48
48
12
29
26
18
9
9
29 12
9/29 1800
12
11
9
90
89
88
87


HURRICANE 217
NOT NAMED
7/11/1916
4
5
5
6
34
14
7
19
26
21
7/14 1200
6
79
78
77


HURRICANE 218
NOT NAMED
8/12/1916
29
28
27
98
97
95
95
8/18 1800
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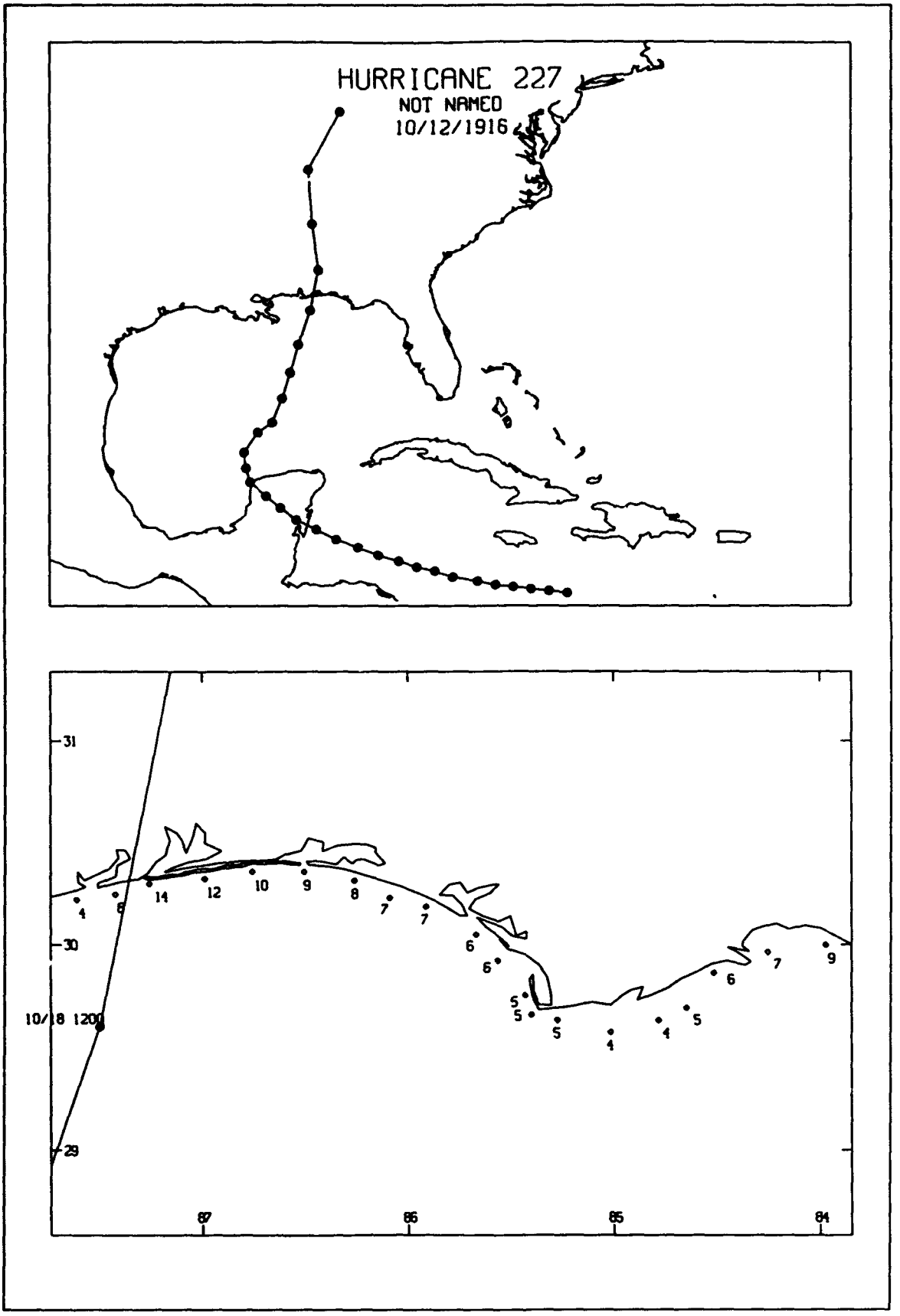
HURRICANE 227
NOT NAMED
10/12/1916
31
30
29
10/18 1200
87
86
85
84
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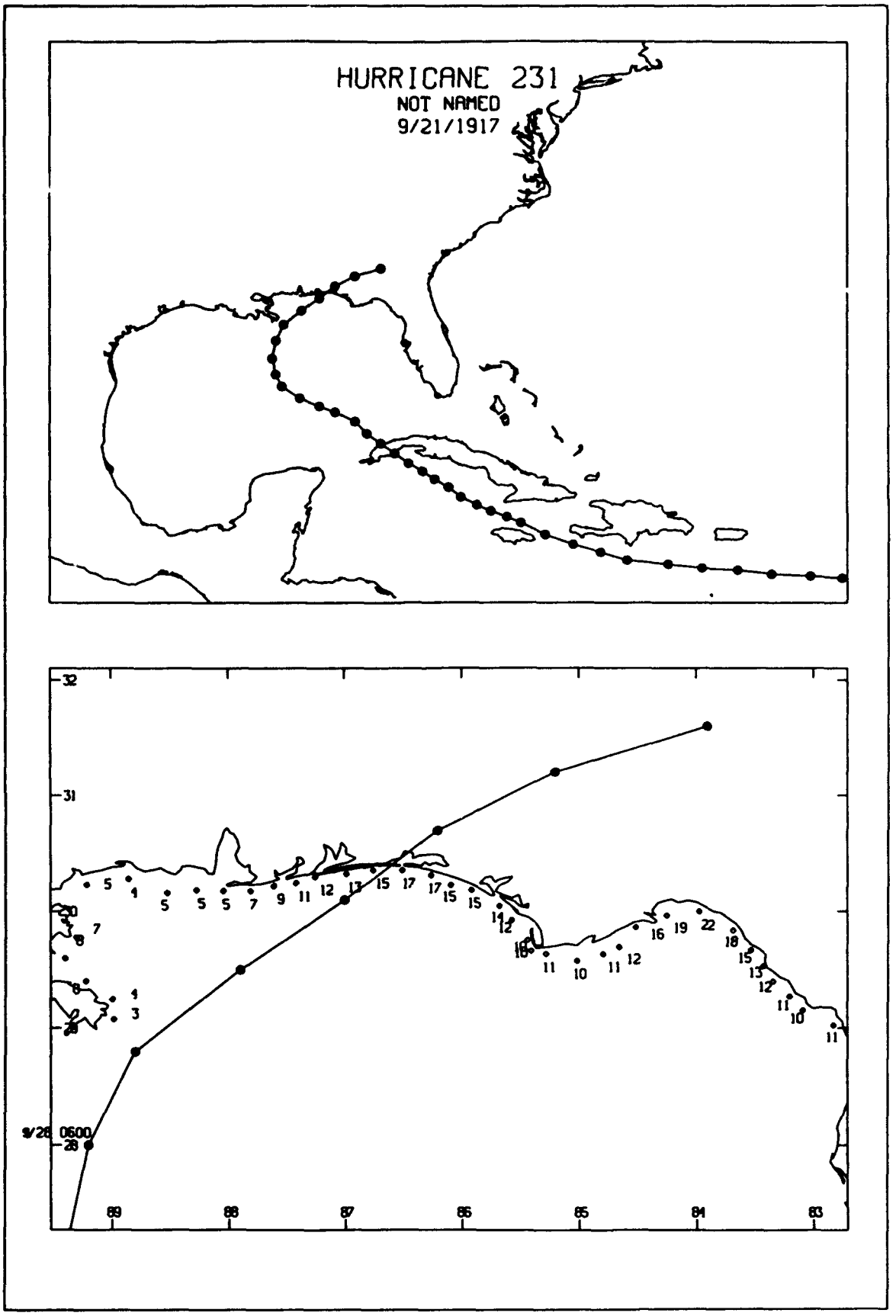
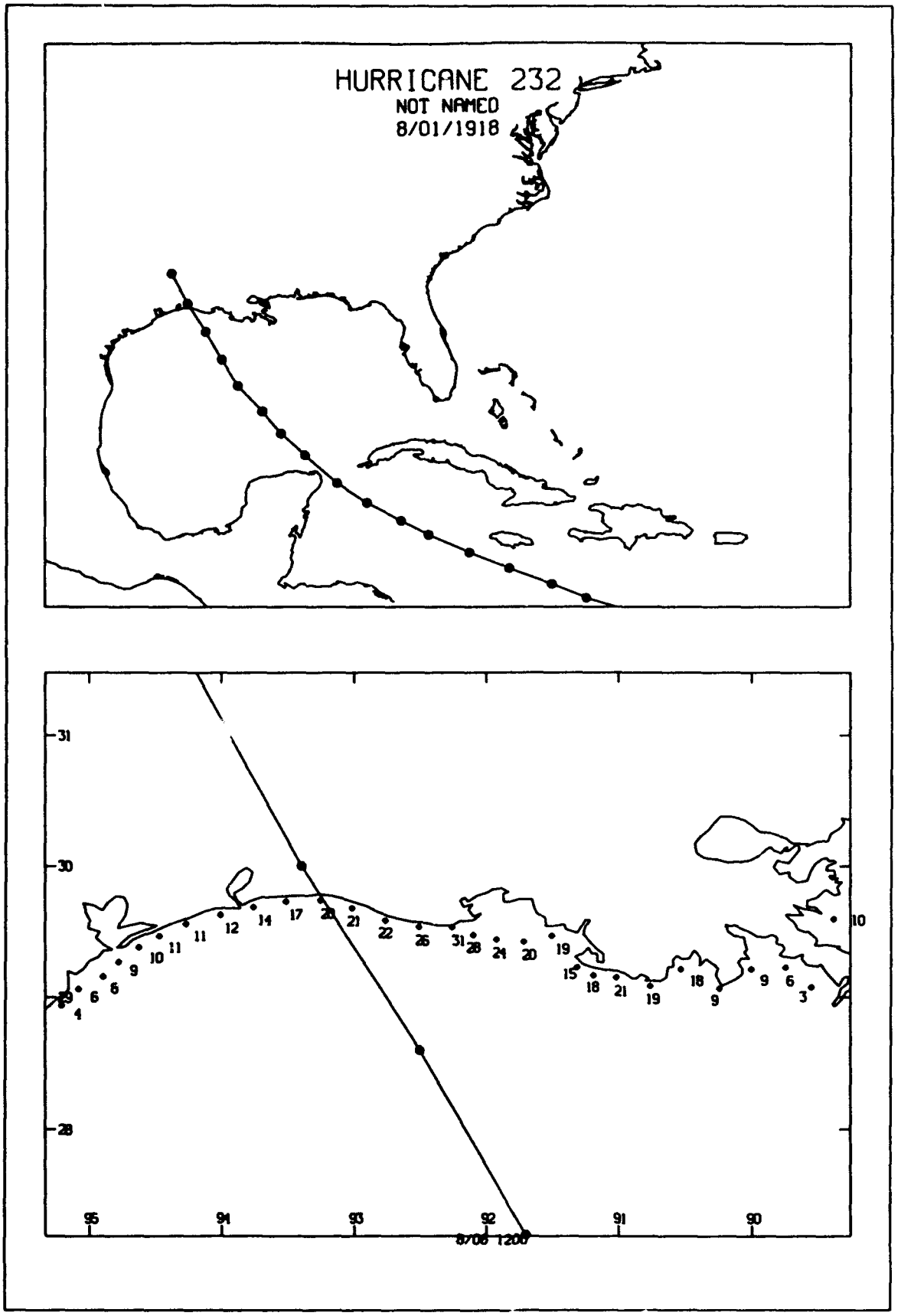
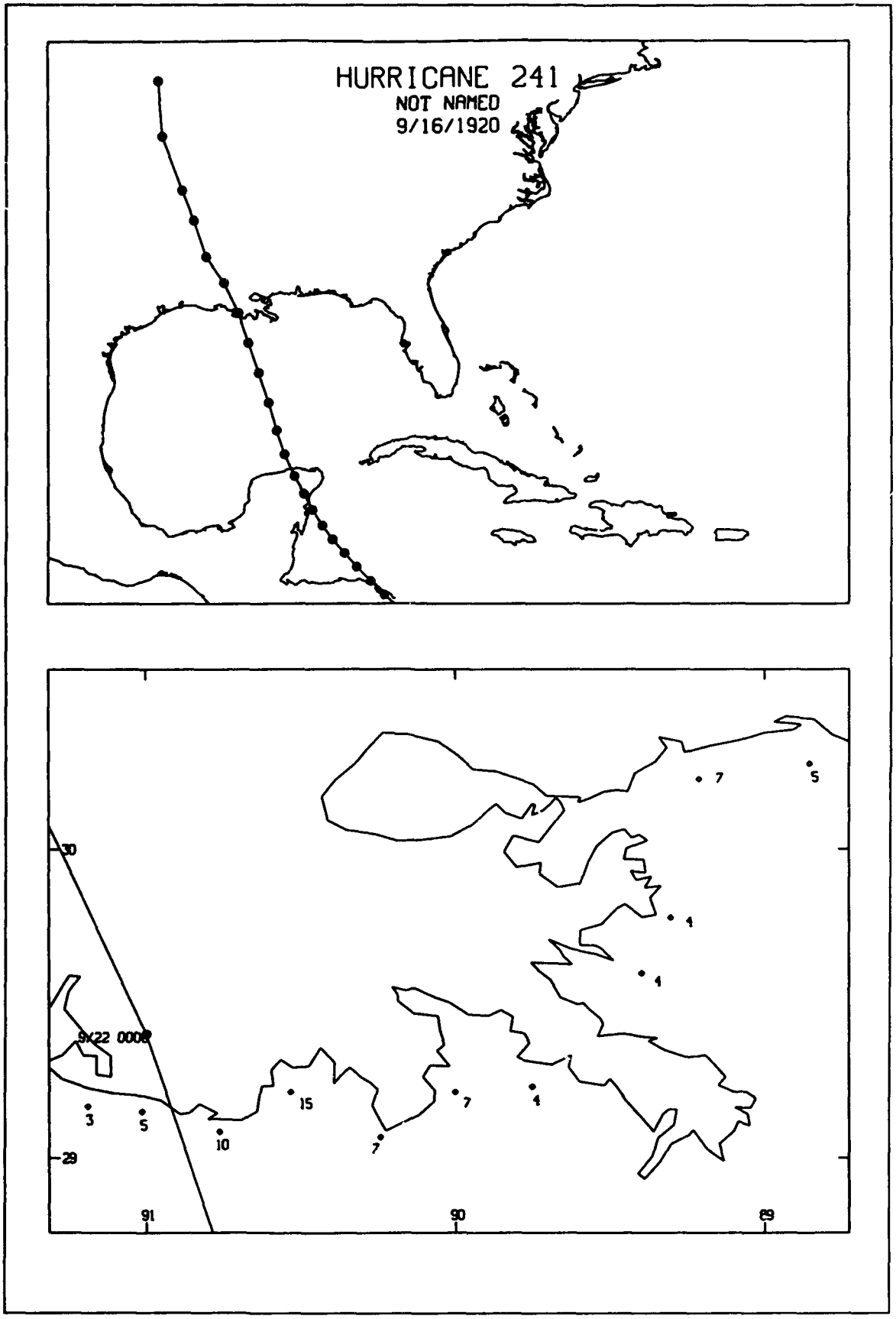

HURRICANE 231
NOT NAMED
9/21/1917
32
31
9/26 0600
28
89
88
87
86
85
84
83


HURRICANE 232
NOT NAMED
8/01/1918
31
30
28
95
94
93
92
91
90
8/06 1200


HURRICANE 241
NOT NAMED
9/16/1920
30
29
91
90
89
9X22 0000
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15
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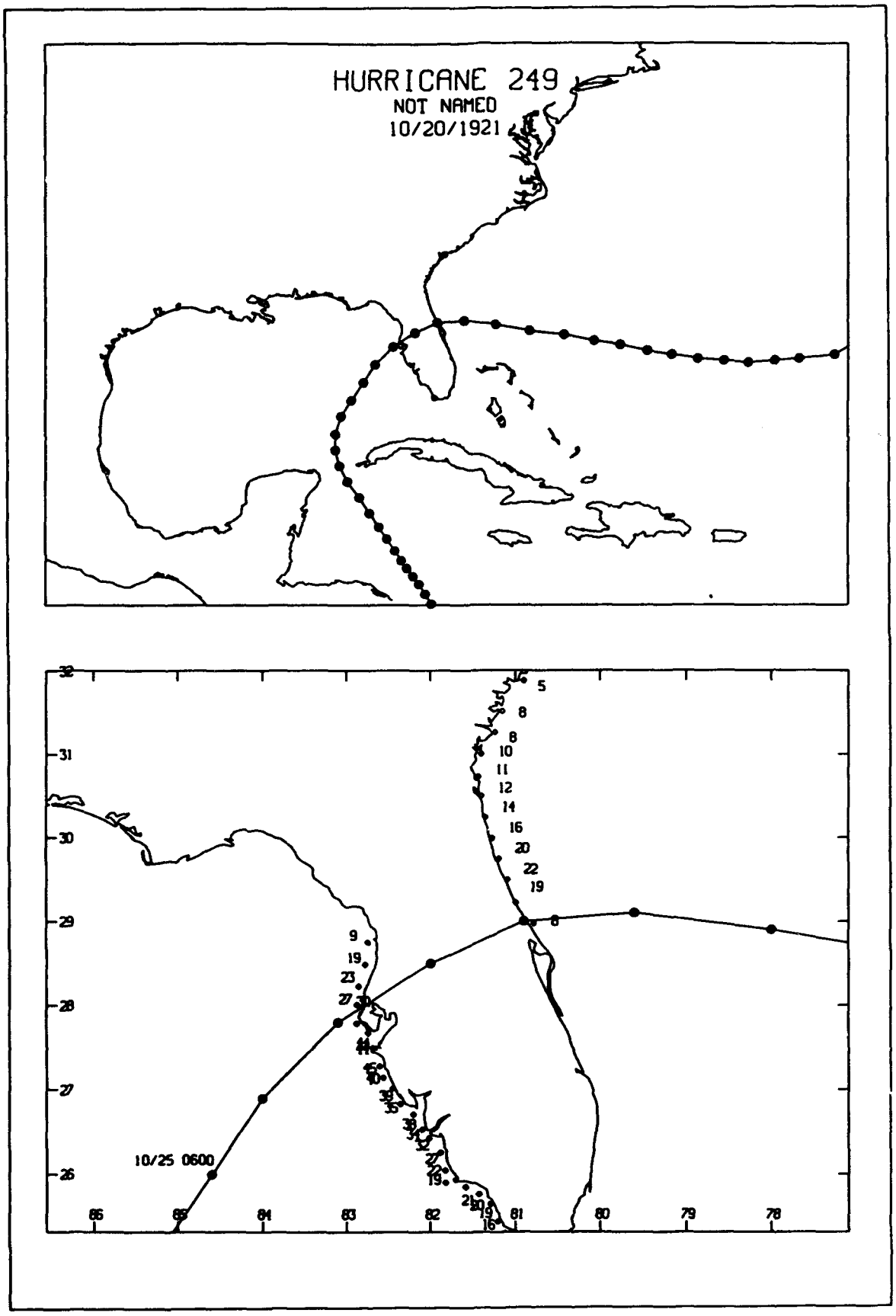
4


HURRICANE 249
NOT NAMED
10/20/1921
32
31
30
29
28
27
26
10/25 0600
86
85
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83
82
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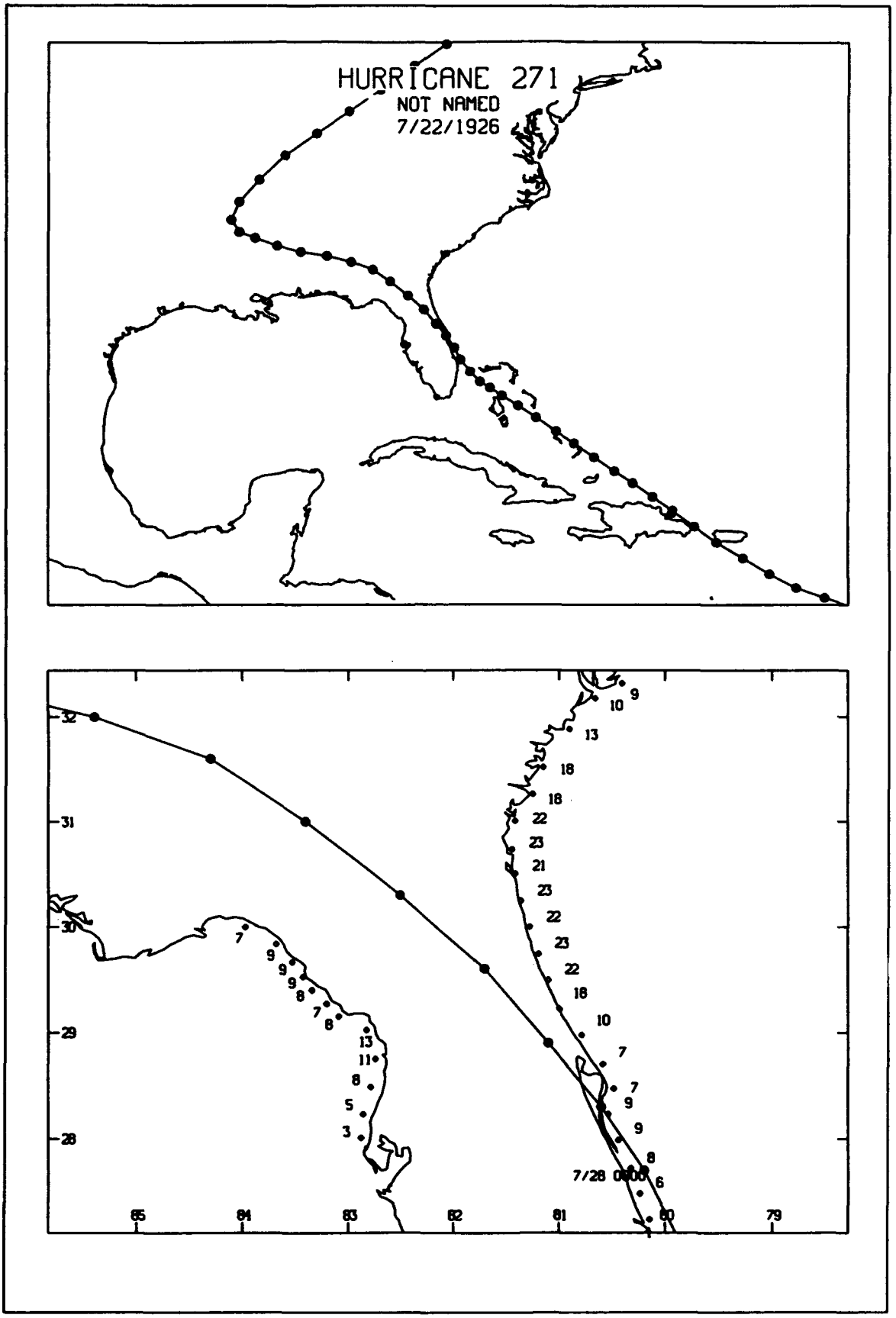
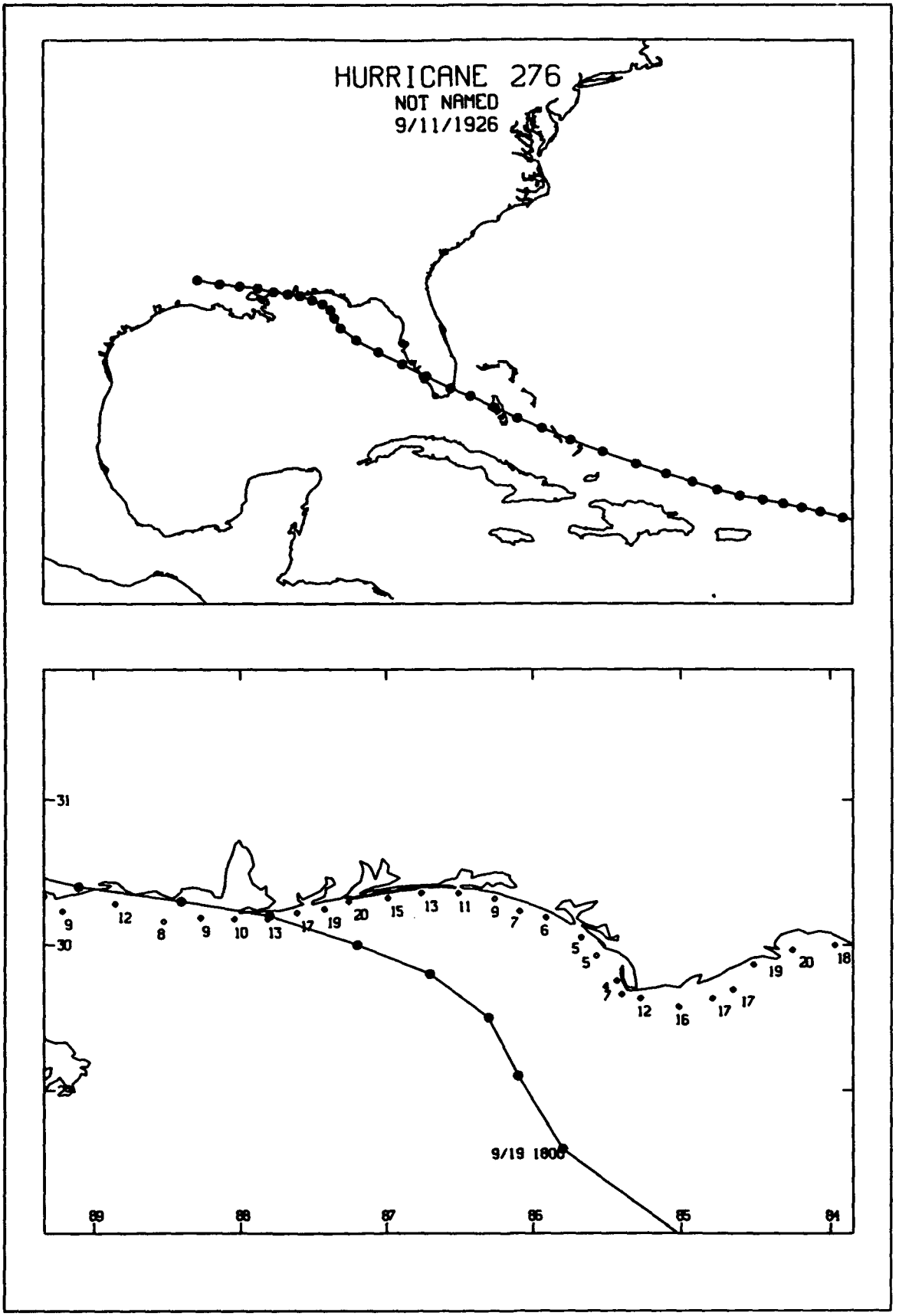
80
79
78


HURRICANE 271
NOT NAMED
7/22/1926
32
31
30
29
28
85
84
83
82
81
80
79
7/28 0600


HURRICANE 276
NOT NAMED
9/11/1926
31
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18
9/19 1800
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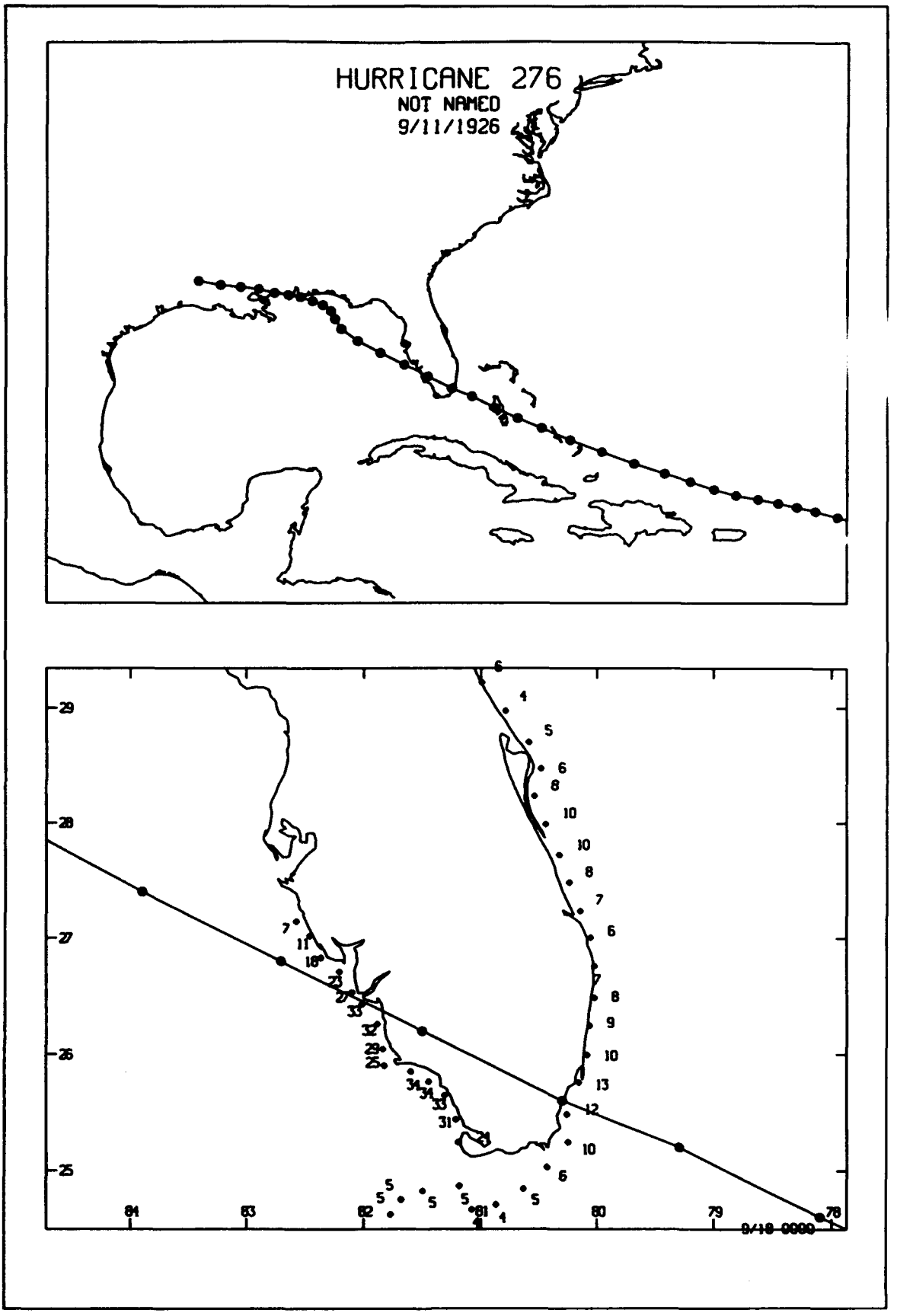
86
85
84


HURRICANE 276
NOT NAMED
9/11/1926
29
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84
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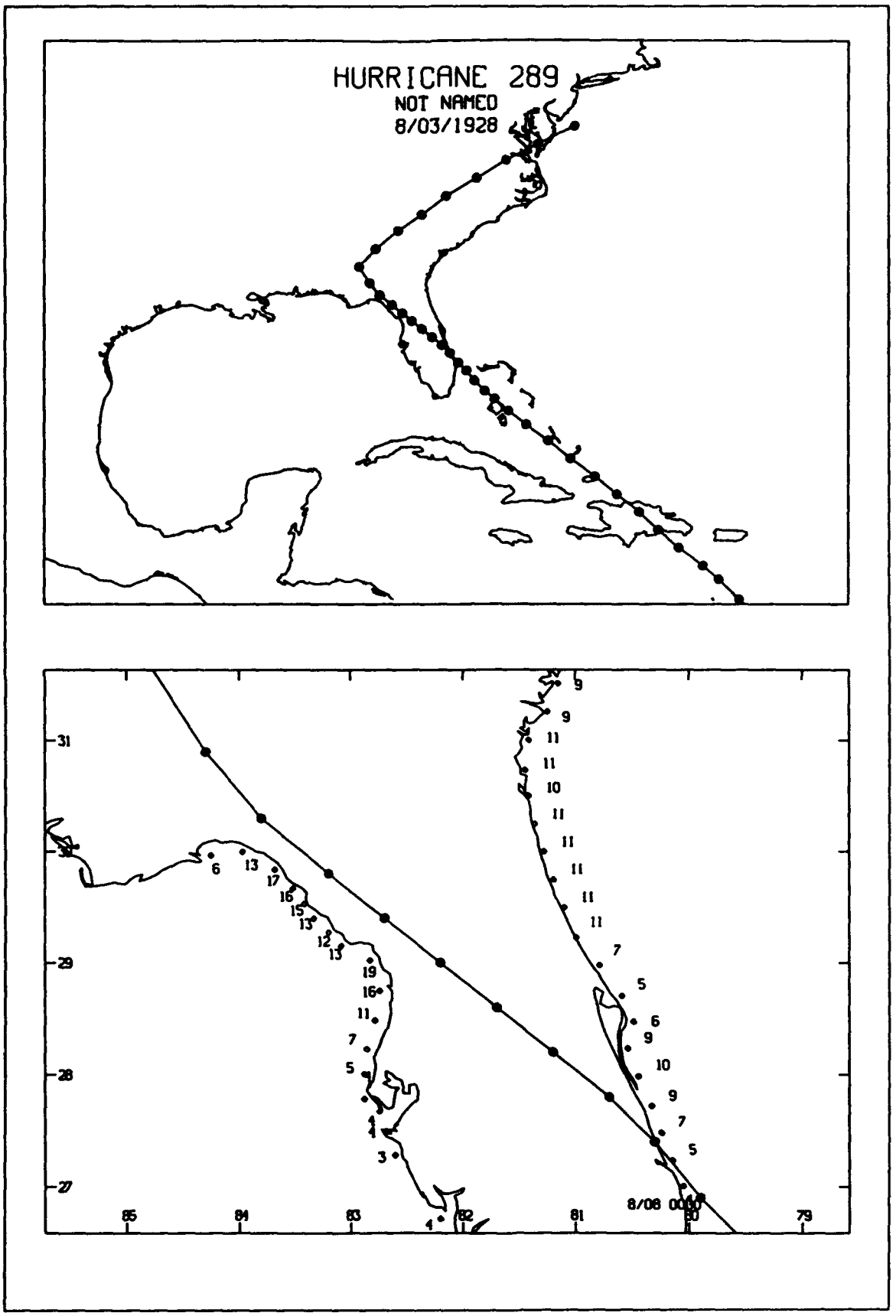
78
9/18 0000


HURRICANE 289
NOT NAMED
8/03/1928
31
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28
27
85
84
83
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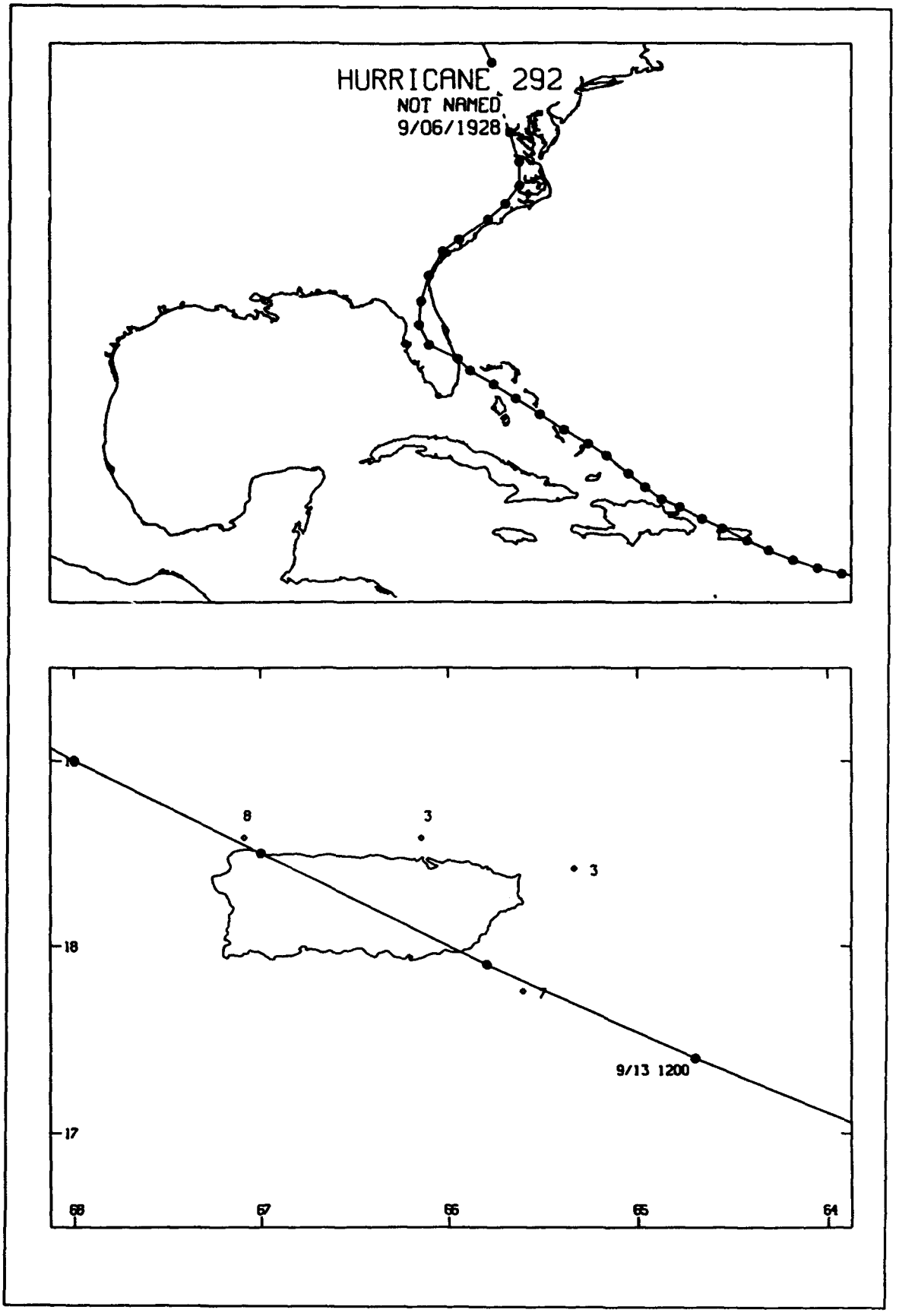
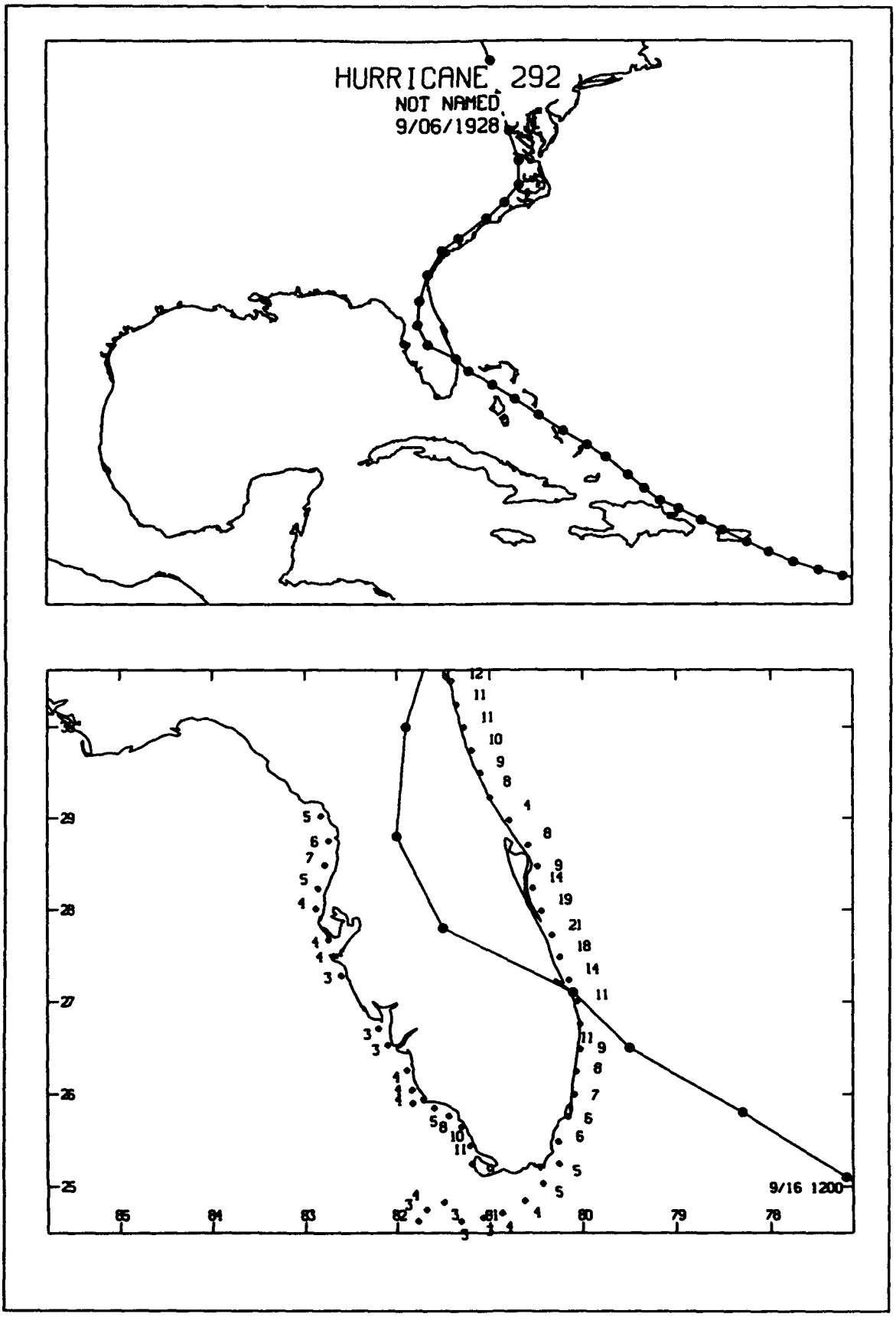
79
8/08 0000


HURRICANE 292
NOT NAMED
9/06/1928
8
3
3
9/13 1200
18
17
68
67
66
65
64


HURRICANE 292
NOT NAMED
9/06/1928
9/16 1200
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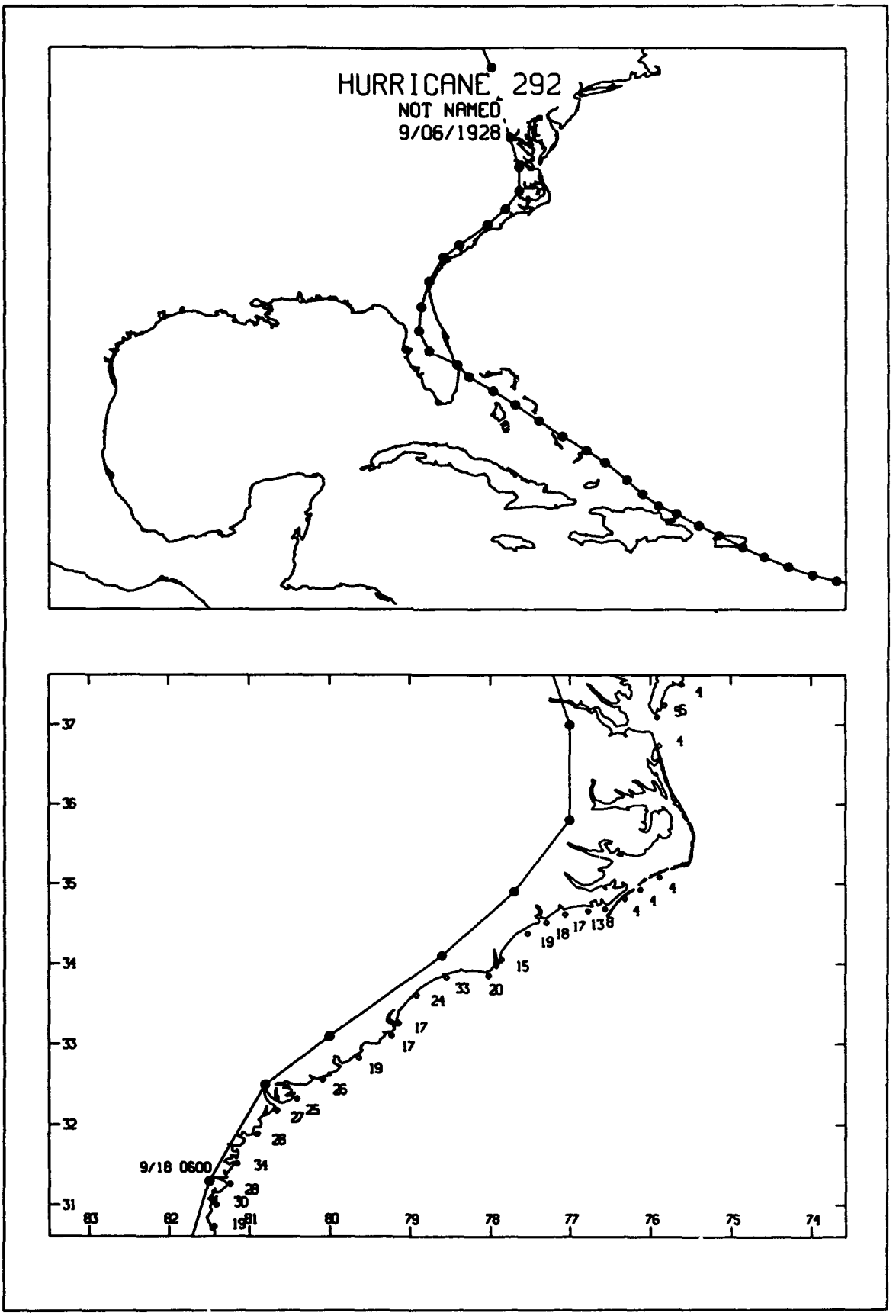
HURRICANE 292
NOT NAMED
9/06/1928
9/18 0600
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81
80
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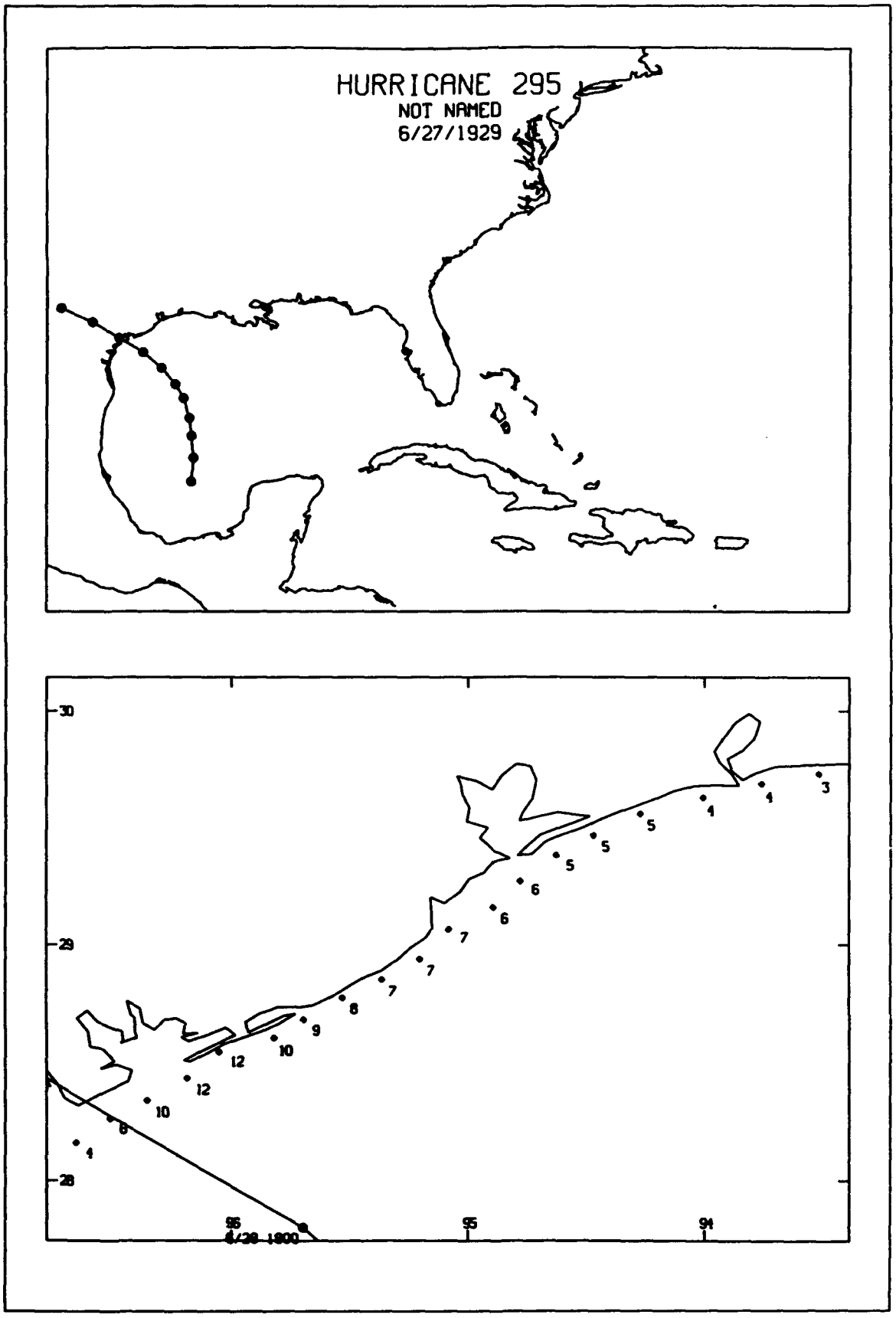
HURRICANE 295
NOT NAMED
6/27/1929
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94
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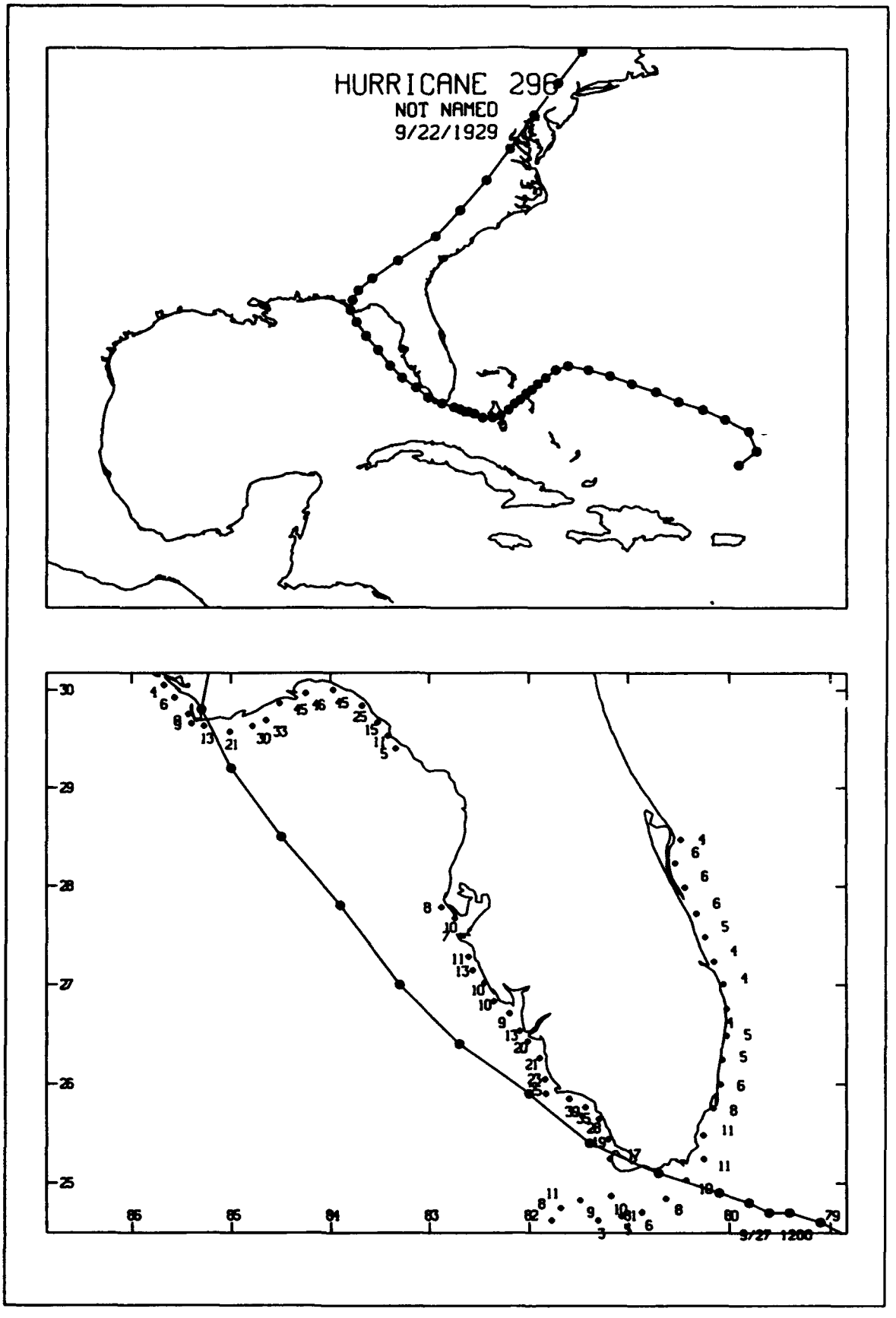
HURRICANE 296
NOT NAMED
9/22/1929
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86
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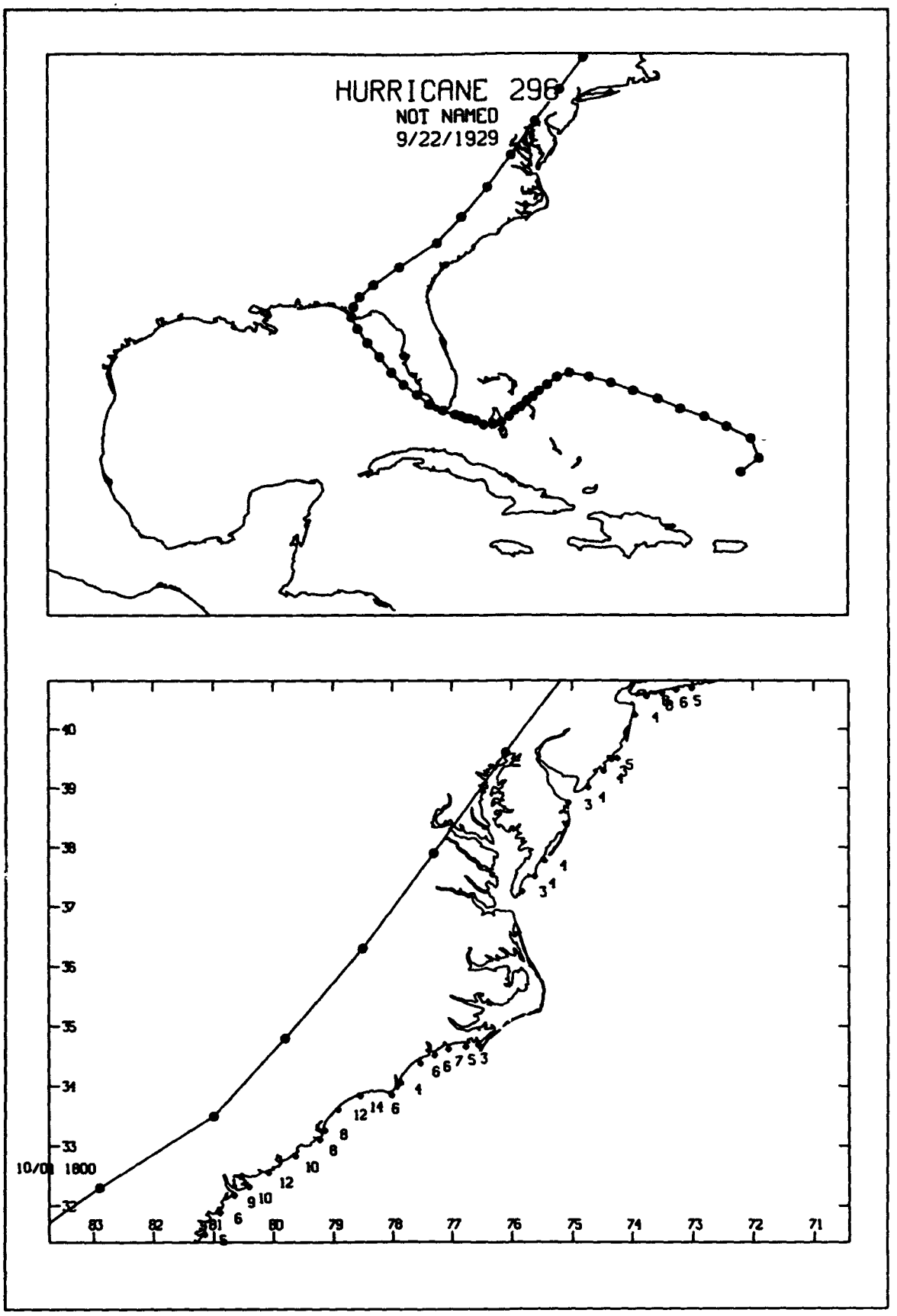
81
80
79
9/27 1200


HURRICANE 296
NOT NAMED
9/22/1929
10/01 1800
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82
81
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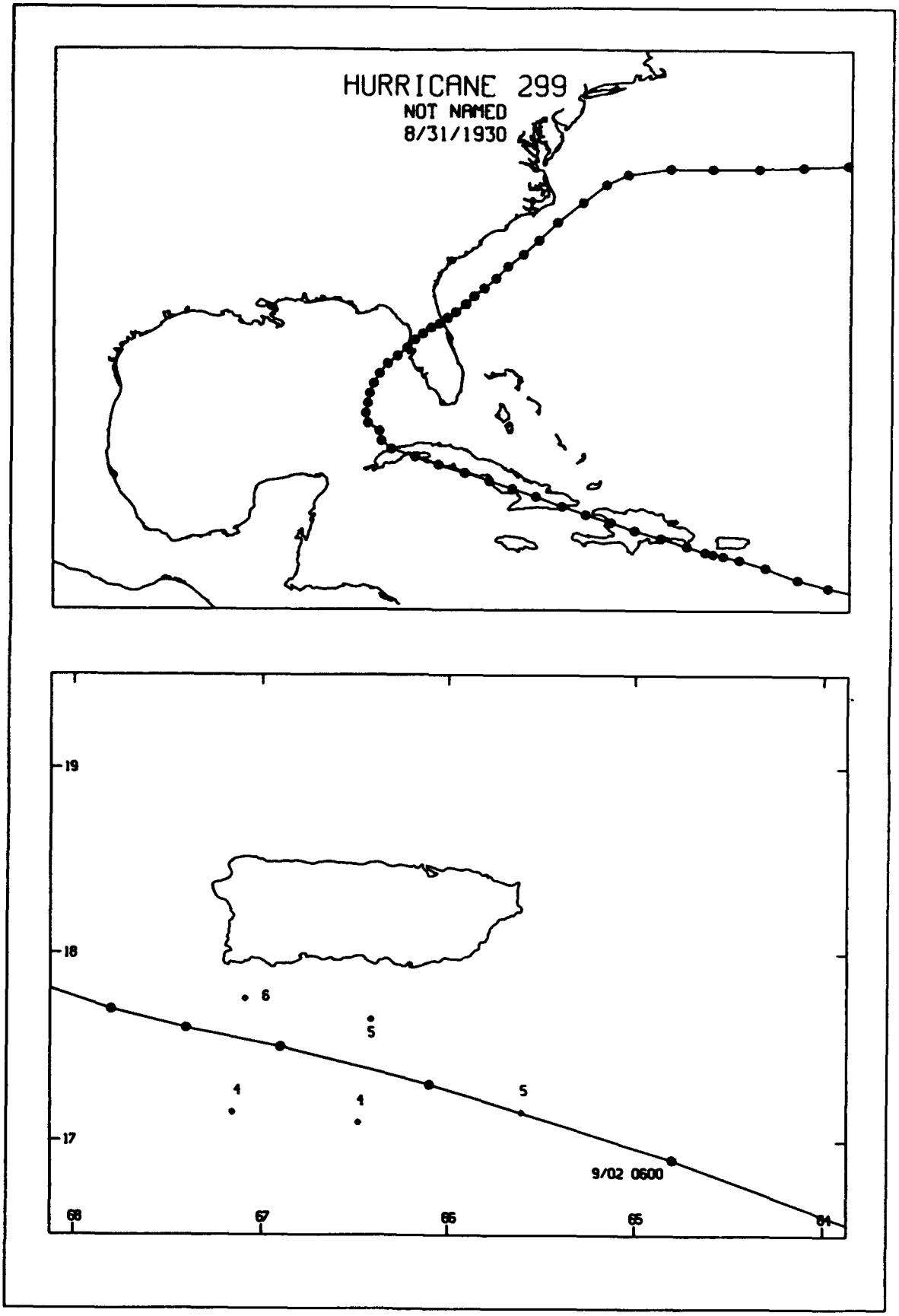
HURRICANE 299
NOT NAMED
8/31/1930
19
18
17
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9/02 0600
68
67
66
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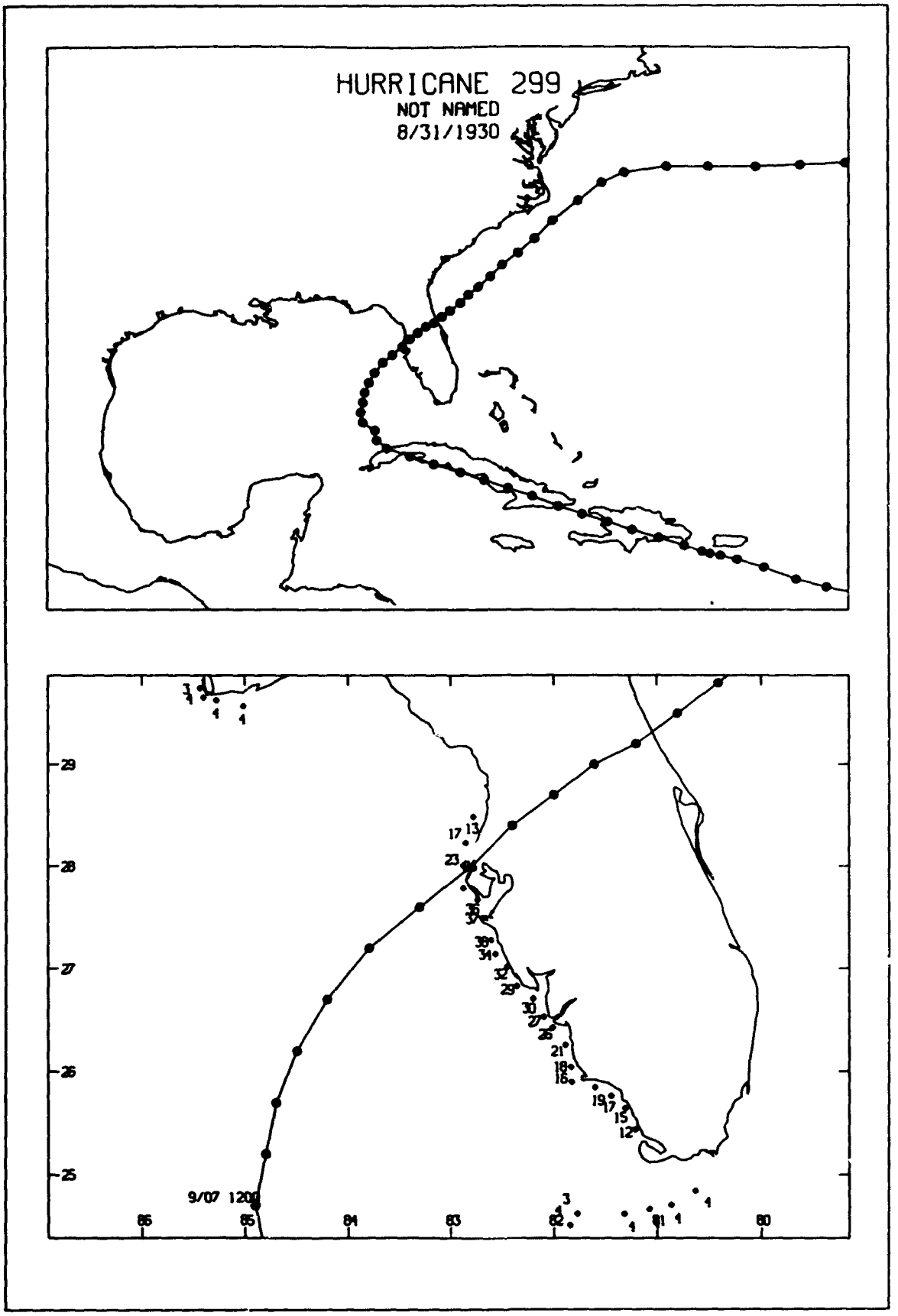
64


HURRICANE 299
NOT NAMED
8/31/1930
29
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25
9/07 1200
85
84
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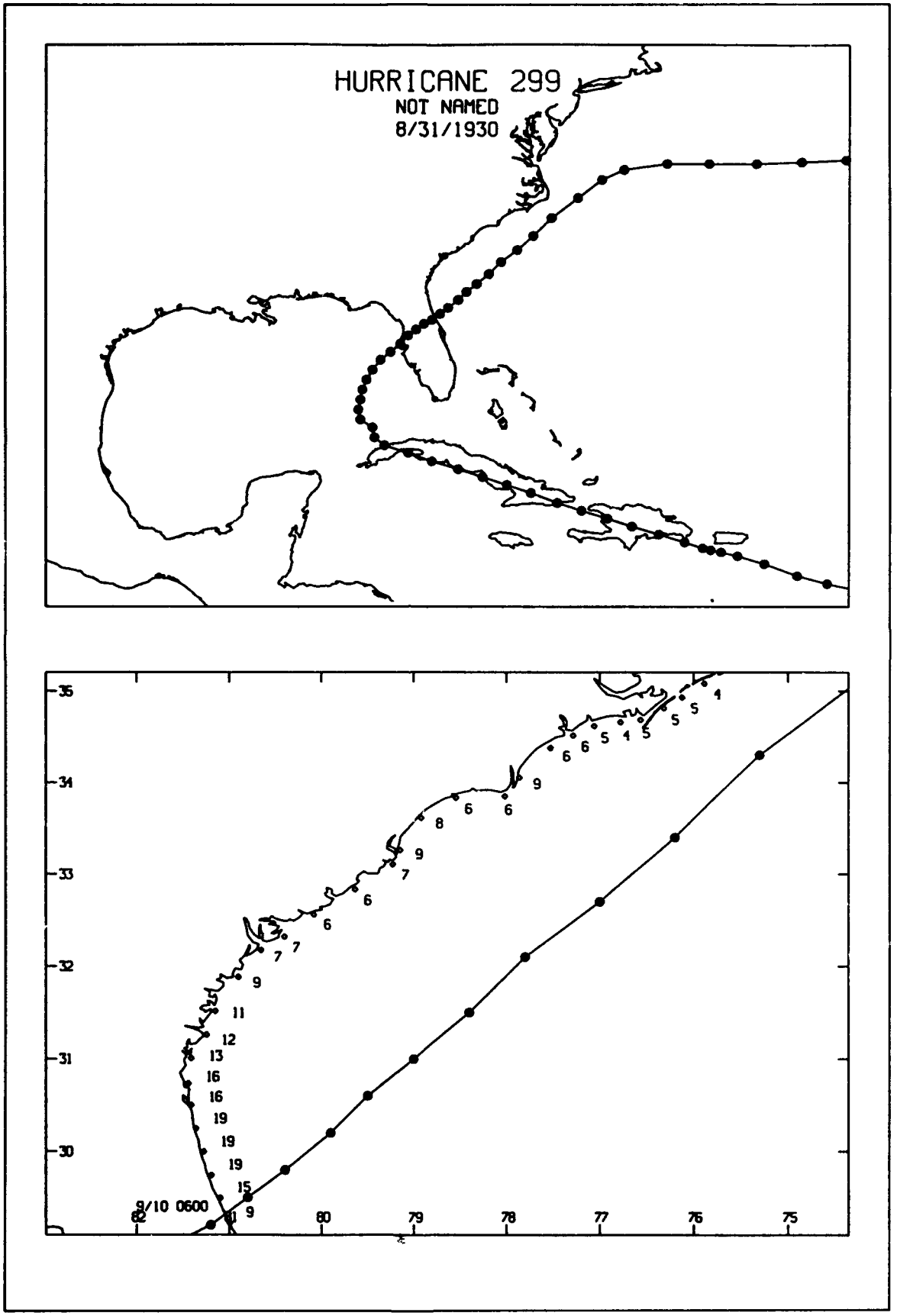
82
81
80


HURRICANE 299
NOT NAMED
8/31/1930
9/10 0600
36
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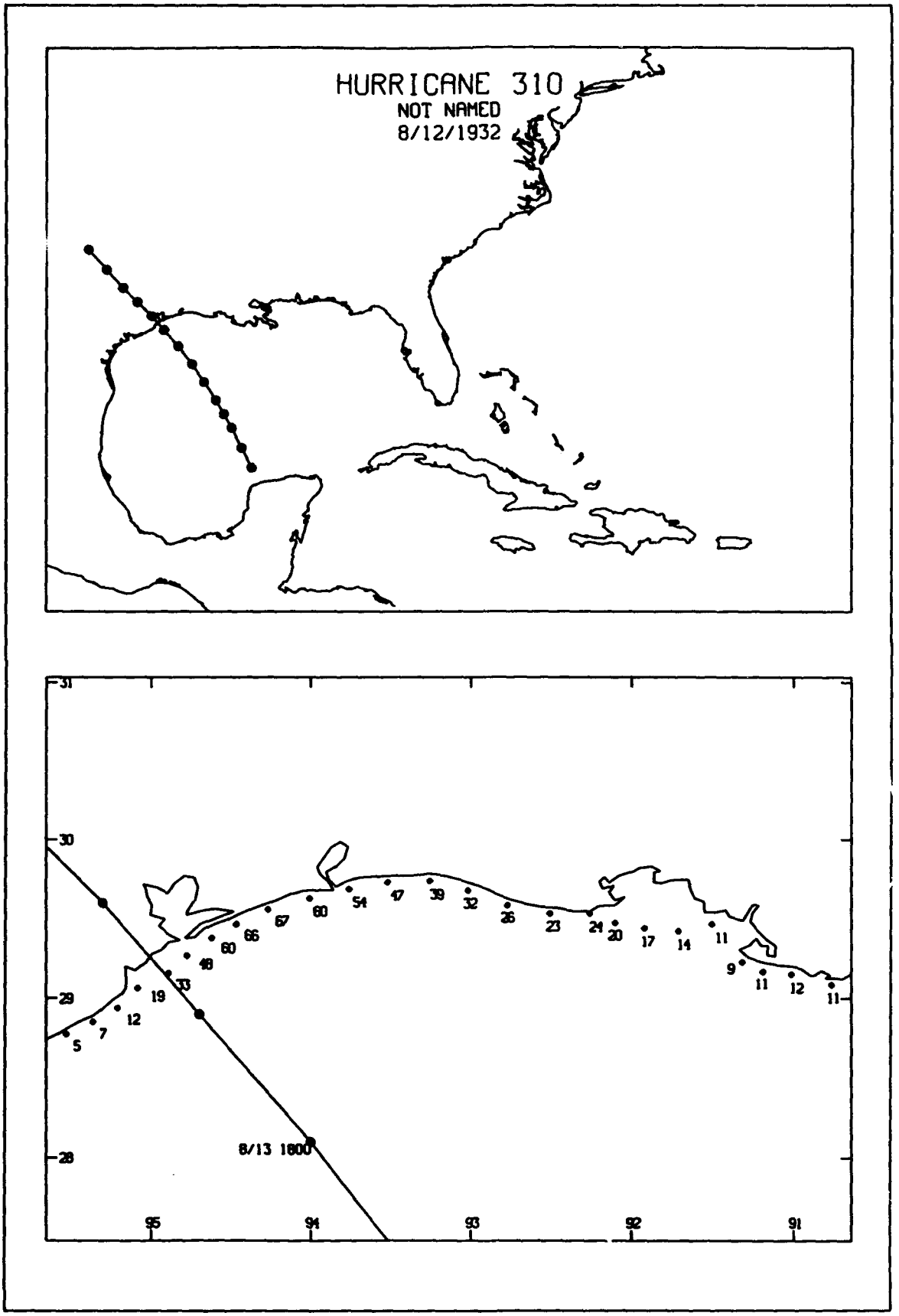
76
75


HURRICANE 310
NOT NAMED
8/12/1932
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8/13 1800
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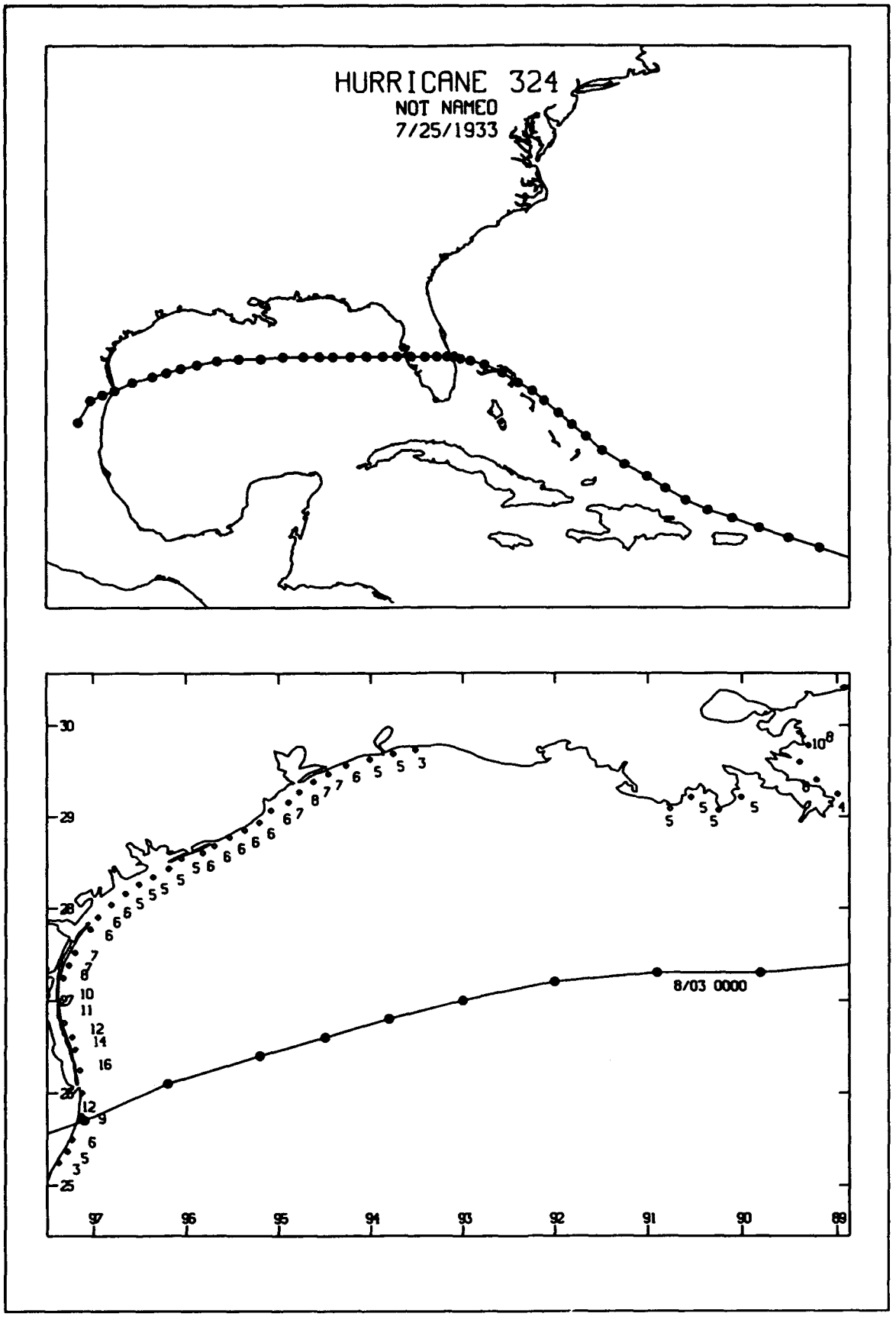
HURRICANE 324
NOT NAMED
7/25/1933
8/03 0000
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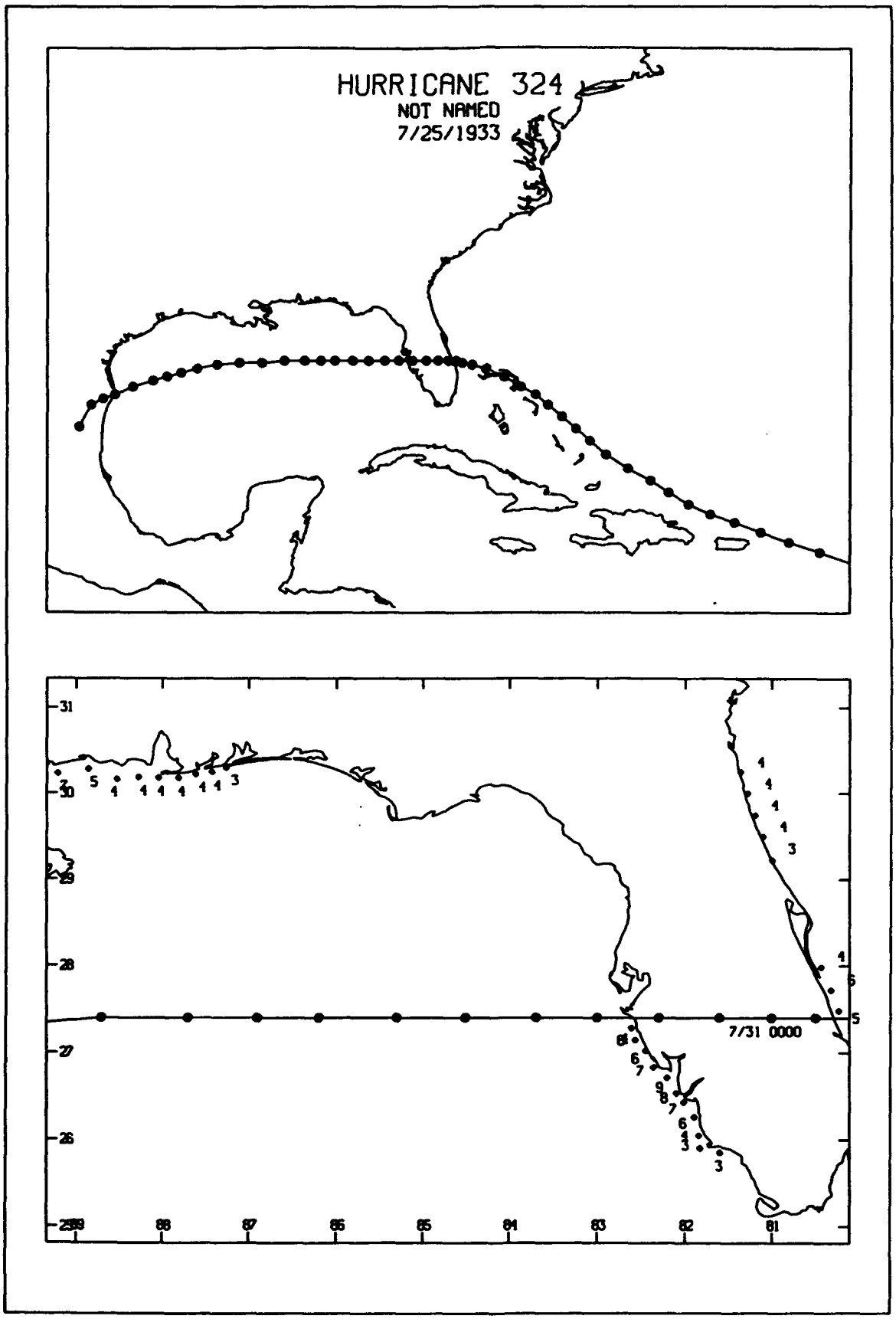
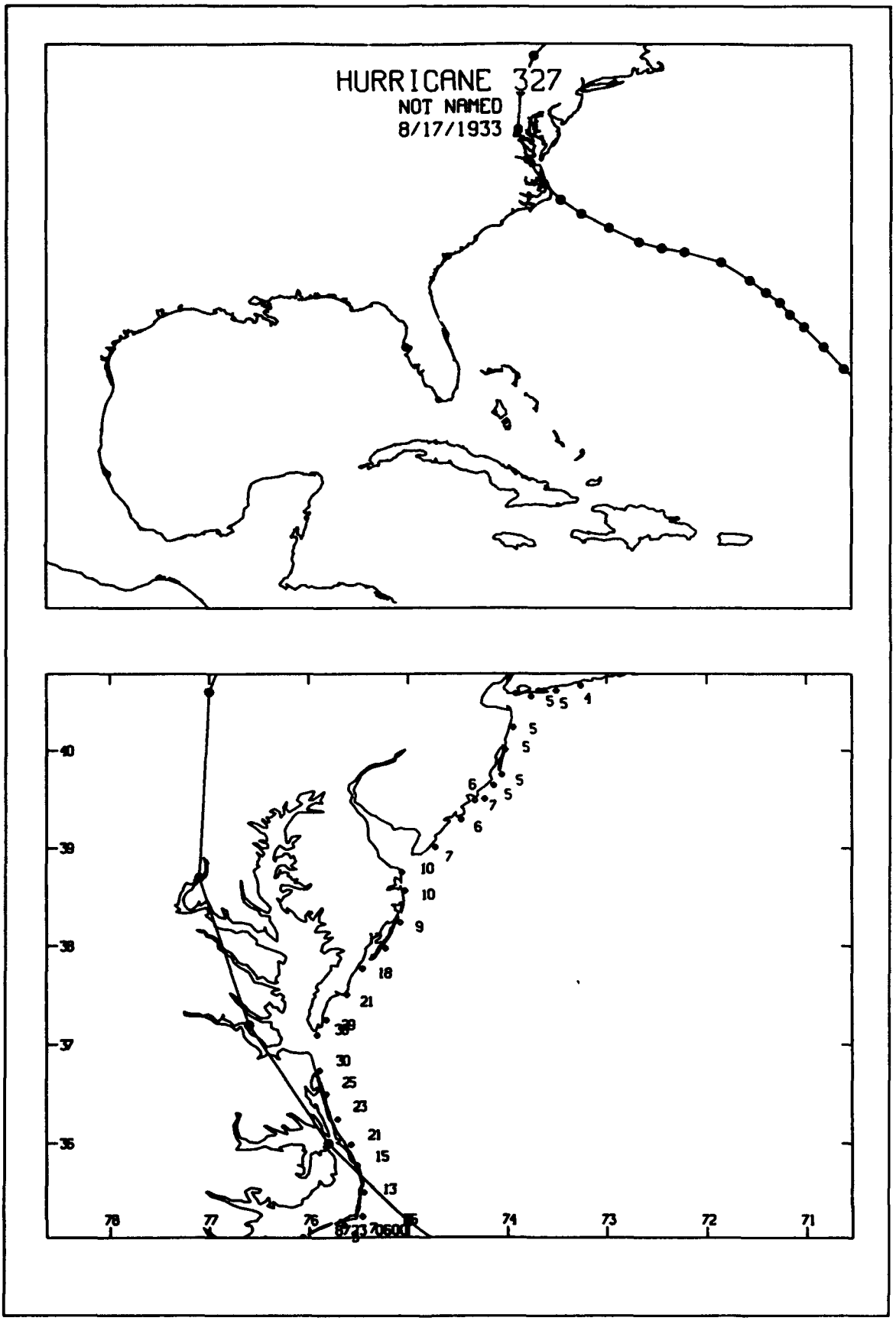

HURRICANE 324
NOT NAMED
7/25/1933
7/31 0000


HURRICANE 327
NOT NAMED
8/17/1933
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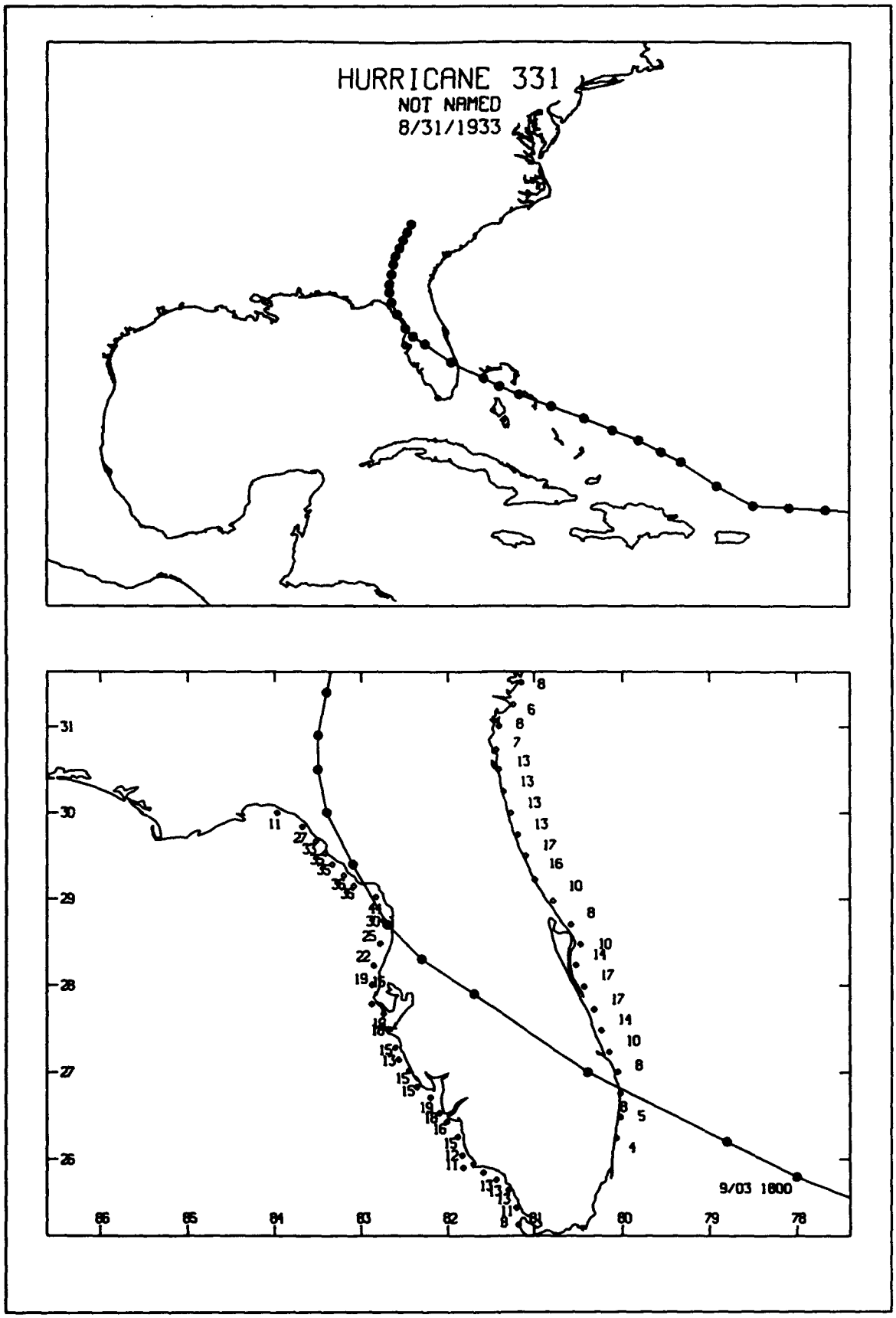
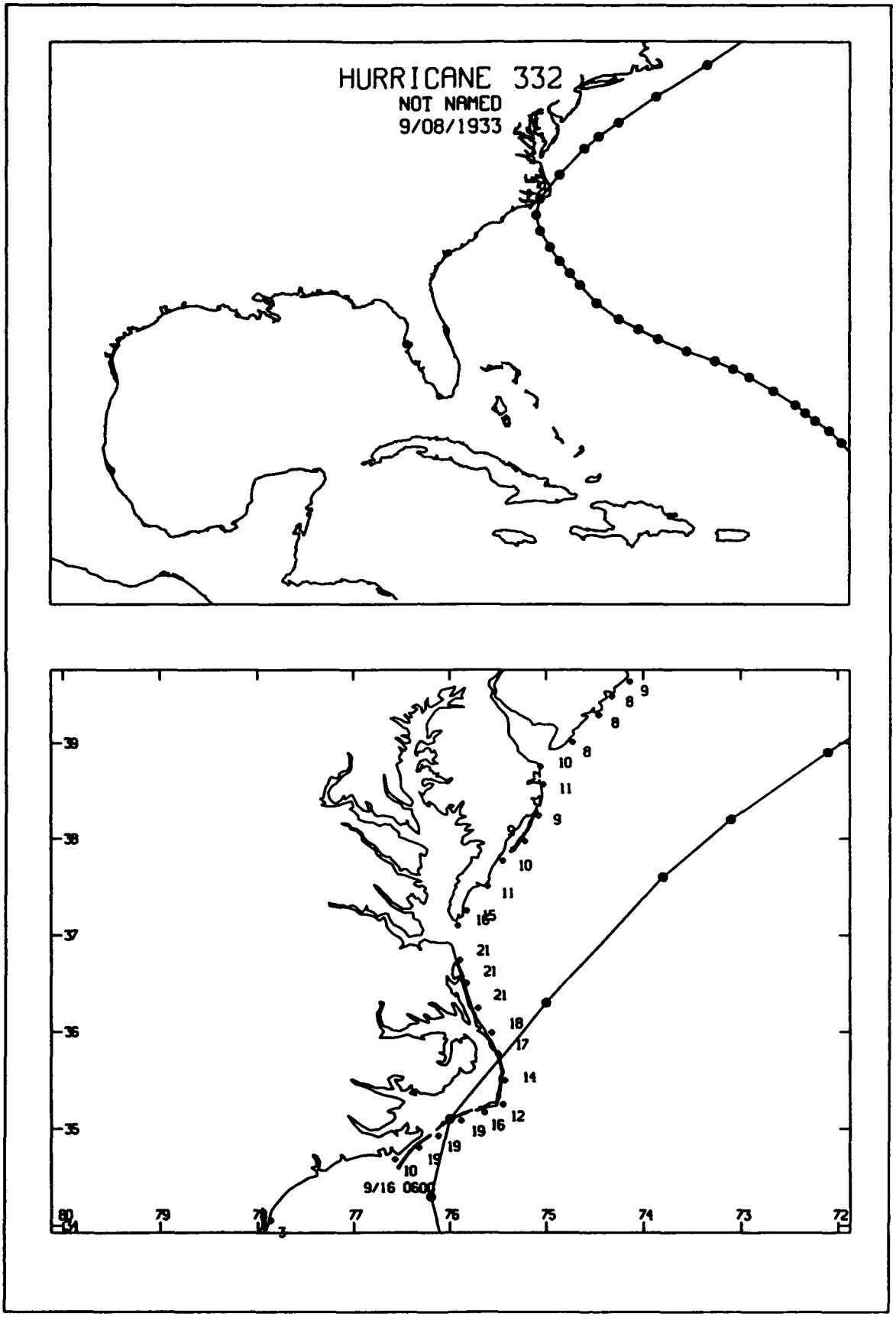

HURRICANE 331
NOT NAMED
8/31/1933
9/03 1800


HURRICANE 332
NOT NAMED
9/08/1933
39
38
37
36
35
9/16 0600
80
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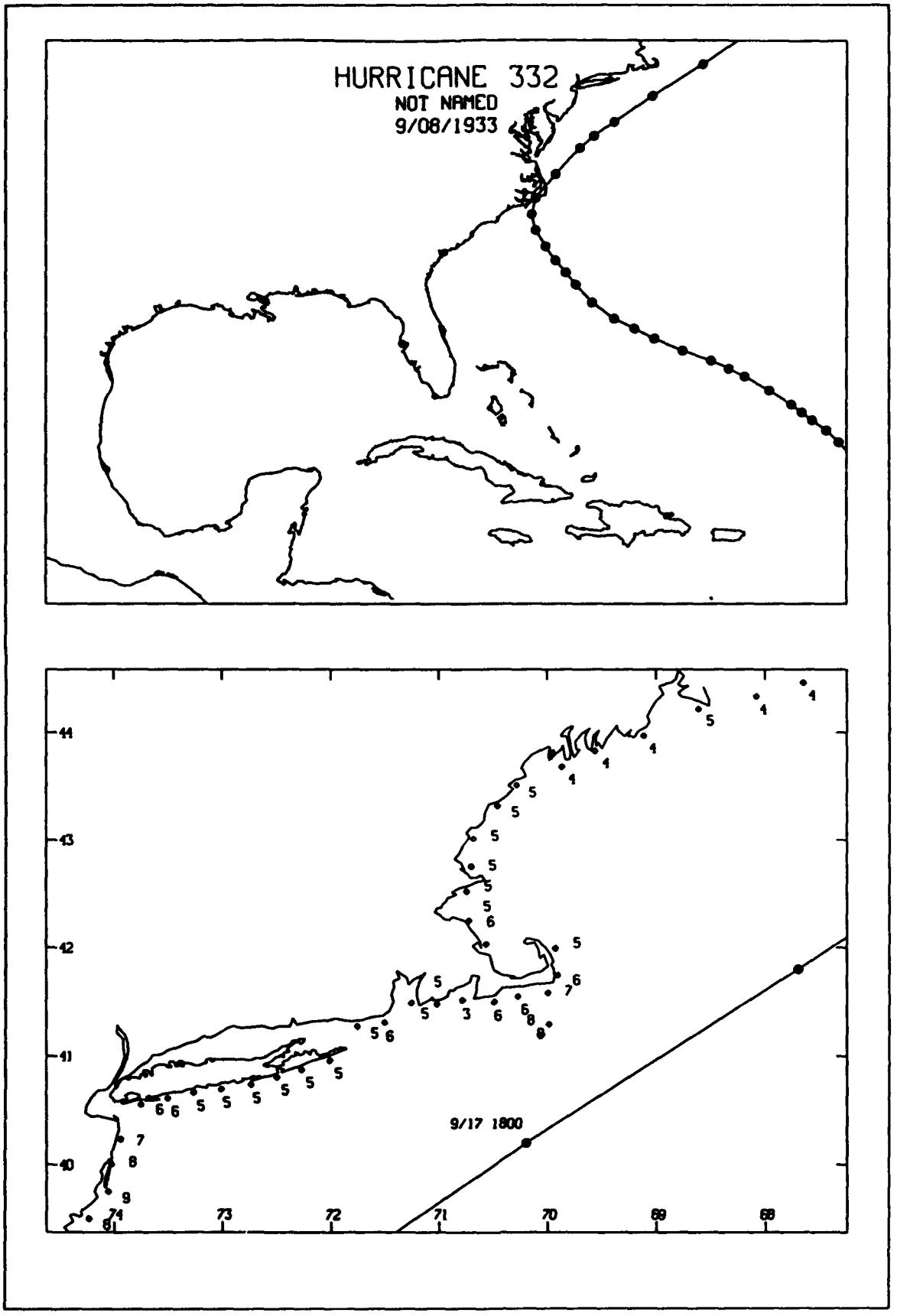
73
72


HURRICANE 332
NOT NAMED
9/08/1933
9/17 1800
44
43
42
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74
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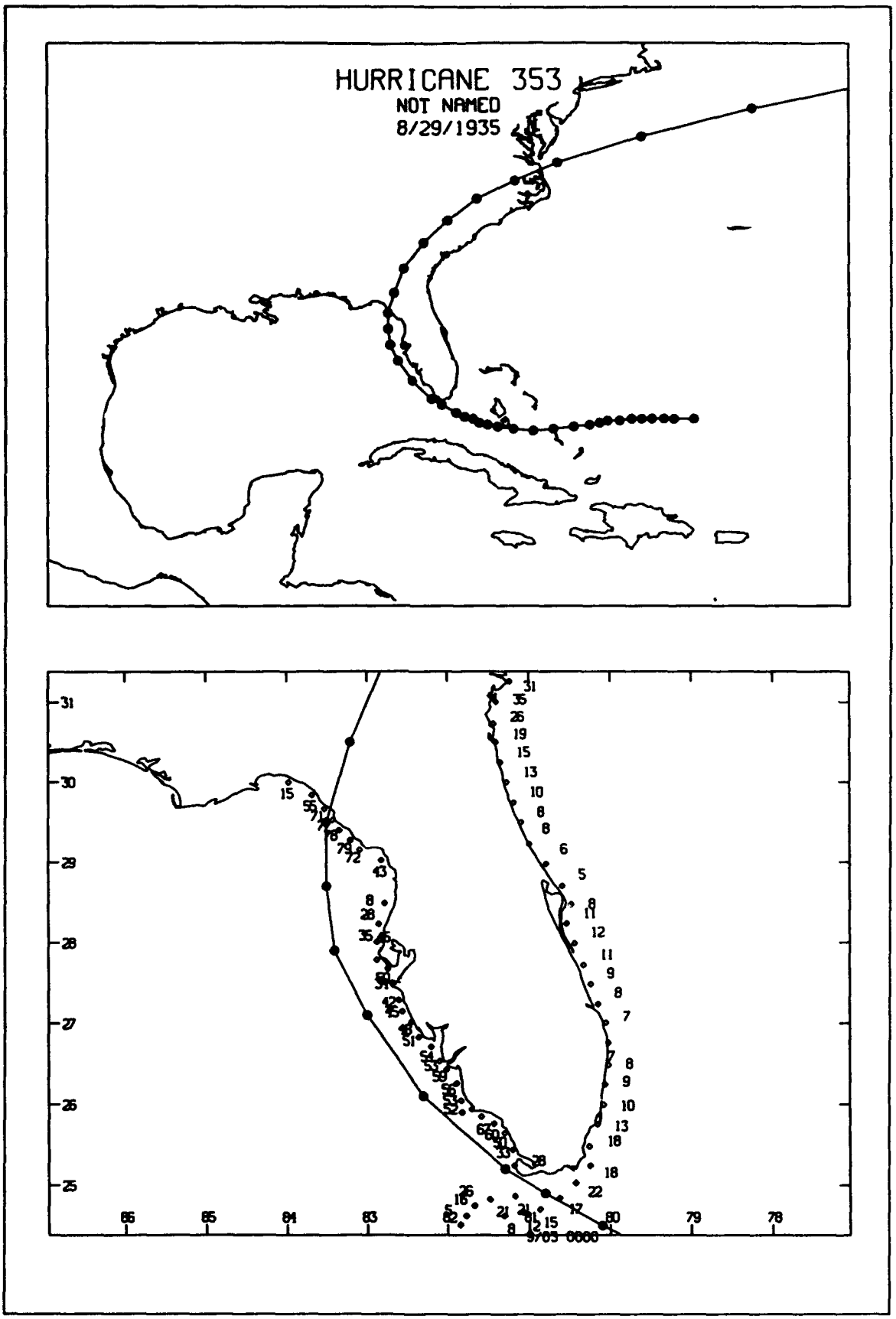
68


HURRICANE 353
NOT NAMED
8/29/1935
31
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86
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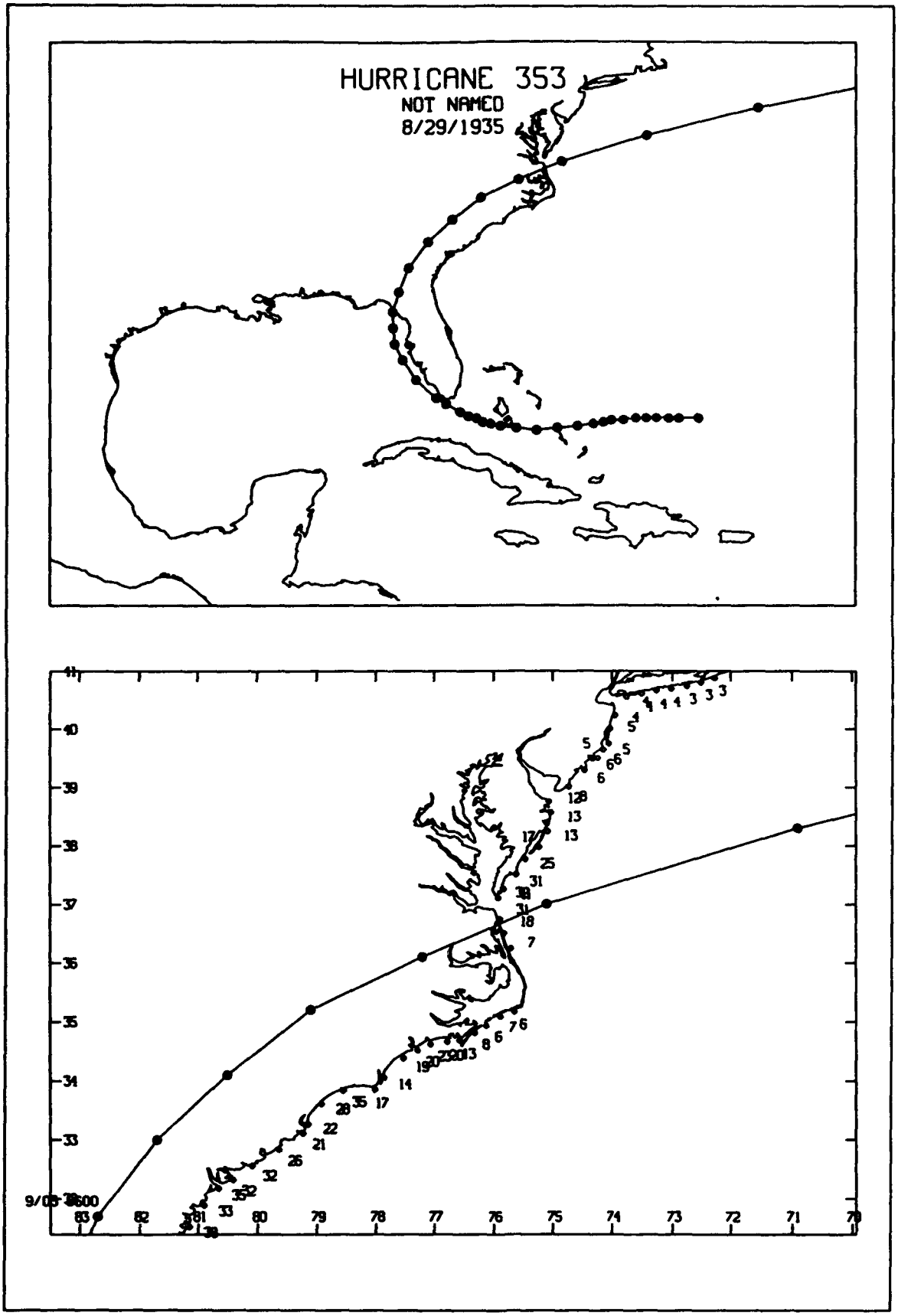
78
9703 0000


HURRICANE 353
NOT NAMED
8/29/1935
9/03 0600
83
82
81
80
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72
71
70
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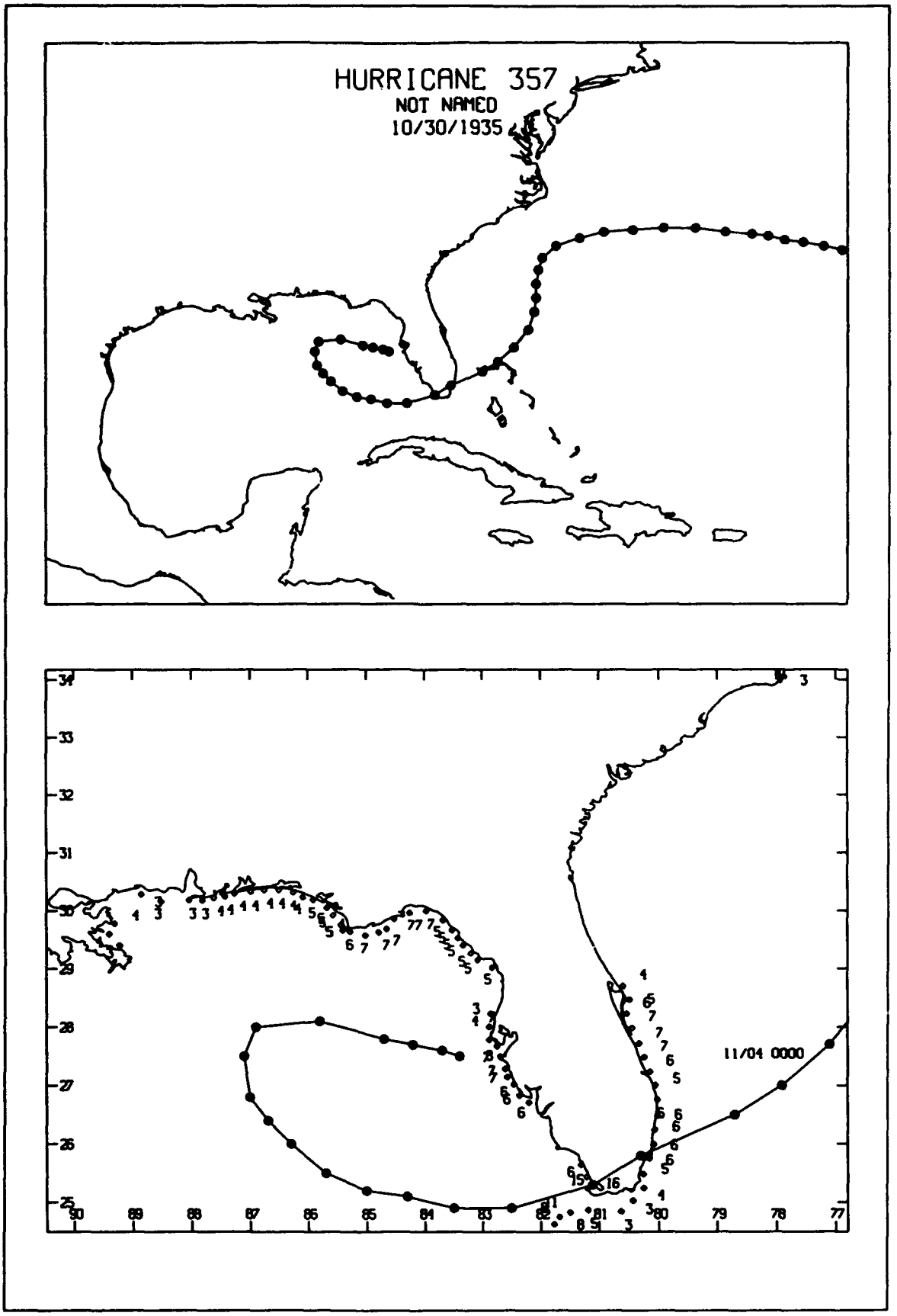
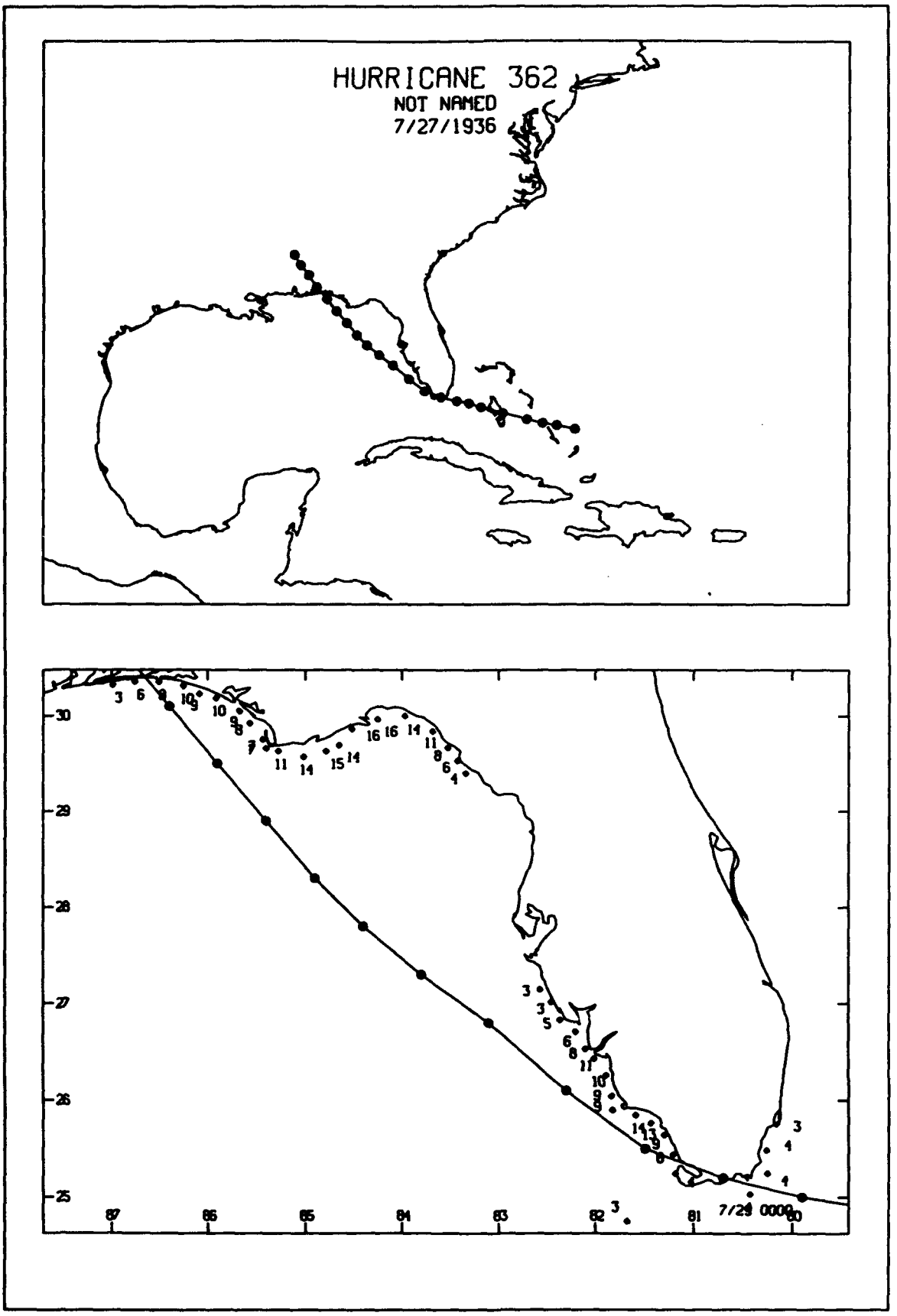
33


HURRICANE 357
NOT NAMED
10/30/1935
11/04 0000


HURRICANE 362
NOT NAMED
7/27/1936
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86
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83
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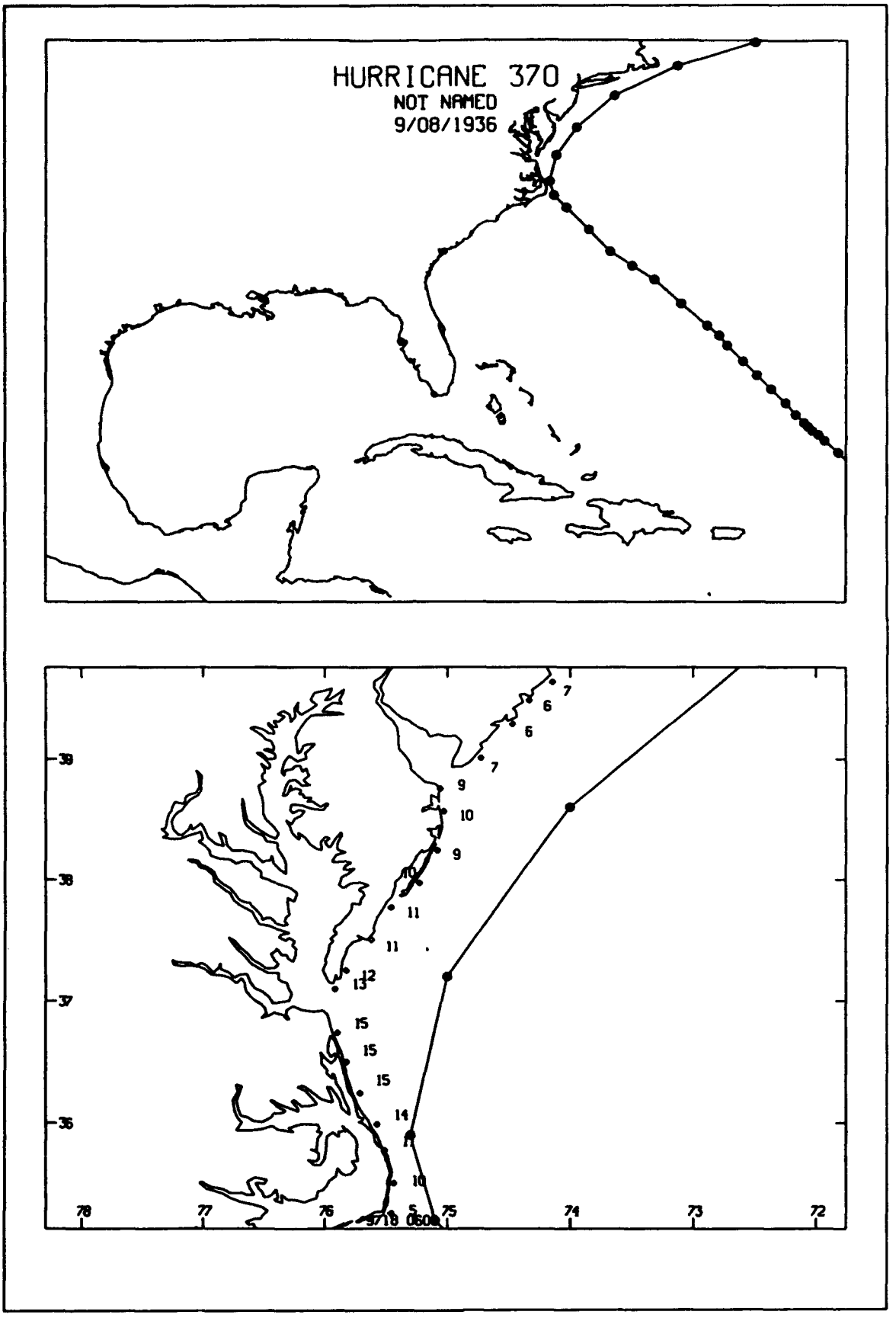
81
7/29 0000


HURRICANE 370
NOT NAMED
9/08/1936
39
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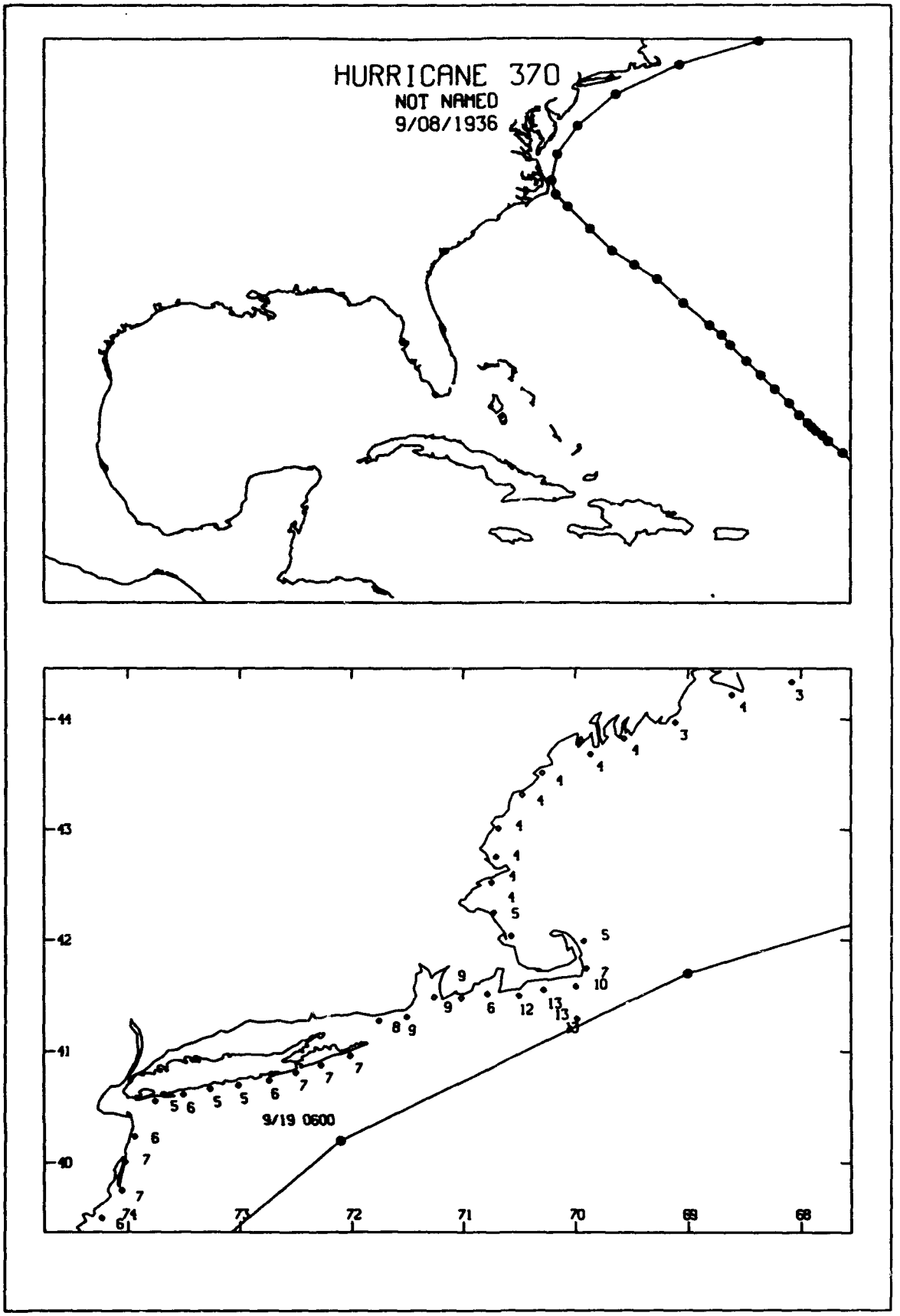
HURRICANE 370
NOT NAMED
9/08/1936
9/19 0600
44
43
42
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74
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72
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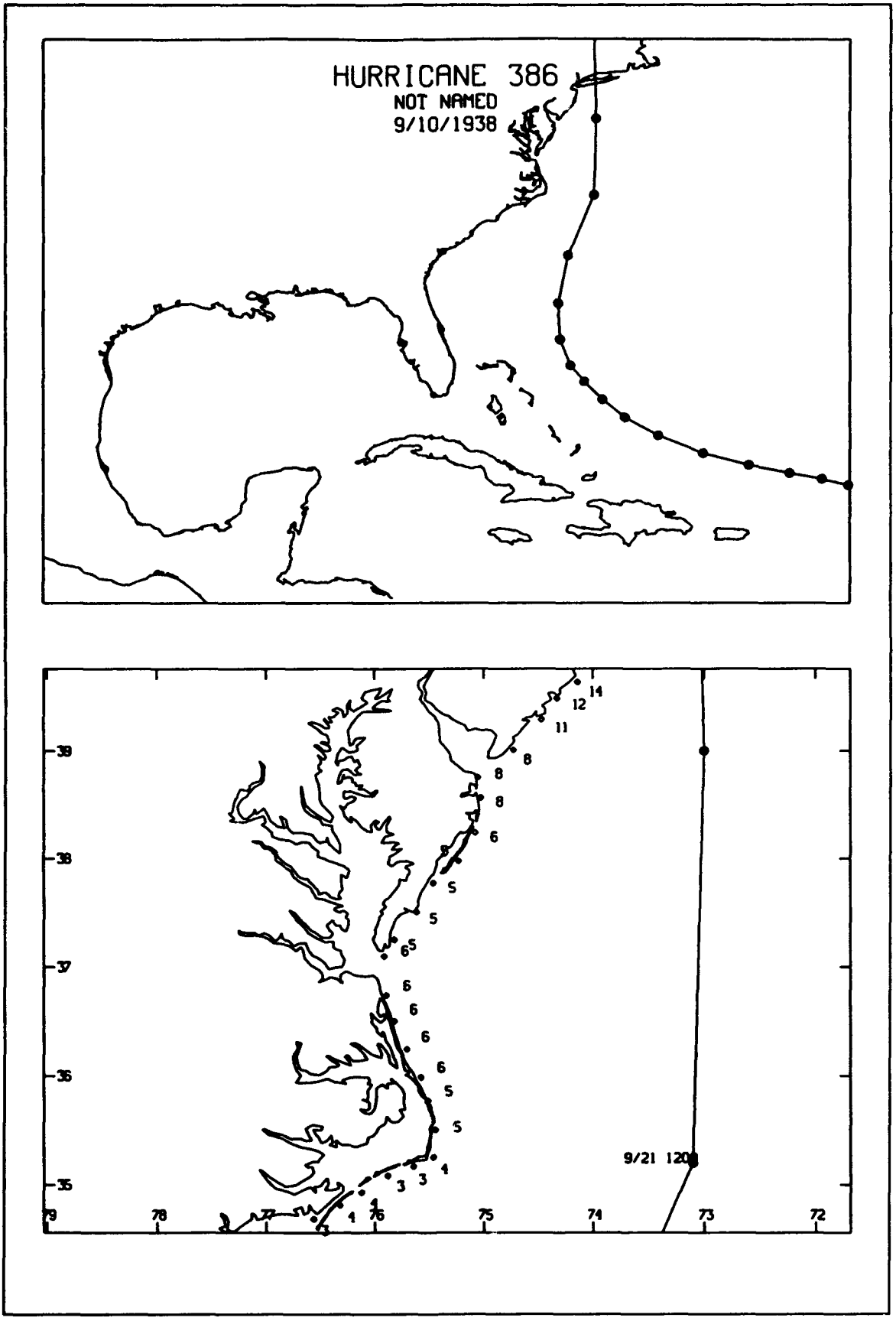
69
68


HURRICANE 386
NOT NAMED
9/10/1938
14
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9/21 120
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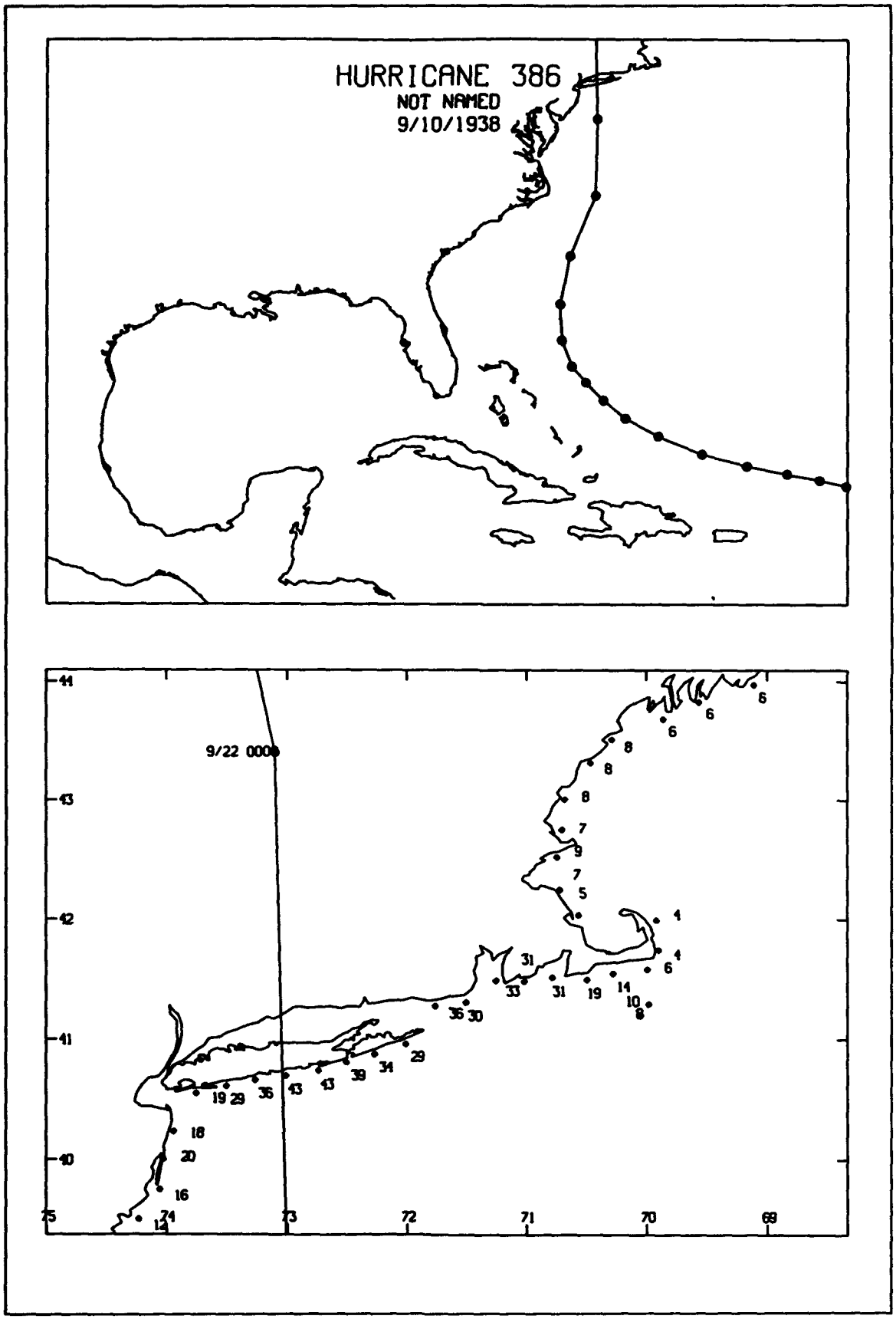
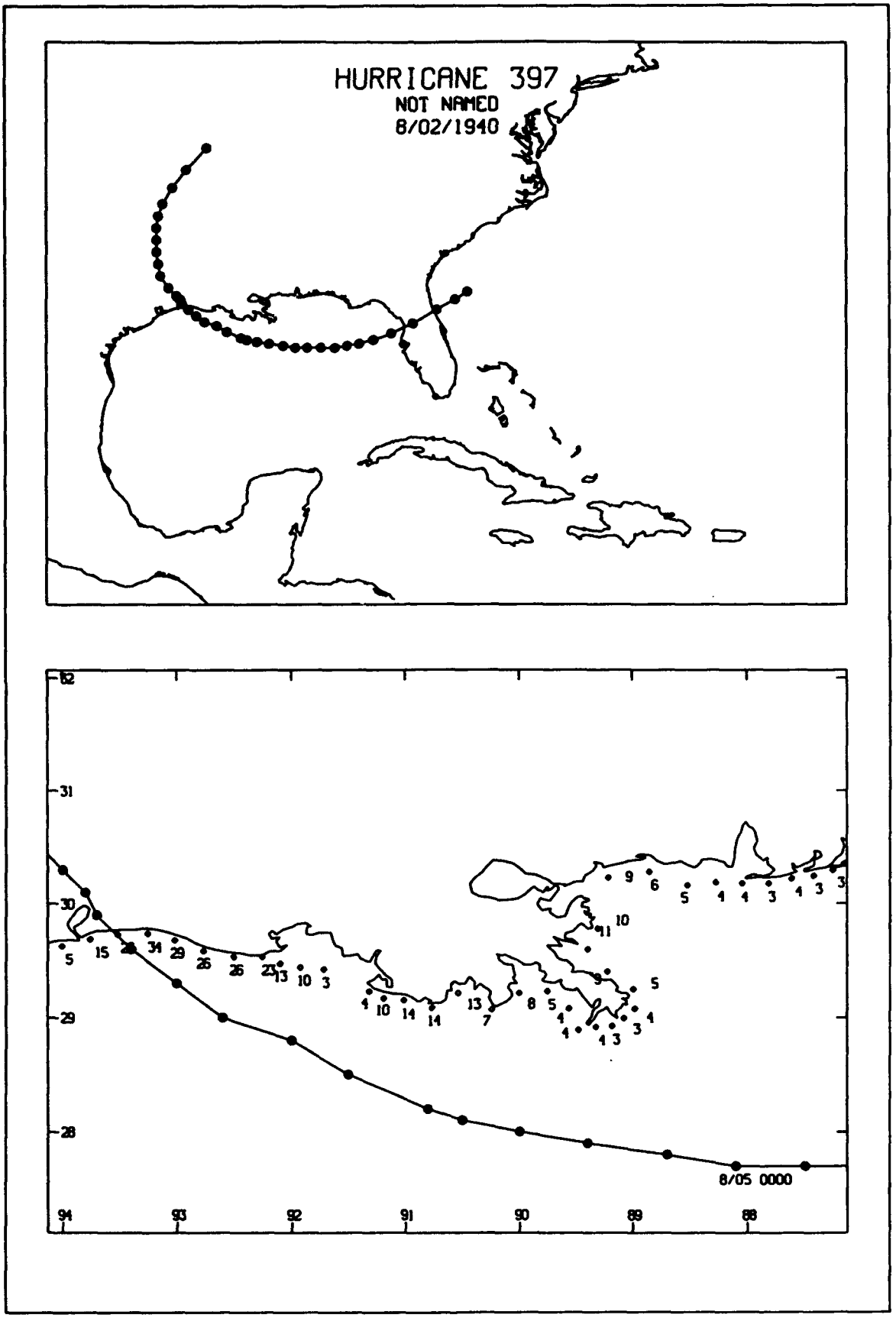

HURRICANE 386
NOT NAMED
9/10/1938
9/22 0000
44
43
42
41
40
75
74
73
72
71
70
69


HURRICANE 397
NOT NAMED
8/02/1940
32
31
30
29
28
94
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92
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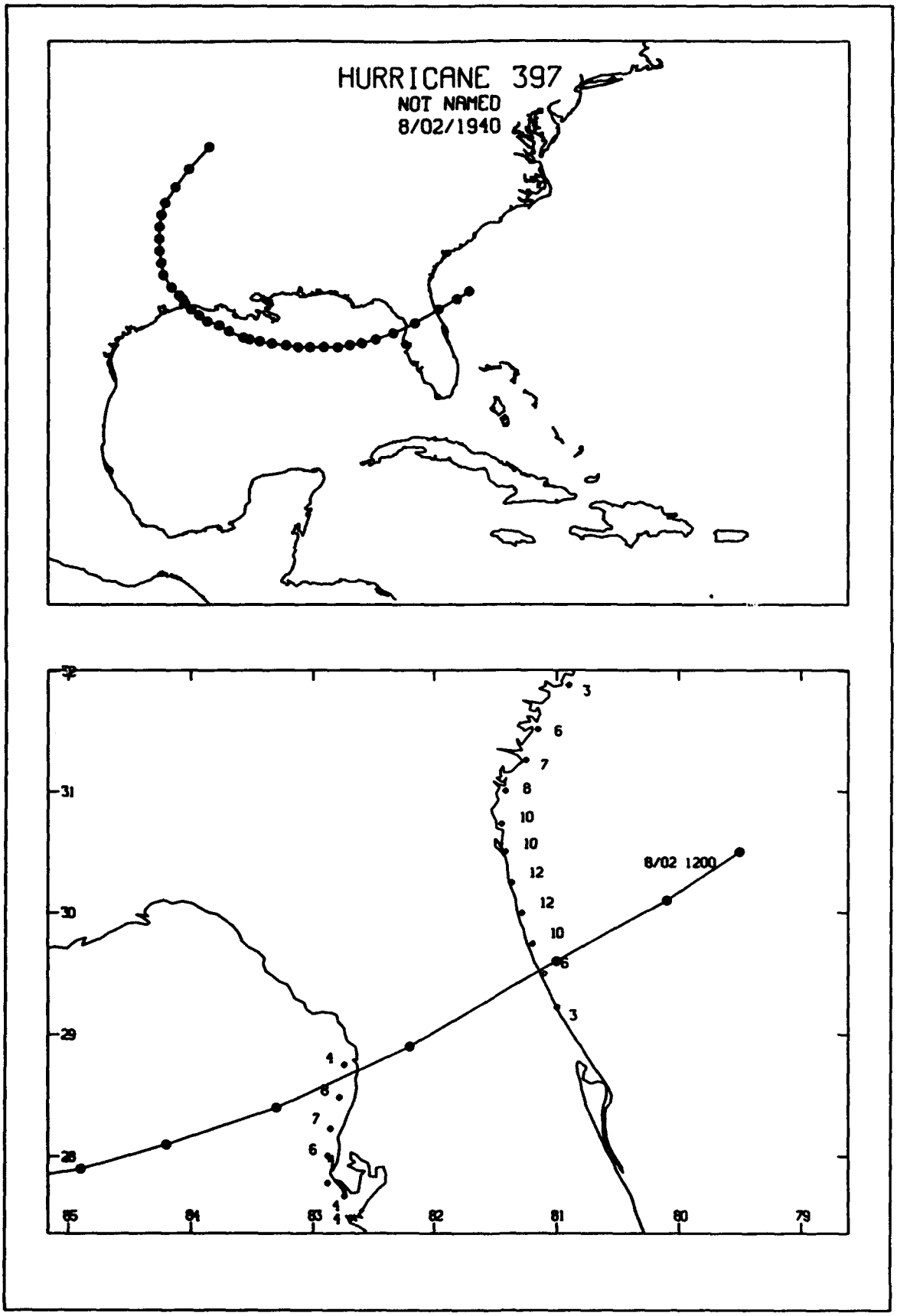
88
8/05 0000


HURRICANE 397
NOT NAMED
8/02/1940
8/02 1200
32
31
30
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85
84
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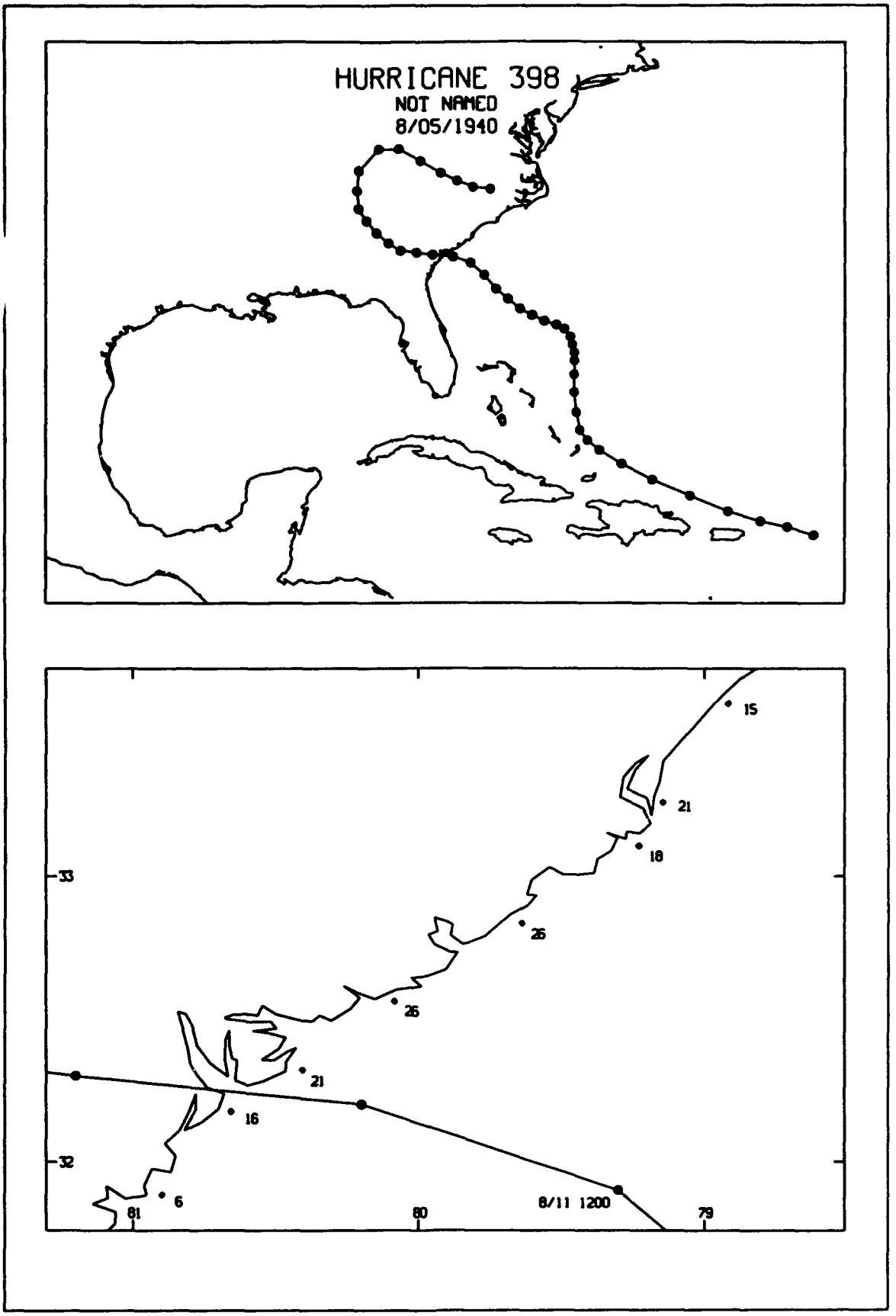
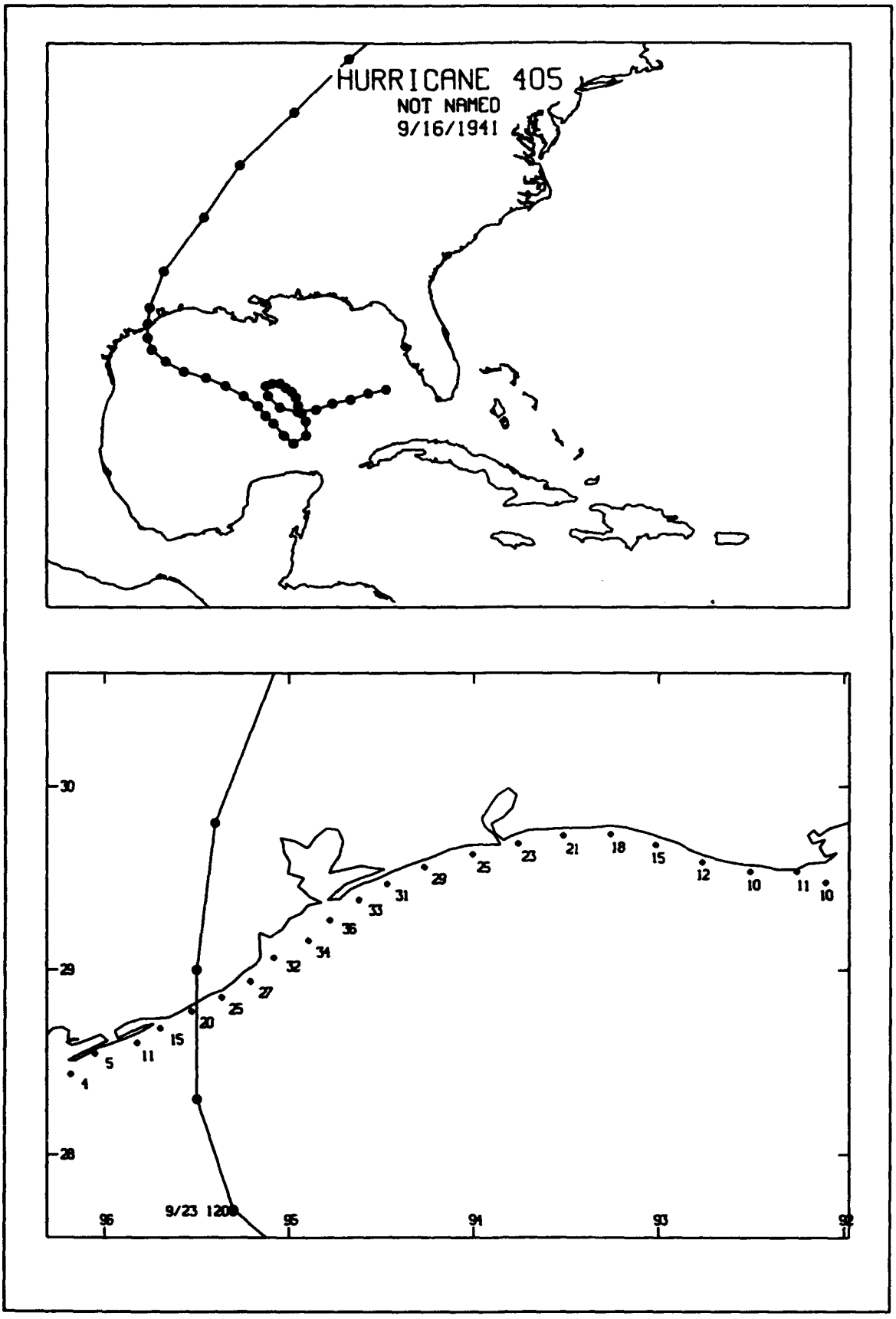

HURRICANE 398
NOT NAMED
8/05/1940
15
21
18
33
26
25
21
16
32
6
81
80
8/11 1200
79


HURRICANE 405
NOT NAMED
9/16/1941
30
29
28
96
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94
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92
9/23 1200
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11
15
20
25
27
32
34
36
33
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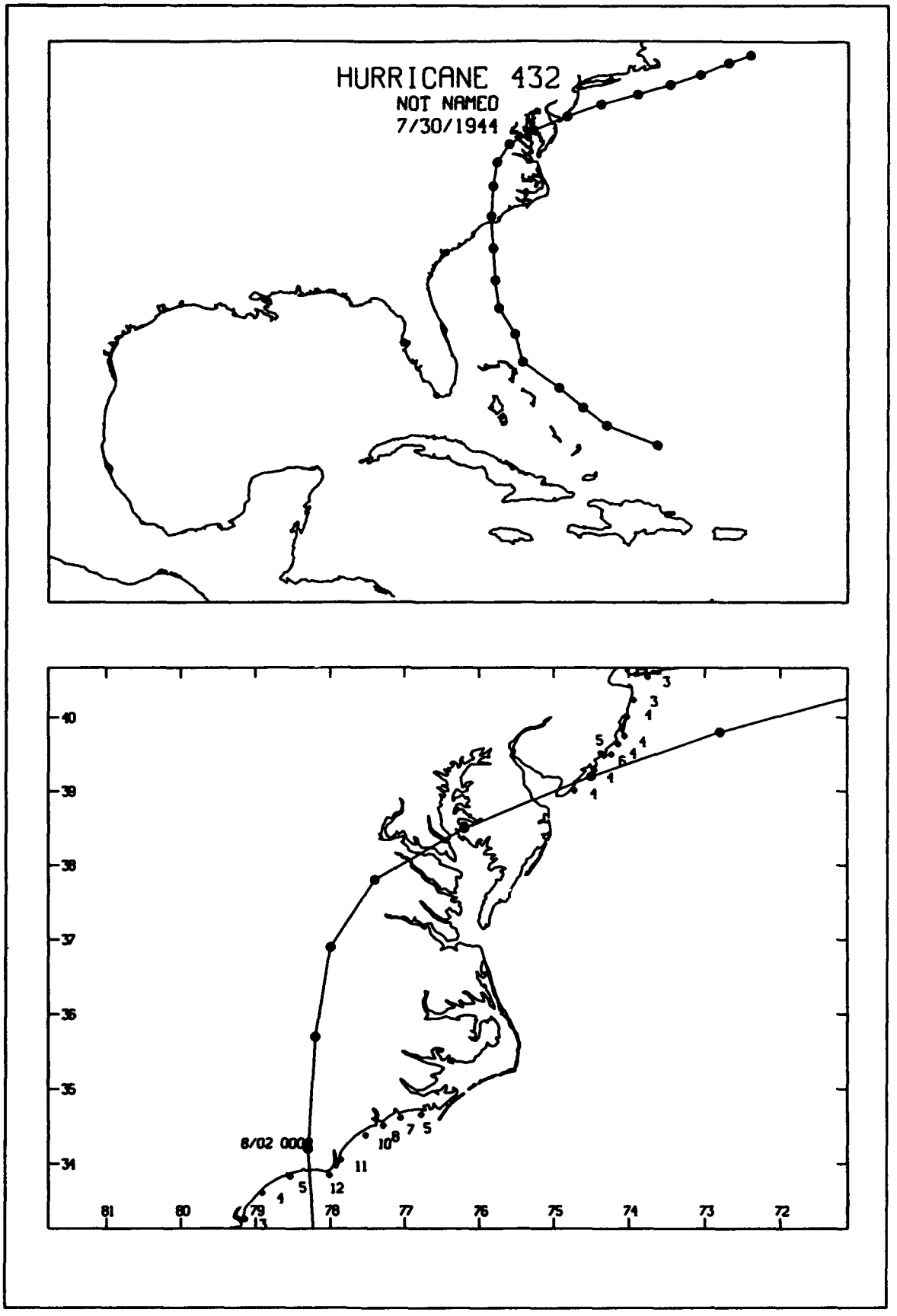
HURRICANE 432
NOT NAMED
7/30/1944
40
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36
35
34
81
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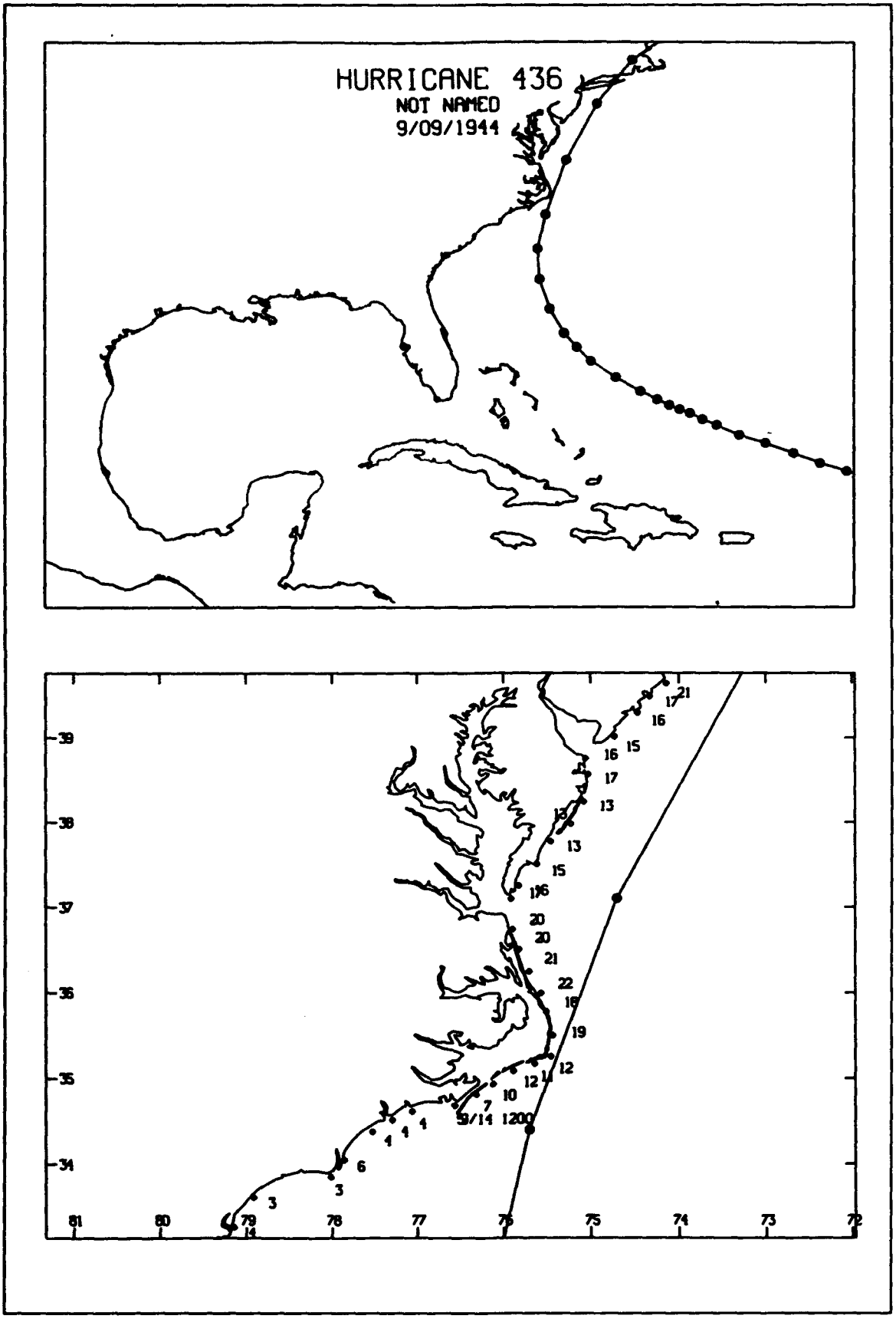
72
8/02 0000


HURRICANE 436
NOT NAMED
9/09/1944
39
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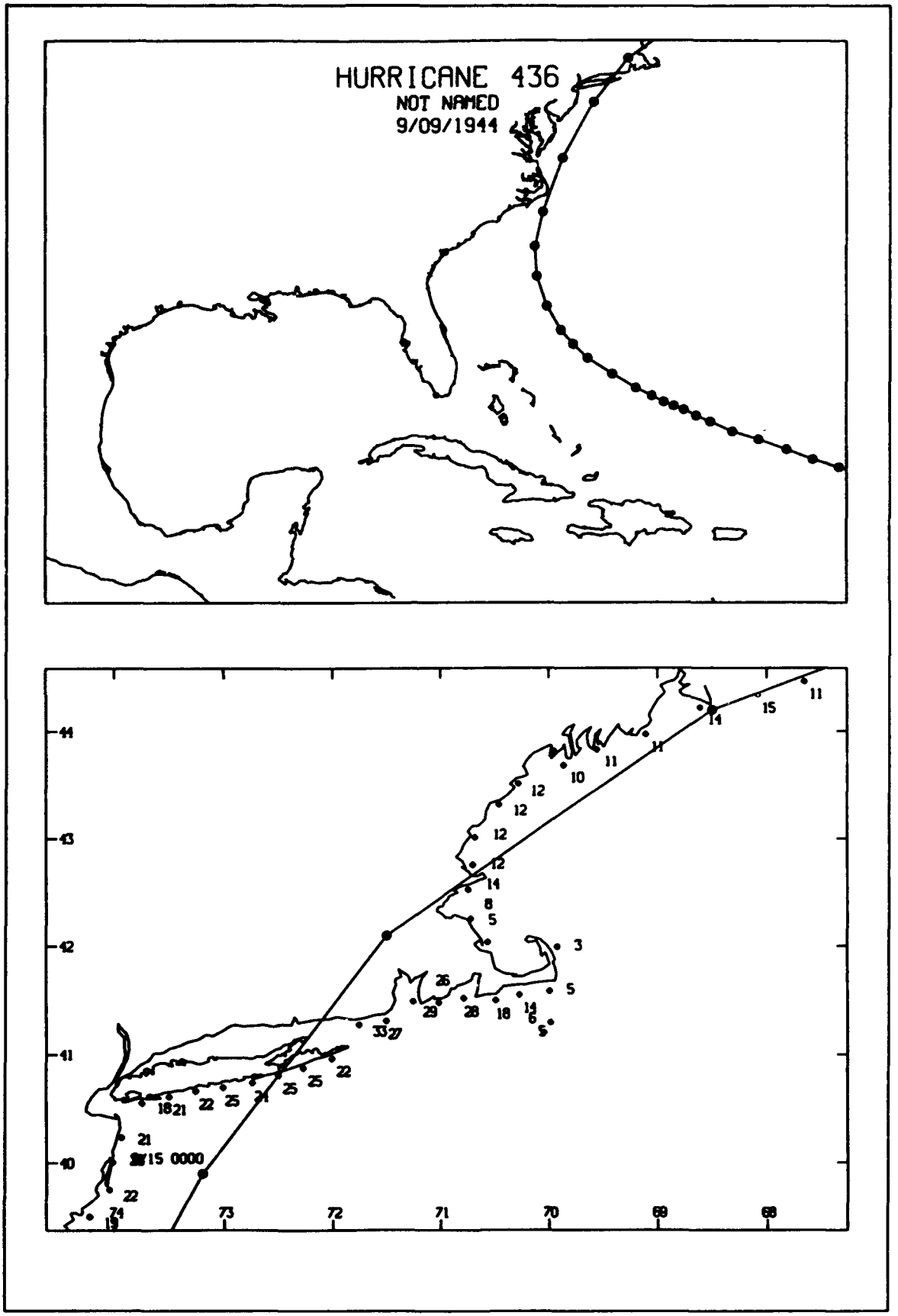
37
36
35
34
81
80
79
78
77
76
75
74
73
72
9/14 1200


HURRICANE 436
NOT NAMED
9/09/1944
44
43
42
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40
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73
72
71
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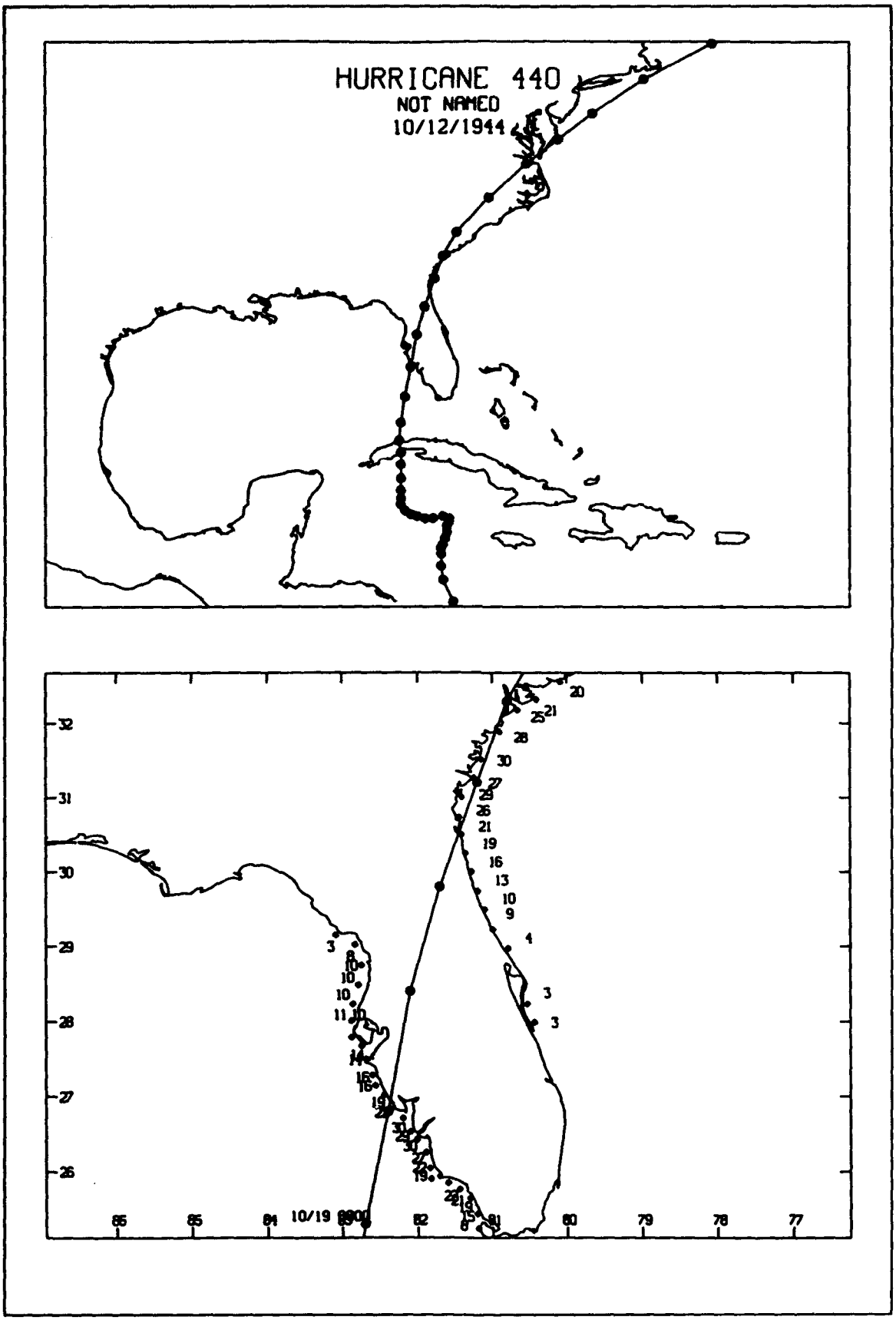
69
68
15 0000


HURRICANE 440
NOT NAMED
10/12/1944
32
31
30
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28
27
26
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84
10/19
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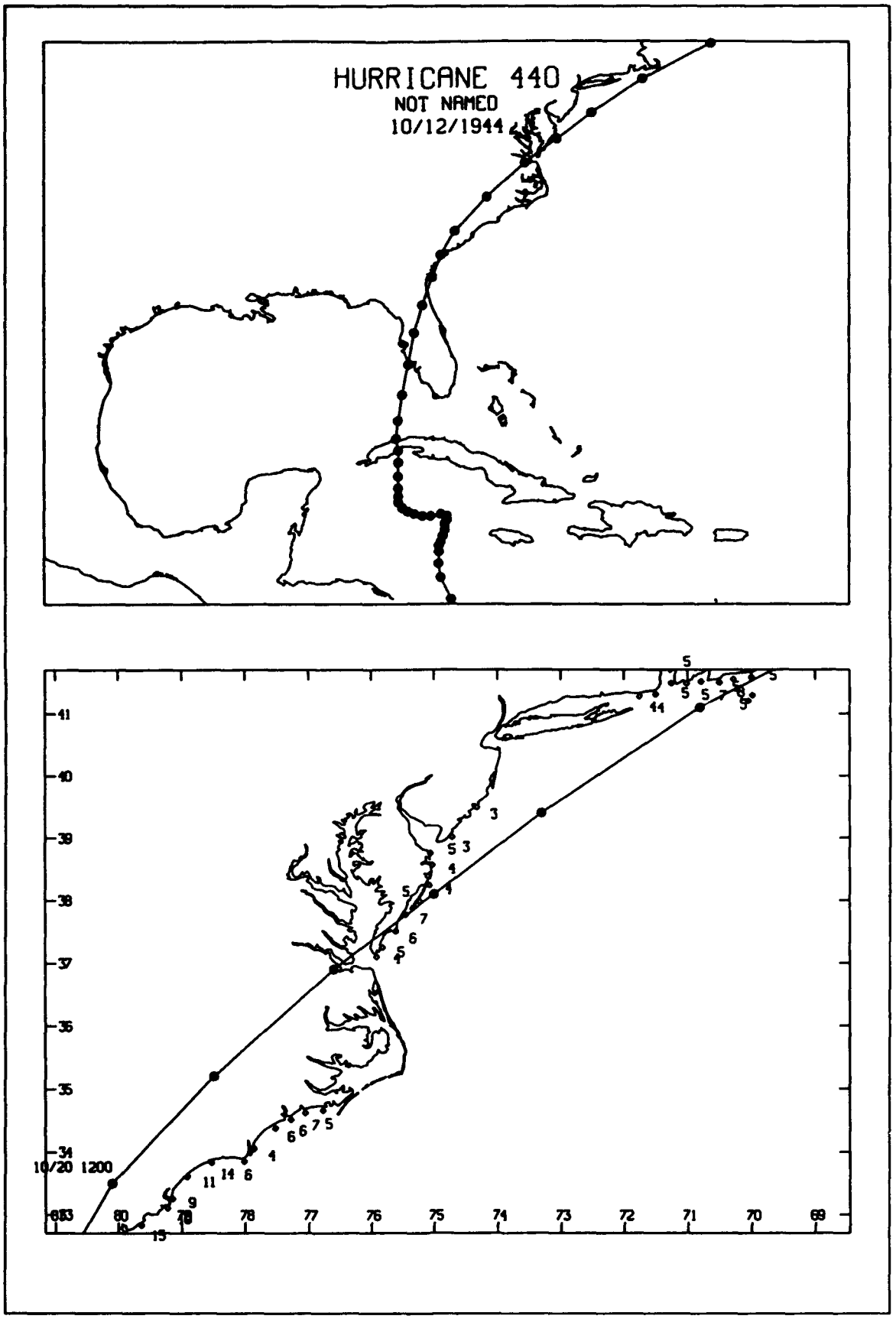
78
77


HURRICANE 440
NOT NAMED
10/12/1944
41
40
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34
10/20 1200
80
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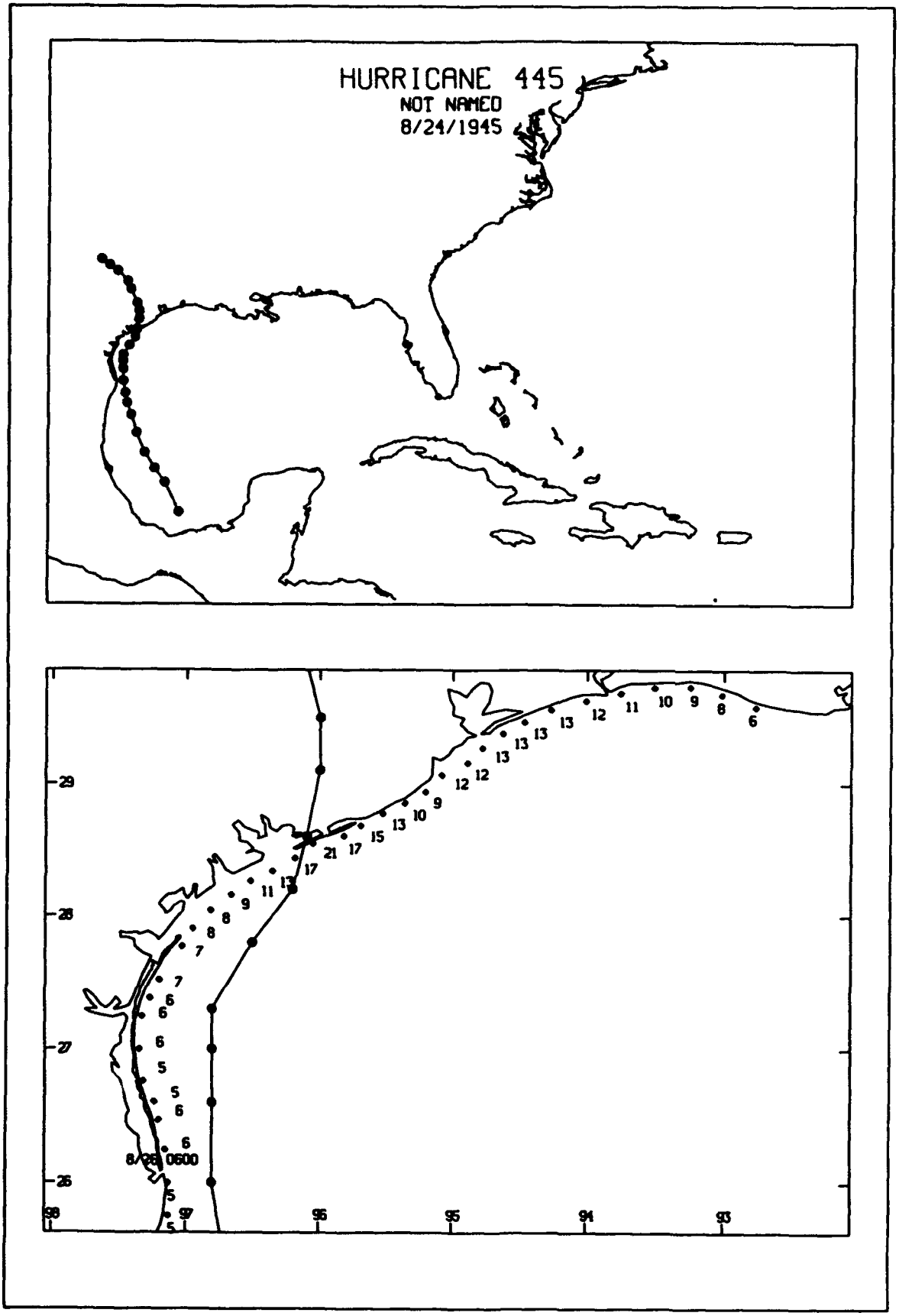
HURRICANE 445
NOT NAMED
8/24/1945
29
28
27
26
98
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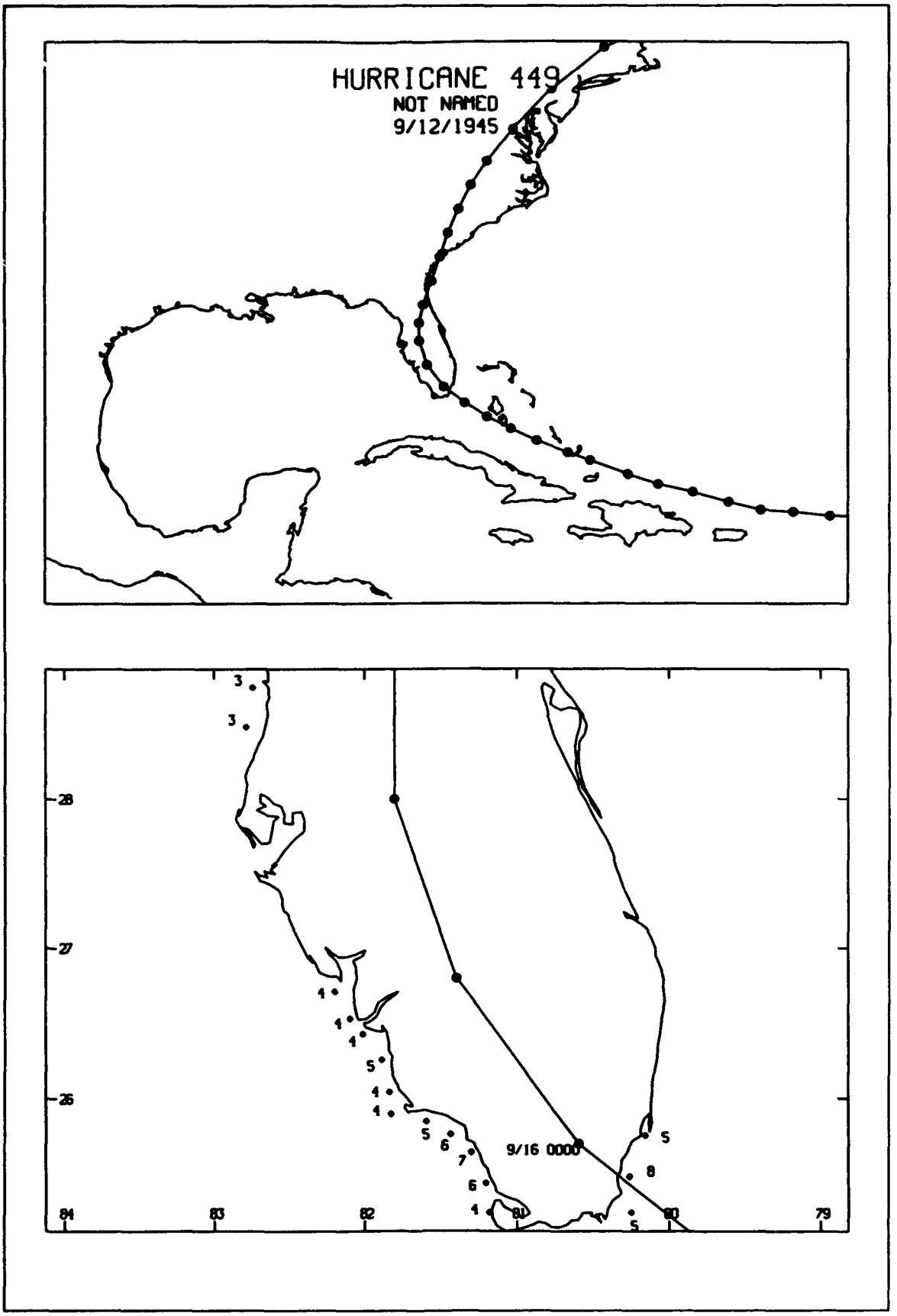
95
94
93
8/26 0600


HURRICANE 449
NOT NAMED
9/12/1945
28
27
26
9/16 0000
84
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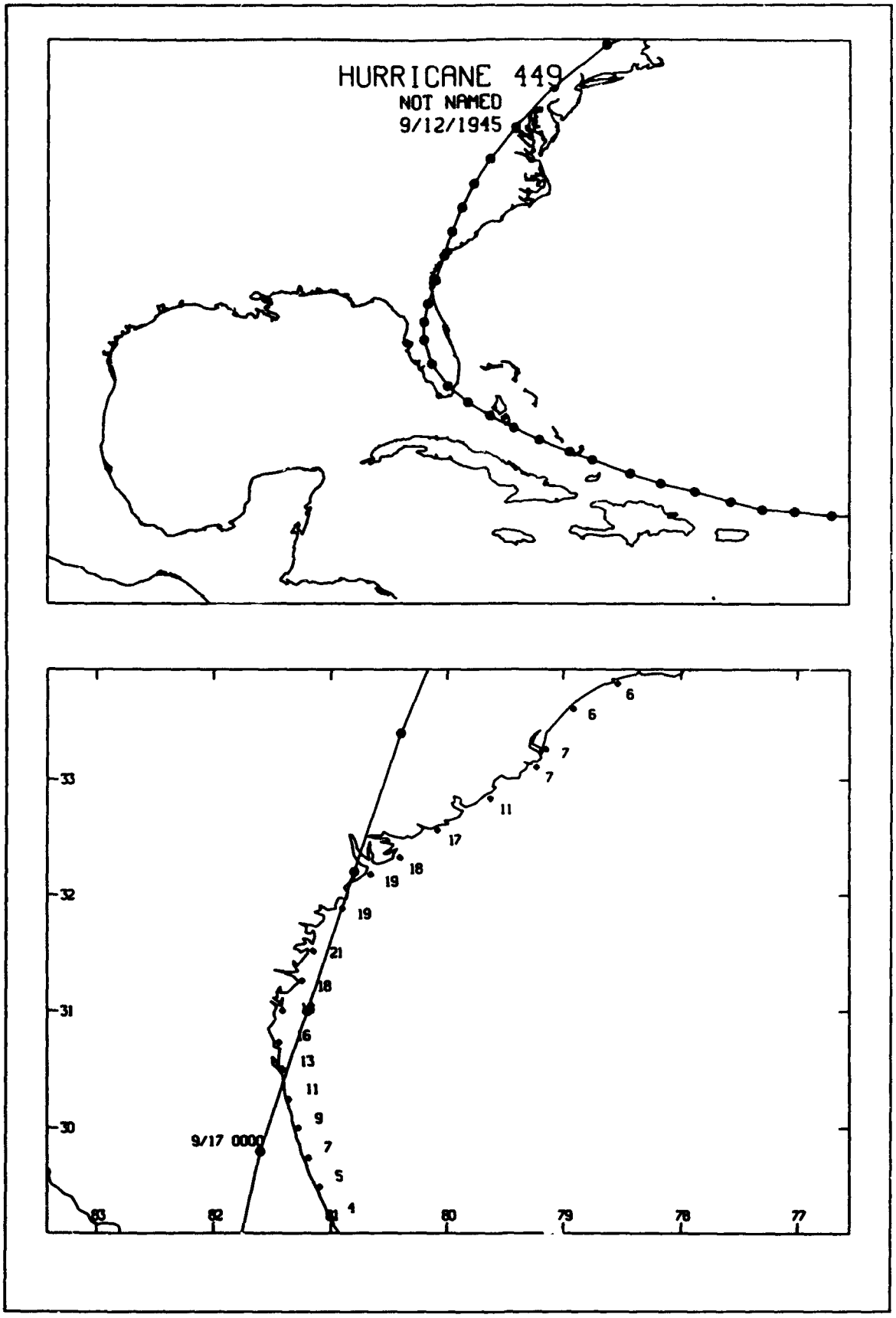
79


HURRICANE 449
NOT NAMED
9/12/1945
33
32
31
30
9/17 0000
6
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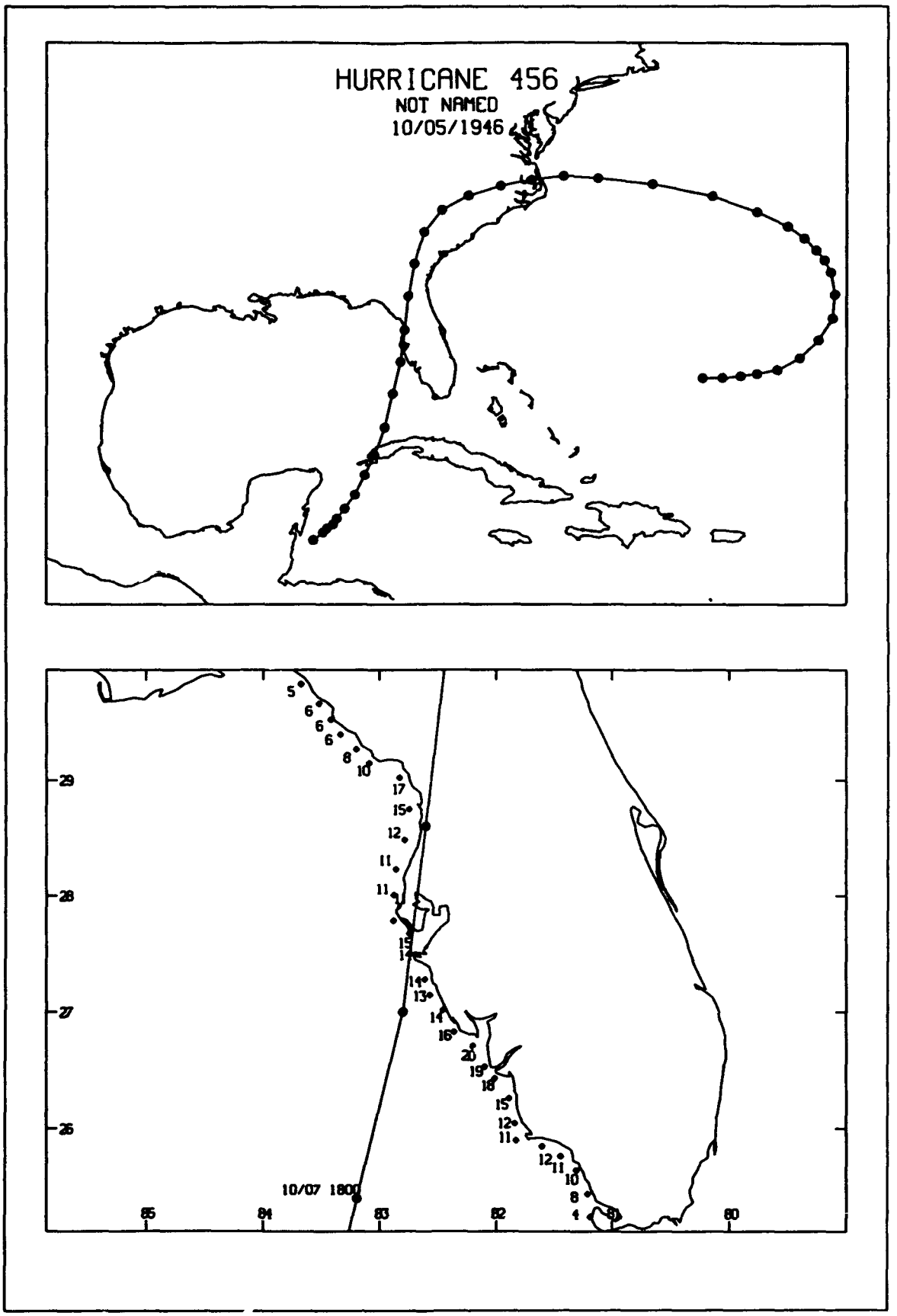
HURRICANE 456
NOT NAMED
10/05/1946
29
28
27
26
10/07 1800
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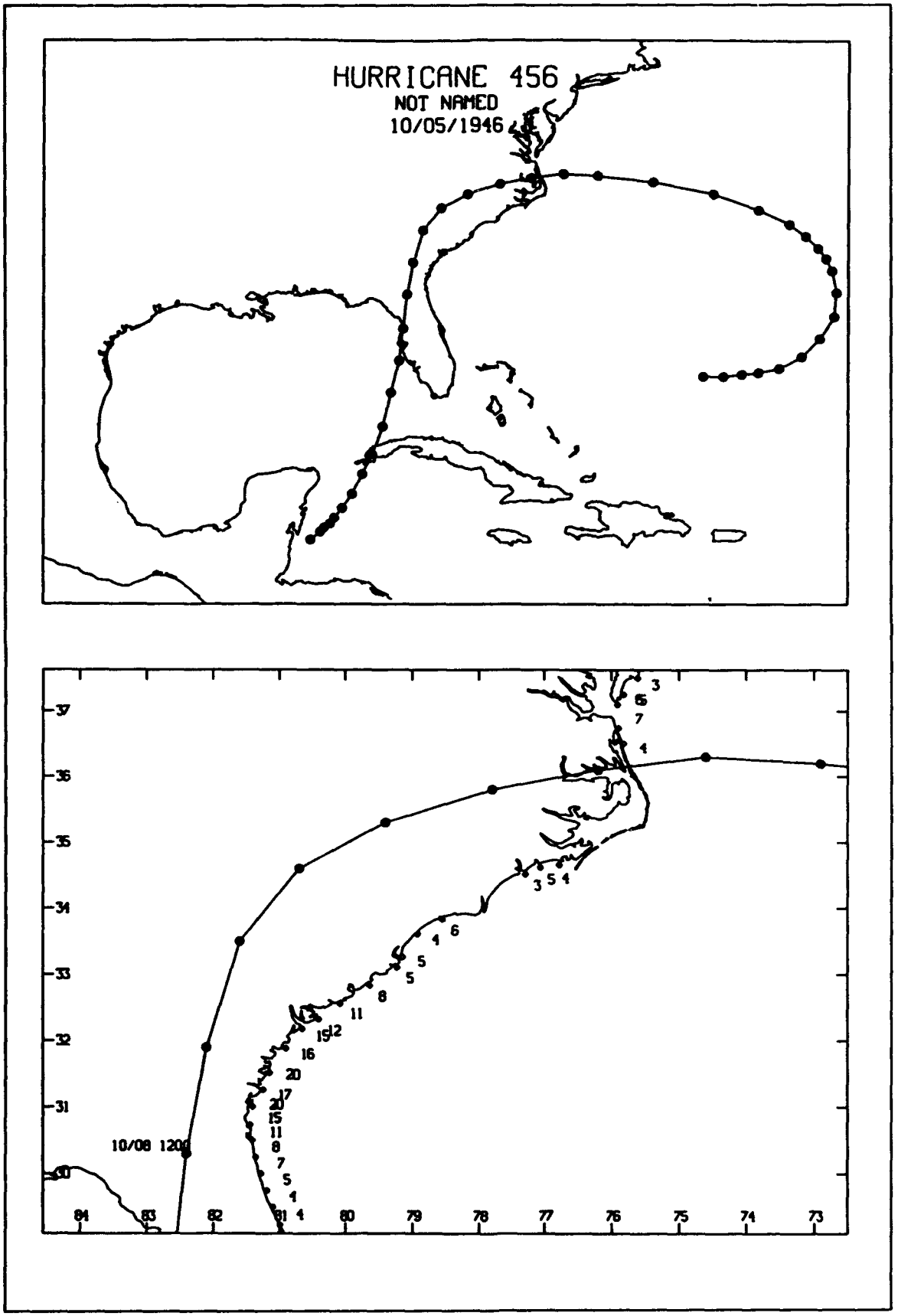
HURRICANE 456
NOT NAMED
10/05/1946
10/08 1200
37
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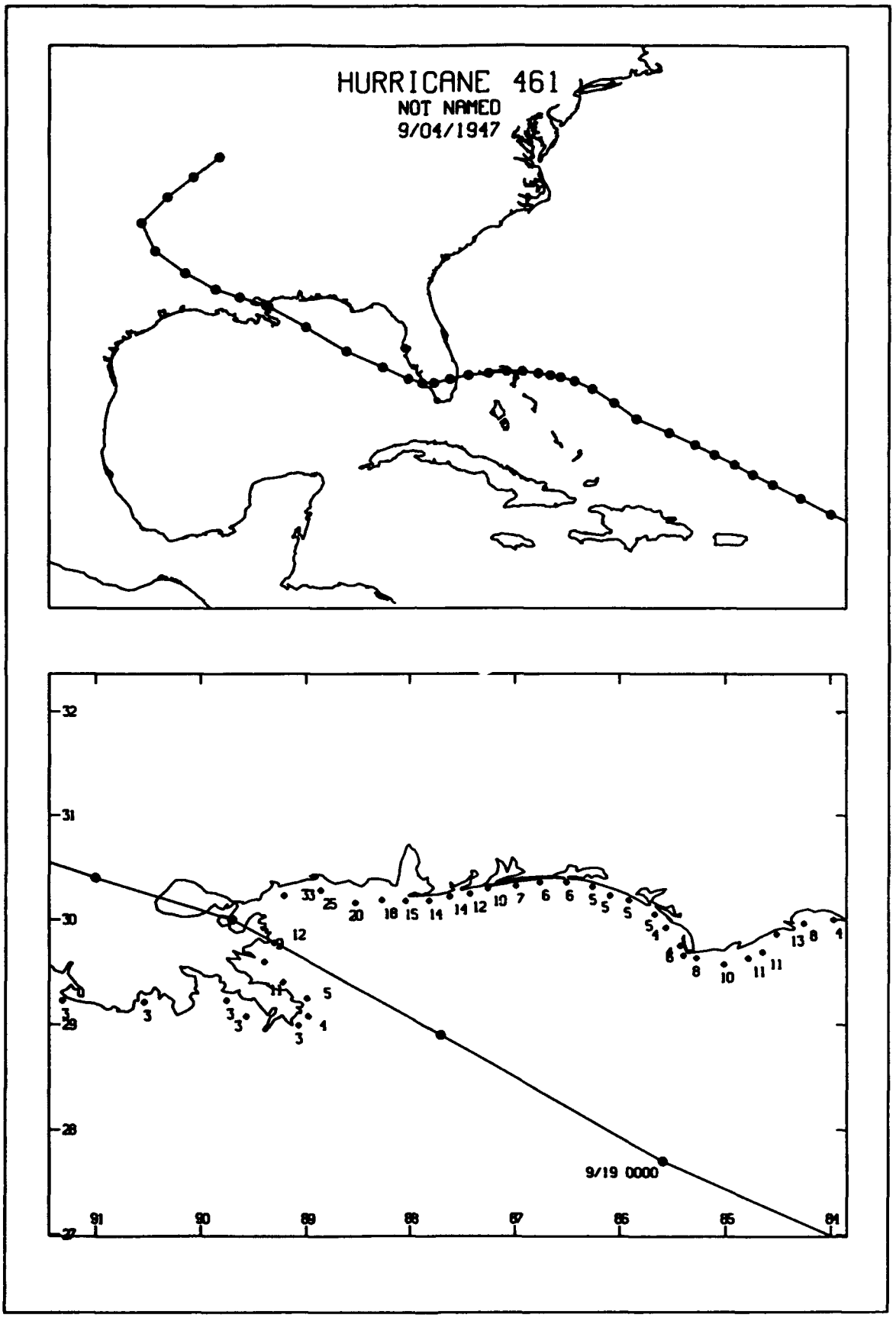
HURRICANE 461
NOT NAMED
9/04/1947
32
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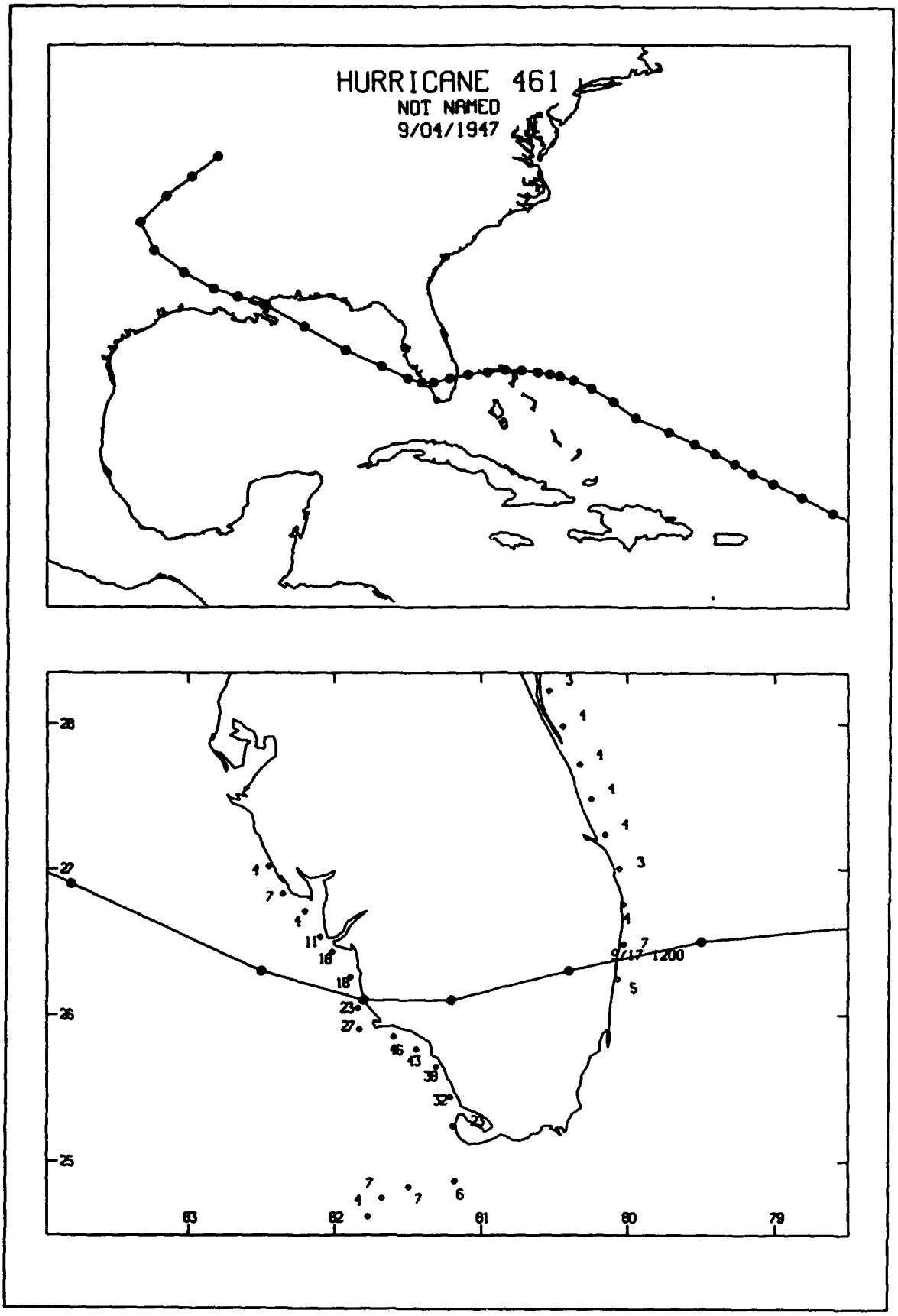
84
9/19 0000


HURRICANE 461
NOT NAMED
9/04/1947
28
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26
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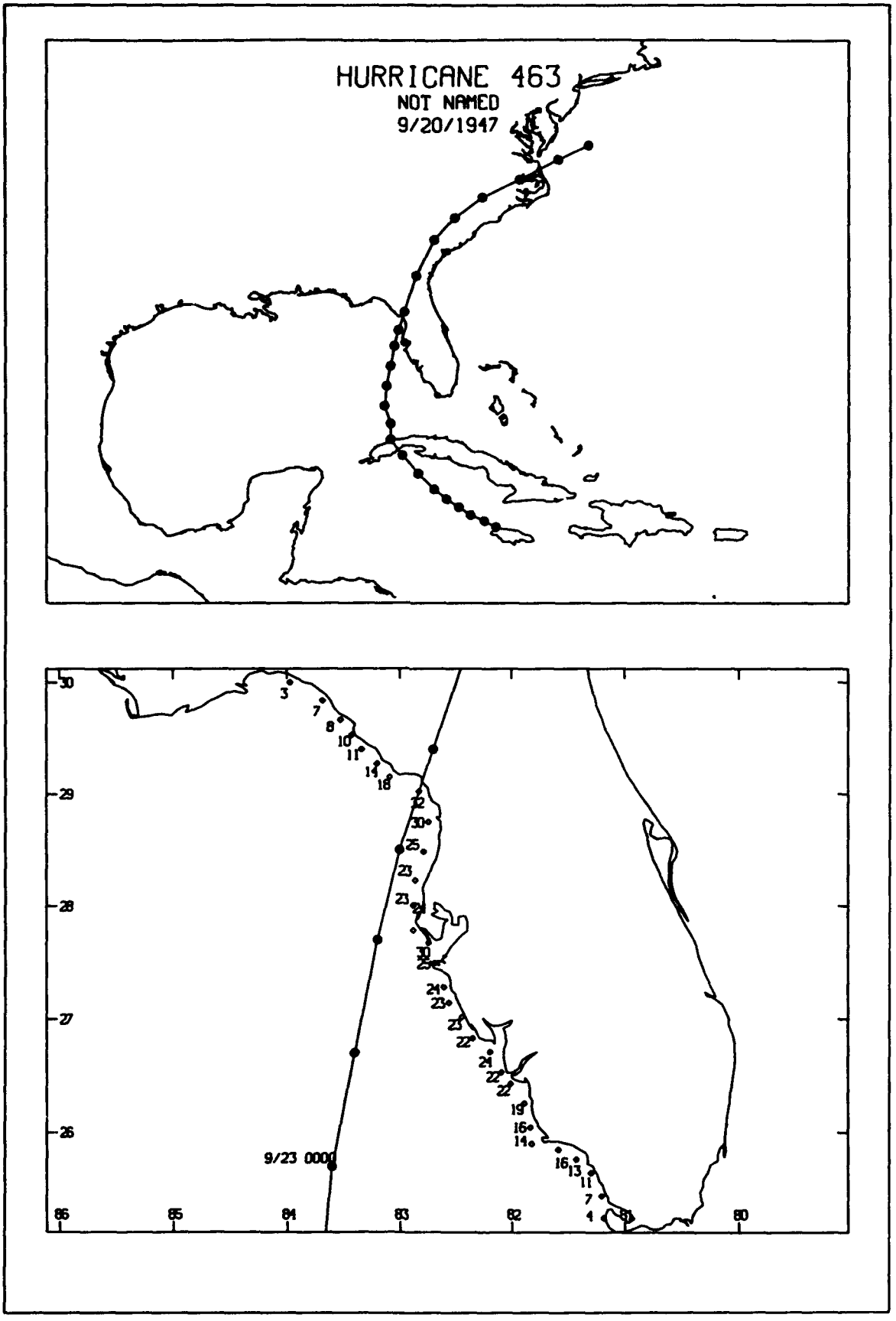
79
9/17 1200


HURRICANE 463
NOT NAMED
9/20/1947
9/23 0000
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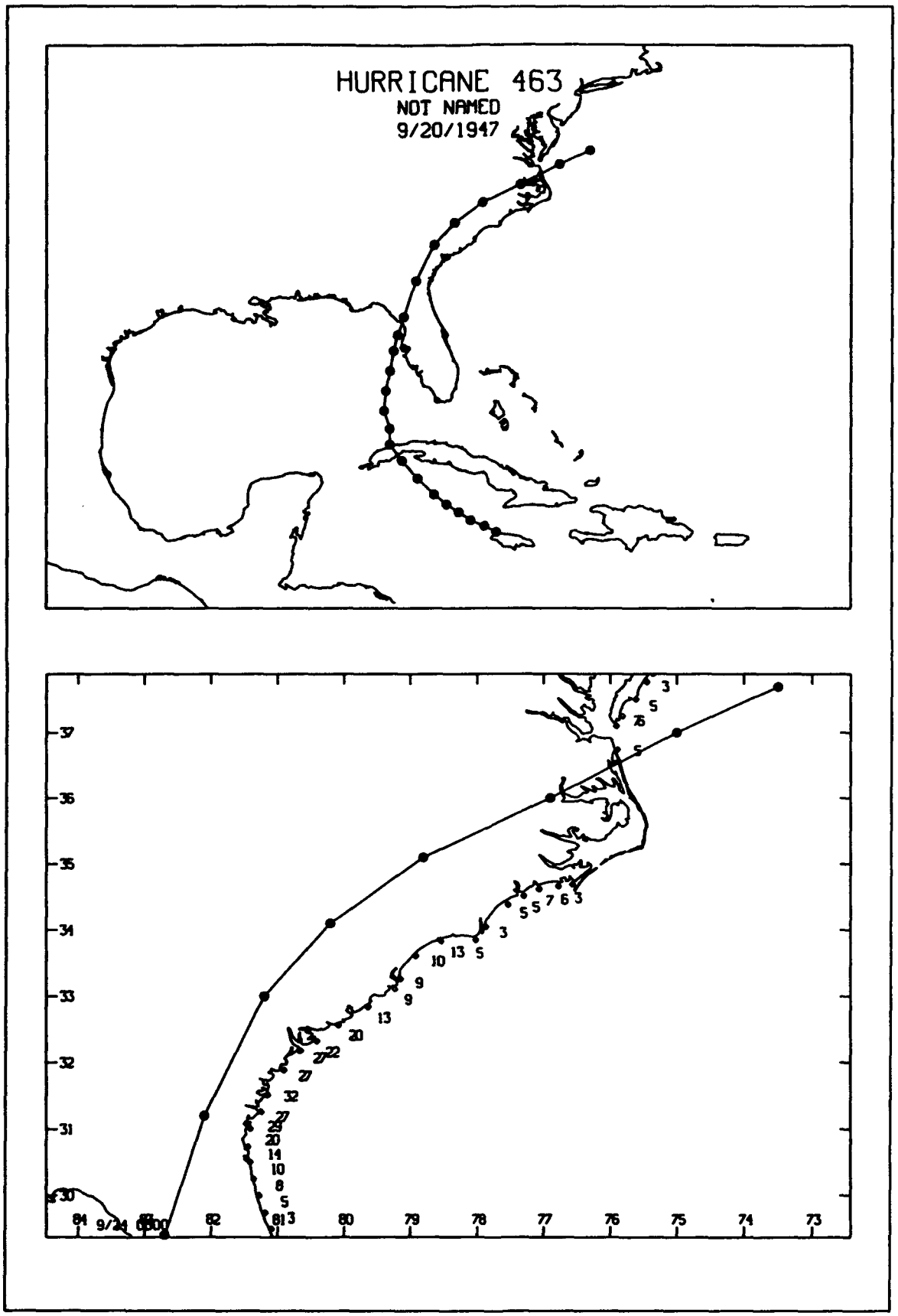
HURRICANE 463
NOT NAMED
9/20/1947
37
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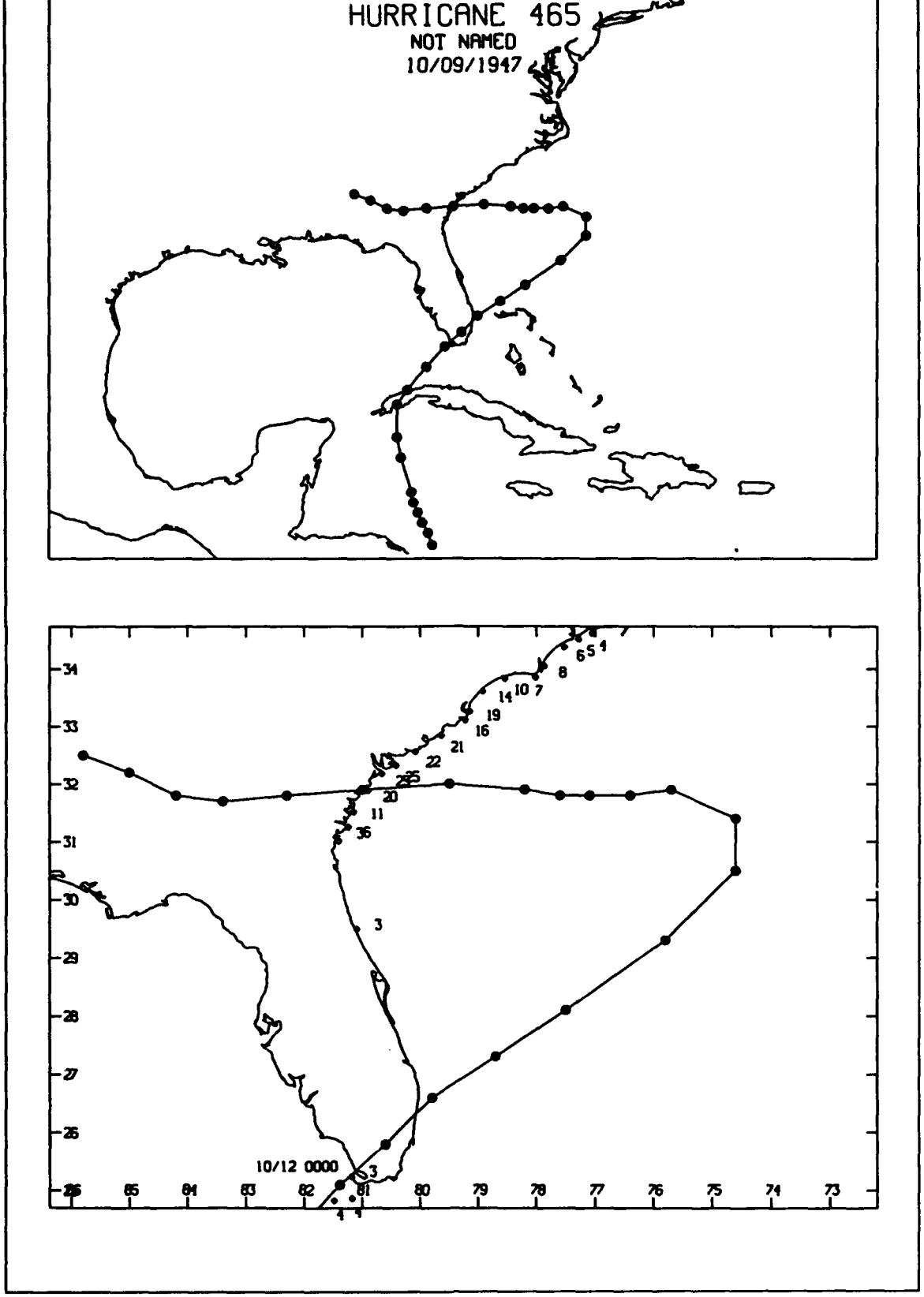
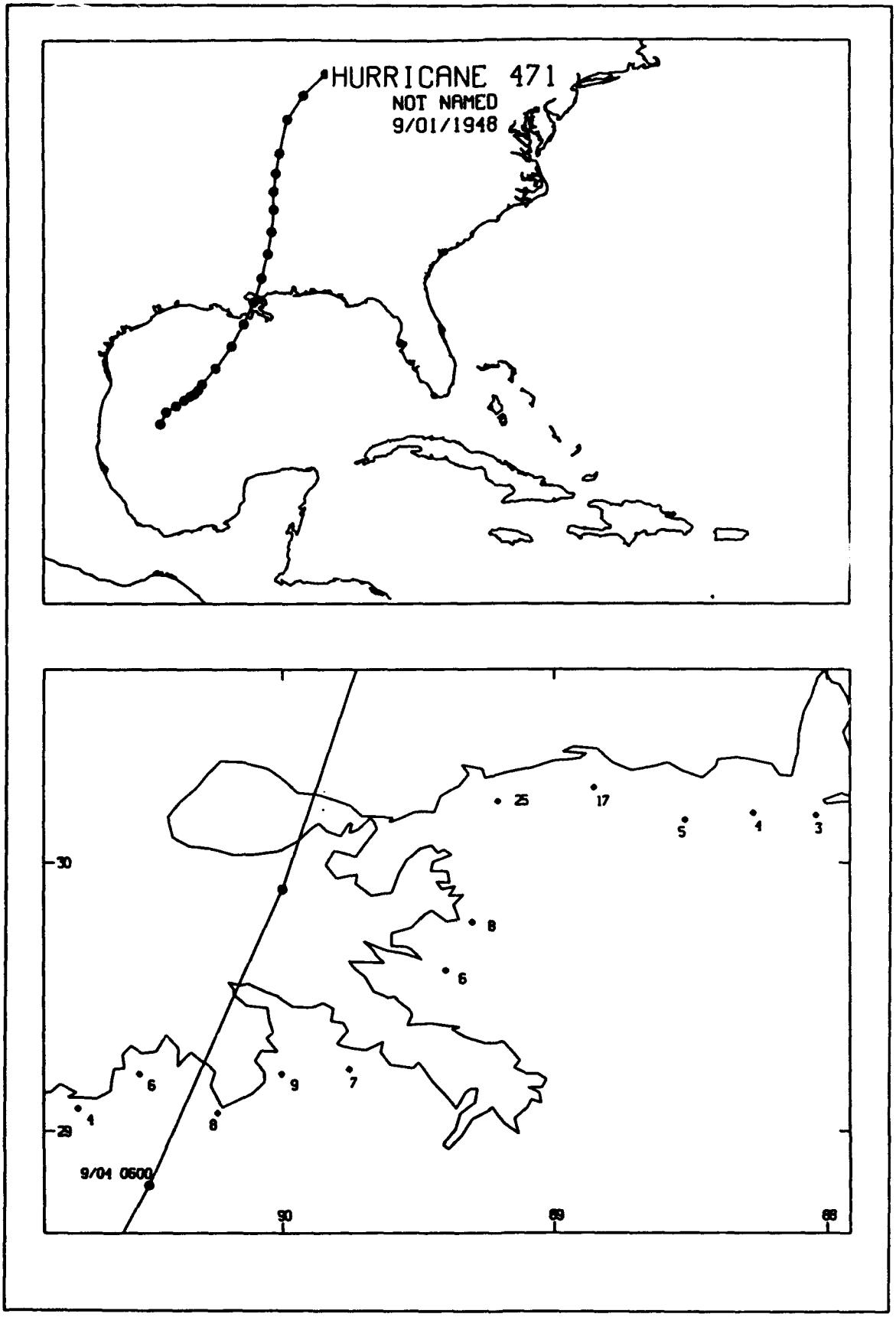
9/24 0600


HURRICANE 465
NOT NAMED
10/09/1947
10/12 0000


HURRICANE 471
NOT NAMED
9/01/1948
25
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9/04 0600
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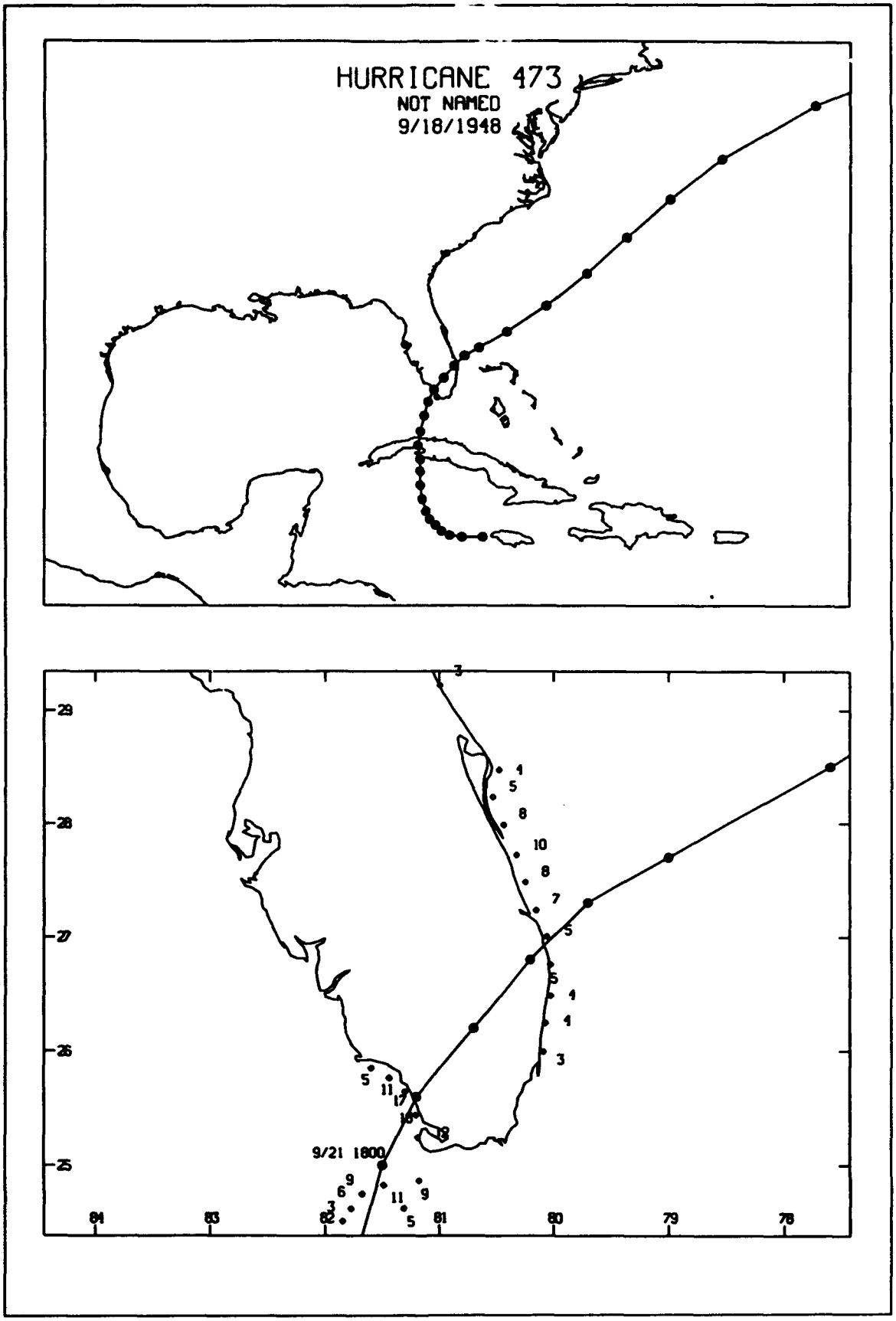
89
88


HURRICANE 473
NOT NAMED
9/18/1948
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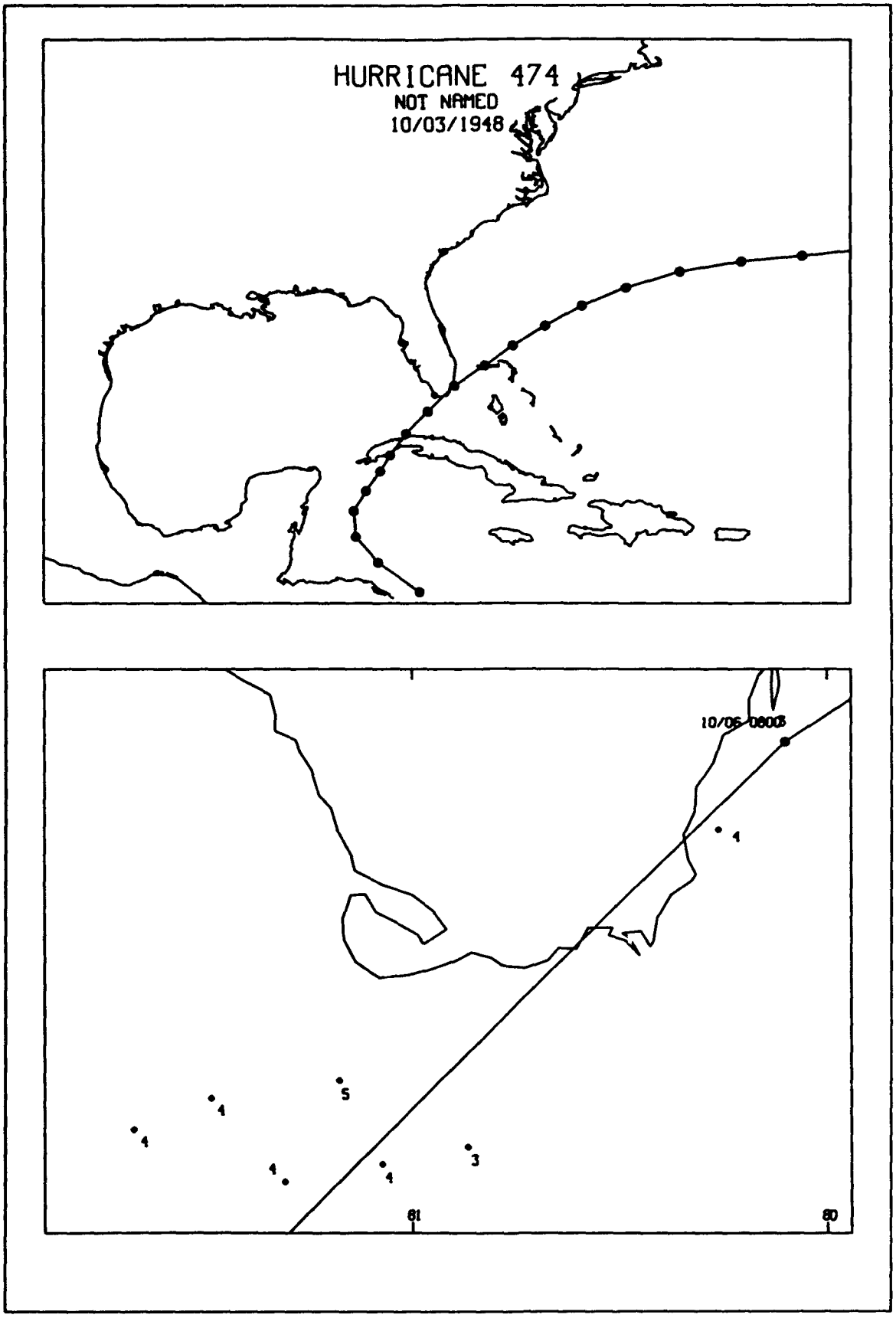
9/21 1800


HURRICANE 474
NOT NAMED
10/03/1948
10/05 0600
4
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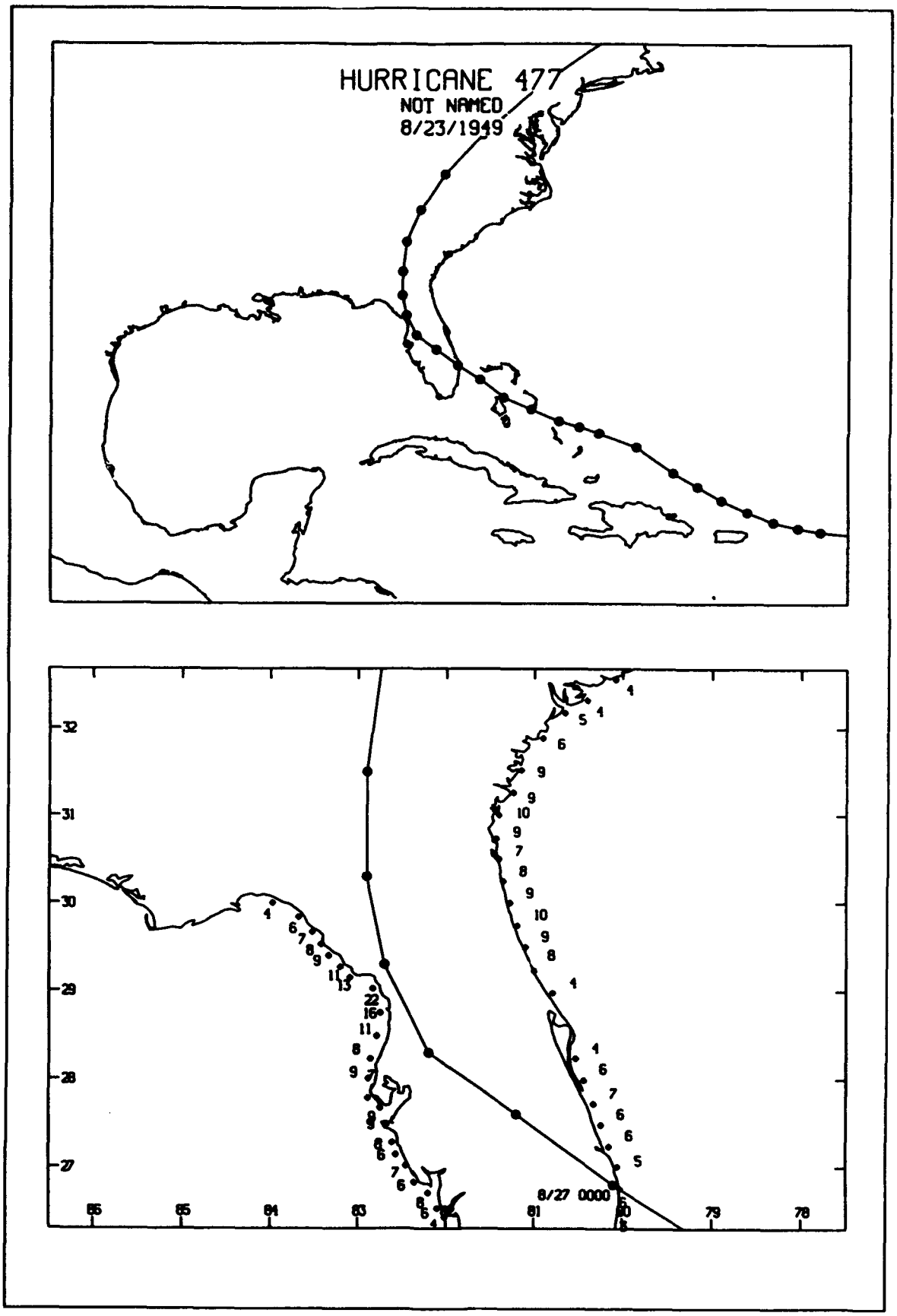
61
80


HURRICANE 477
NOT NAMED
8/23/1949
32
31
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28
27
8/27 0000
85
84
83
81
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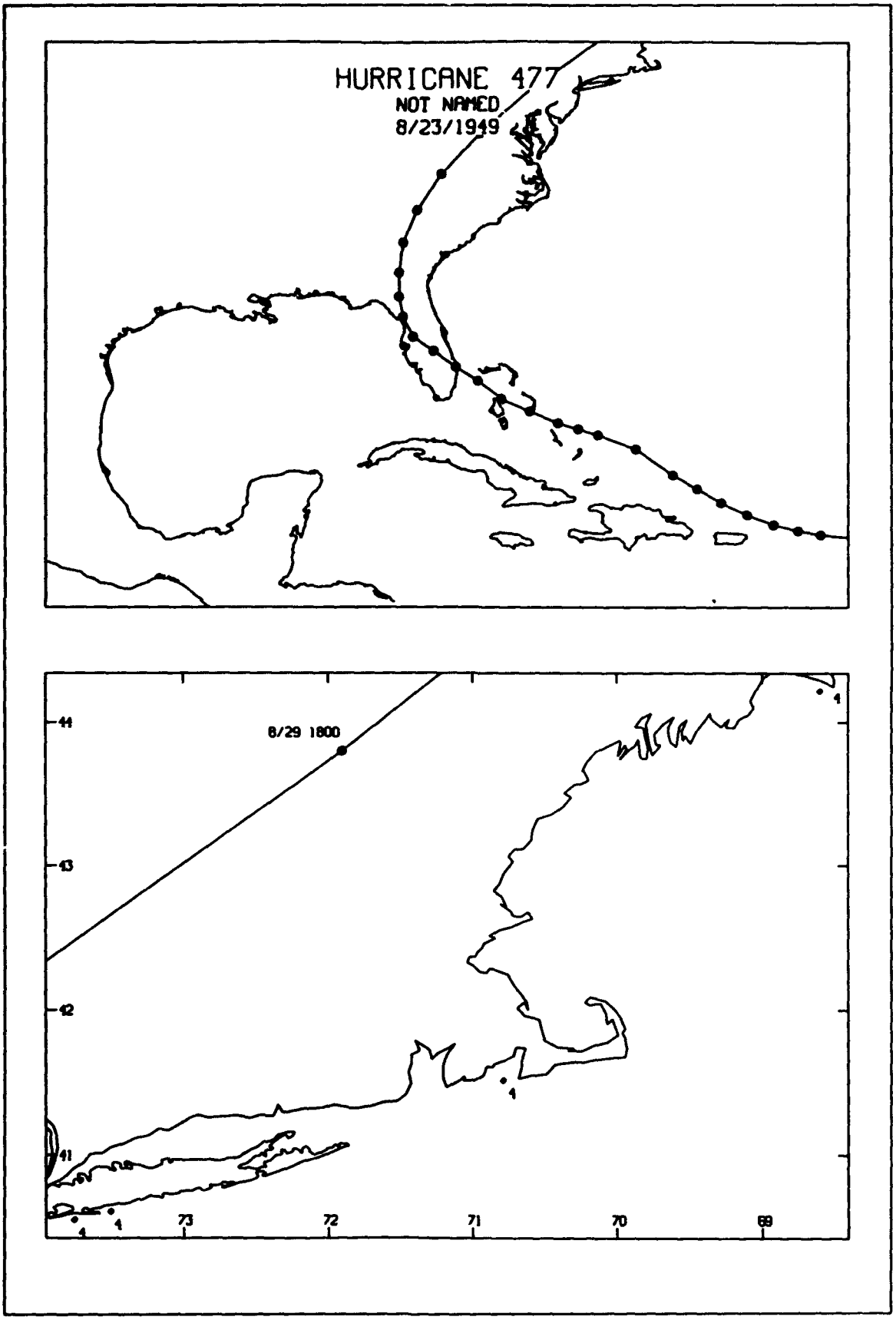
79
78


HURRICANE 477
NOT NAMED
8/23/1949
8/29 1800
44
43
42
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72
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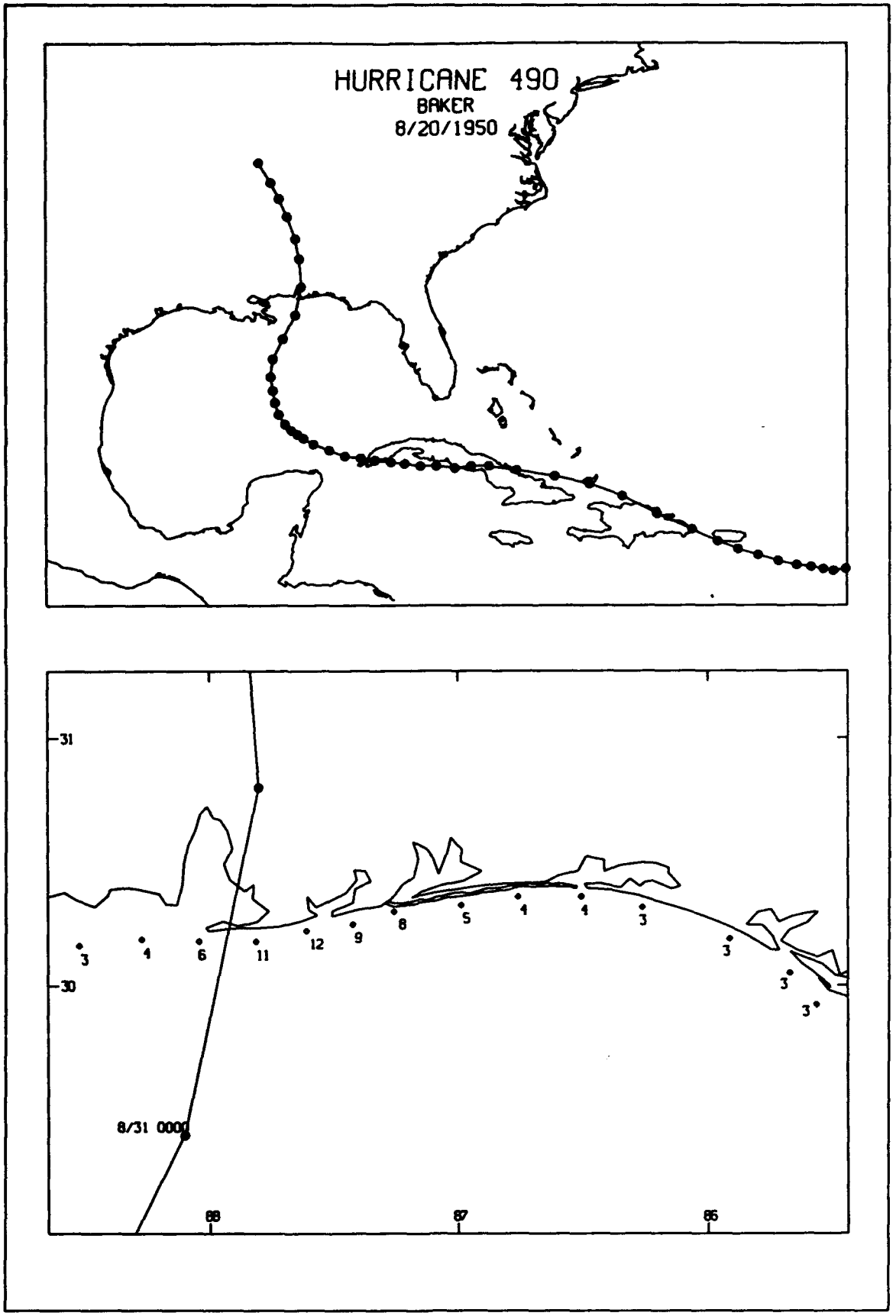
HURRICANE 490
BAKER
8/20/1950
31
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12
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3
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8/31 0000
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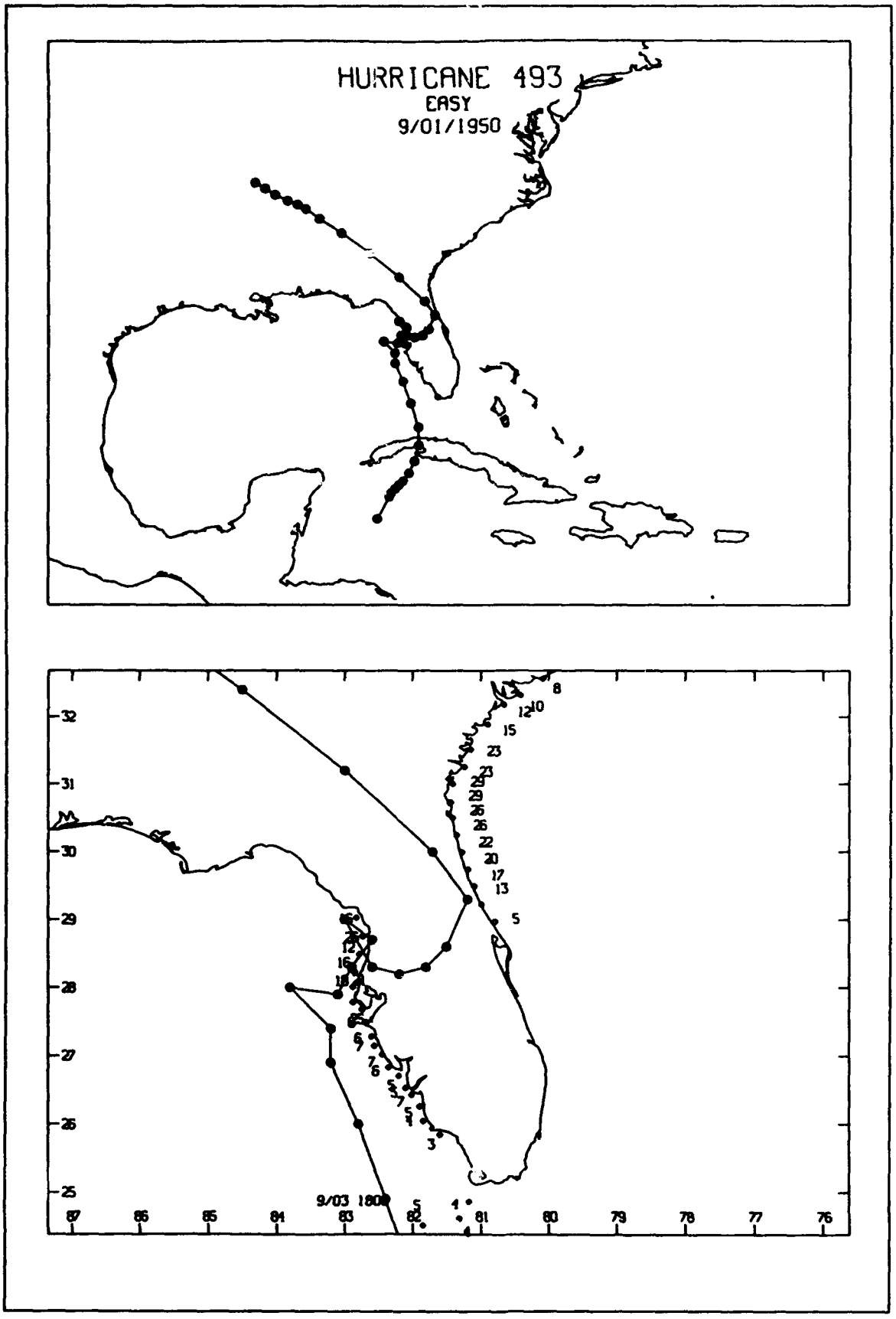
87
86


HURRICANE 493
EASY
9/01/1950
32
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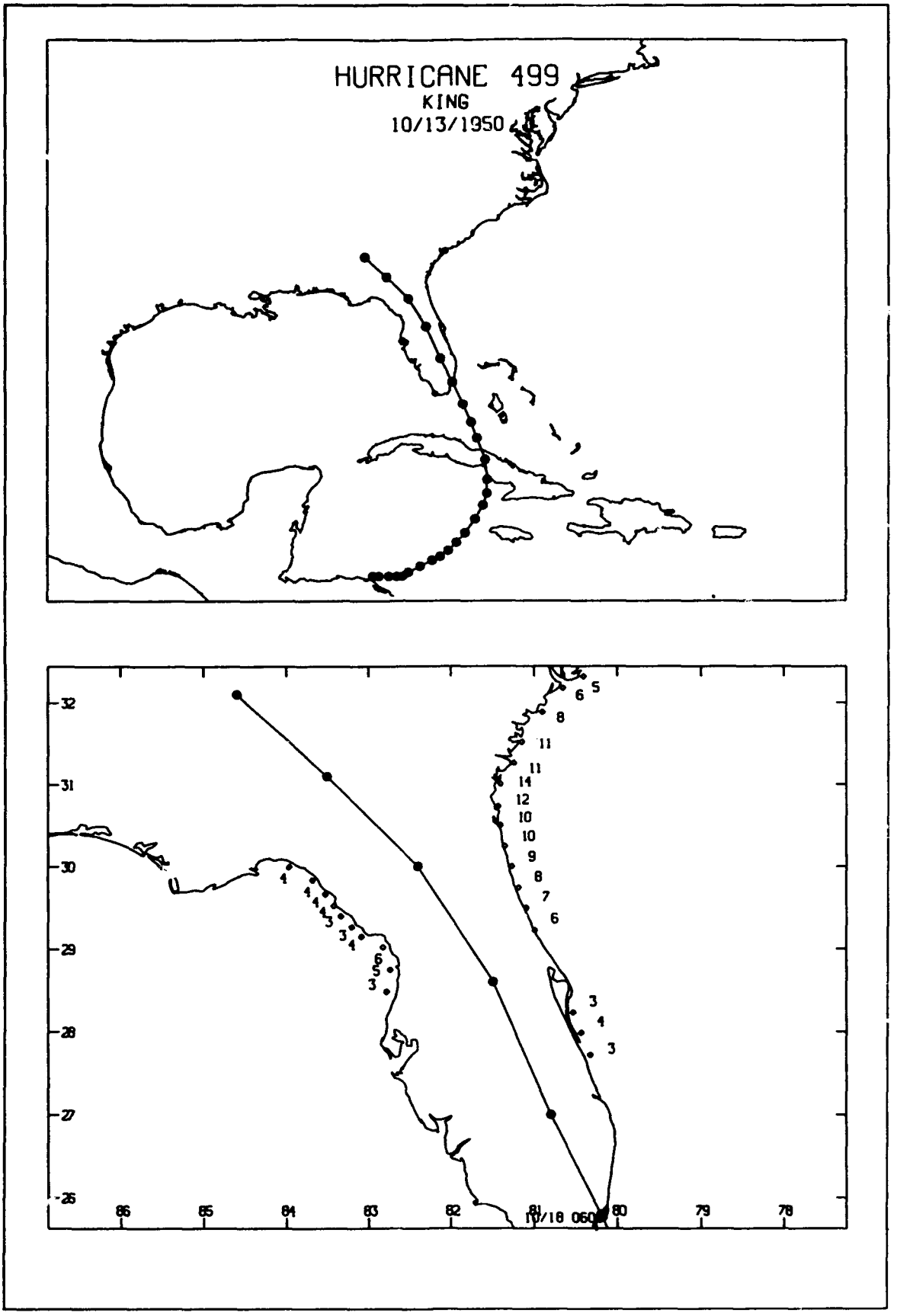
76
9/03 1800


HURRICANE 499
KING
10/13/1950
32
31
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29
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86
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84
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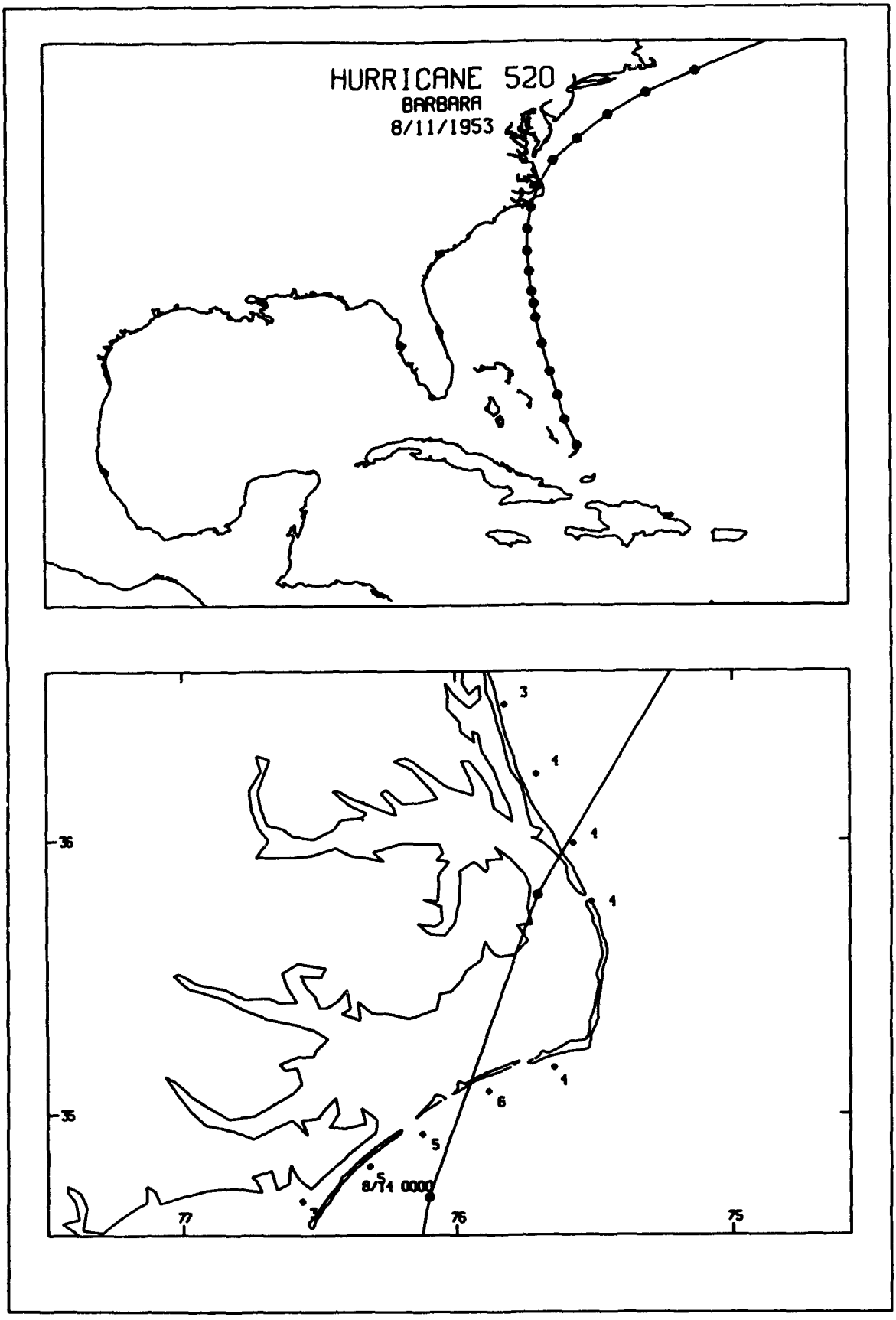
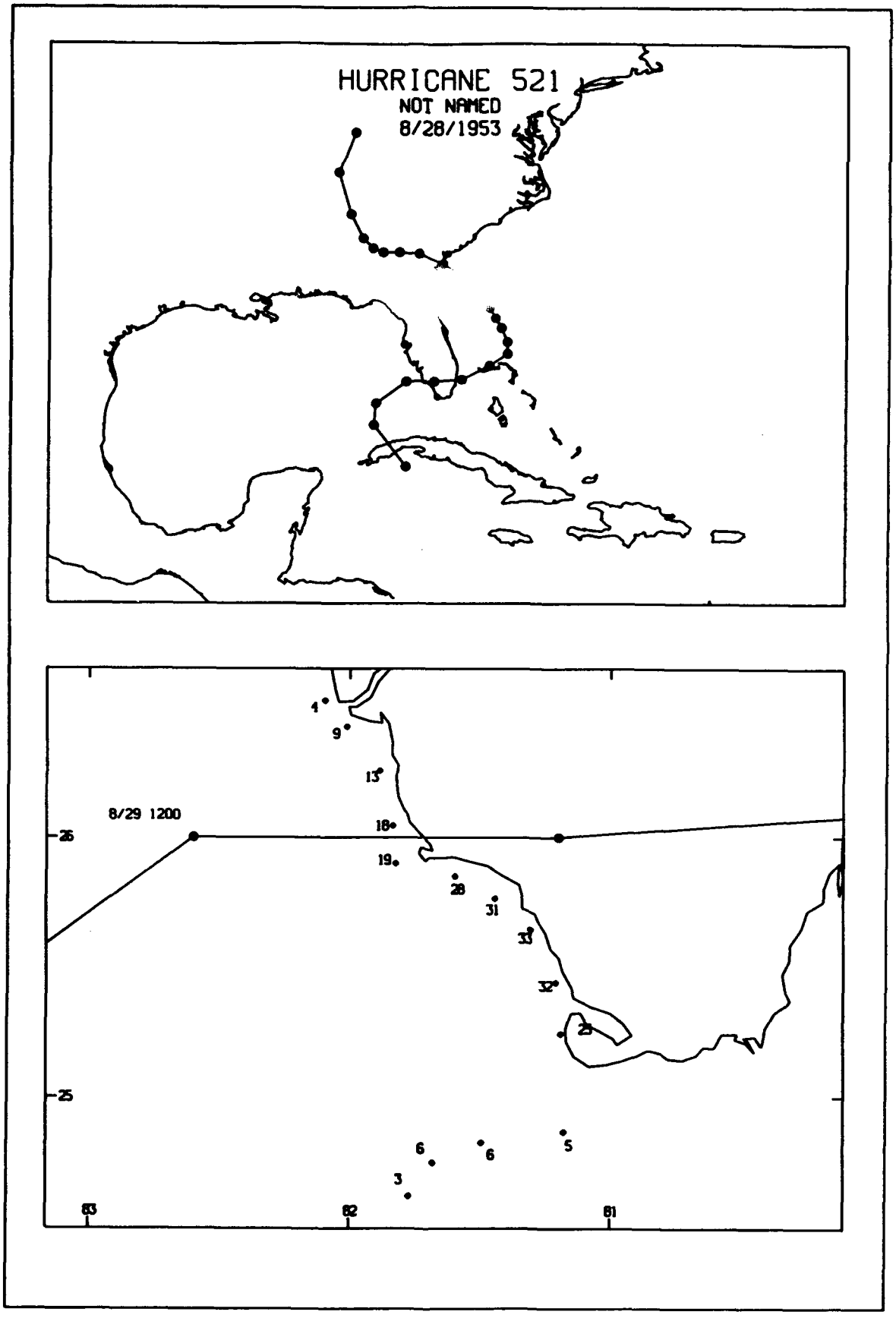
10/18 060


HURRICANE 520
BARBARA
8/11/1953
3
1
1
1
1
6
5
5
8/14 0000
36
35
77
76
75


HURRICANE 521
NOT NAMED
8/28/1953
8/29 1200
4
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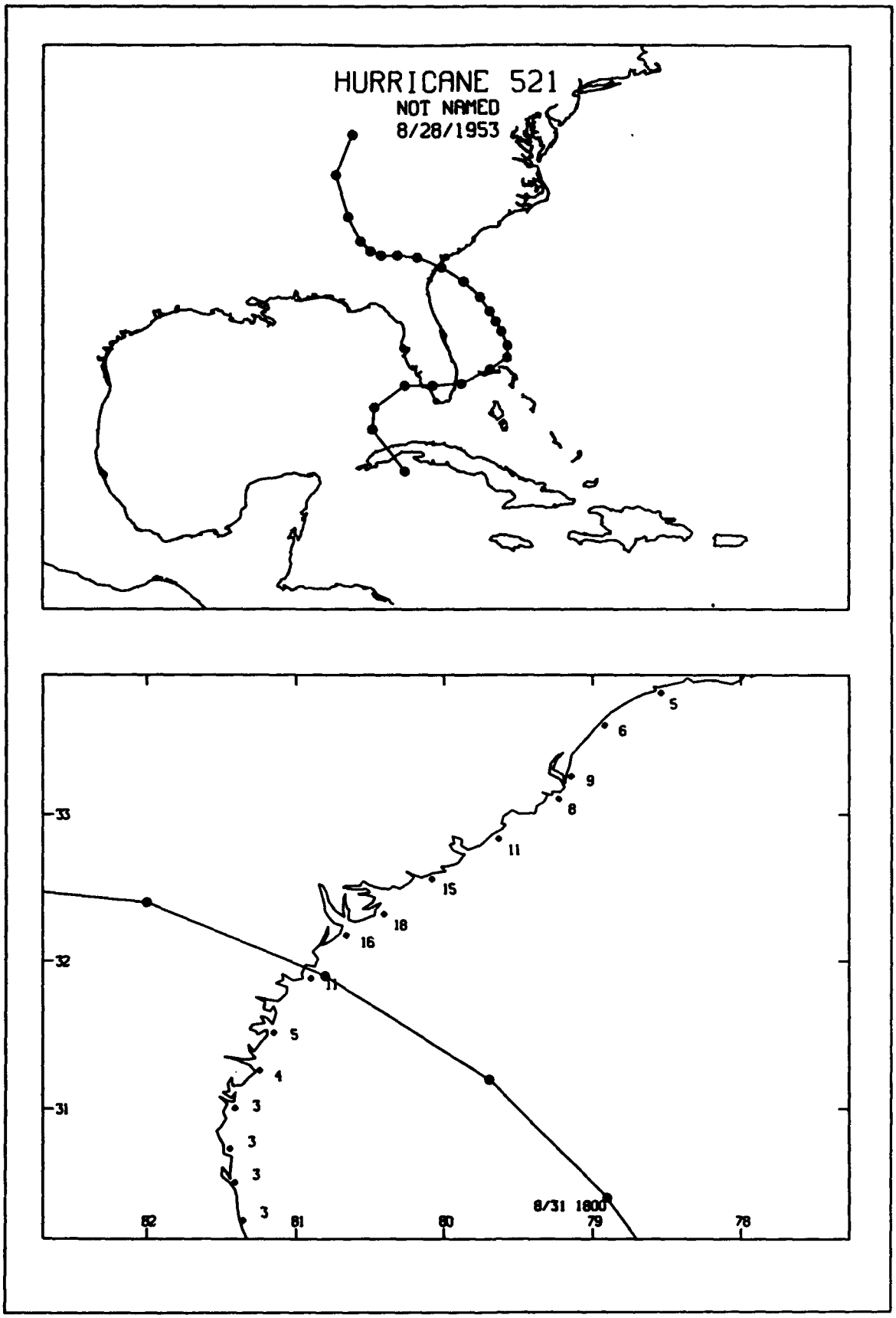
82
81


HURRICANE 521
NOT NAMED
8/28/1953
33
32
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82
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78
8/31 1800
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16
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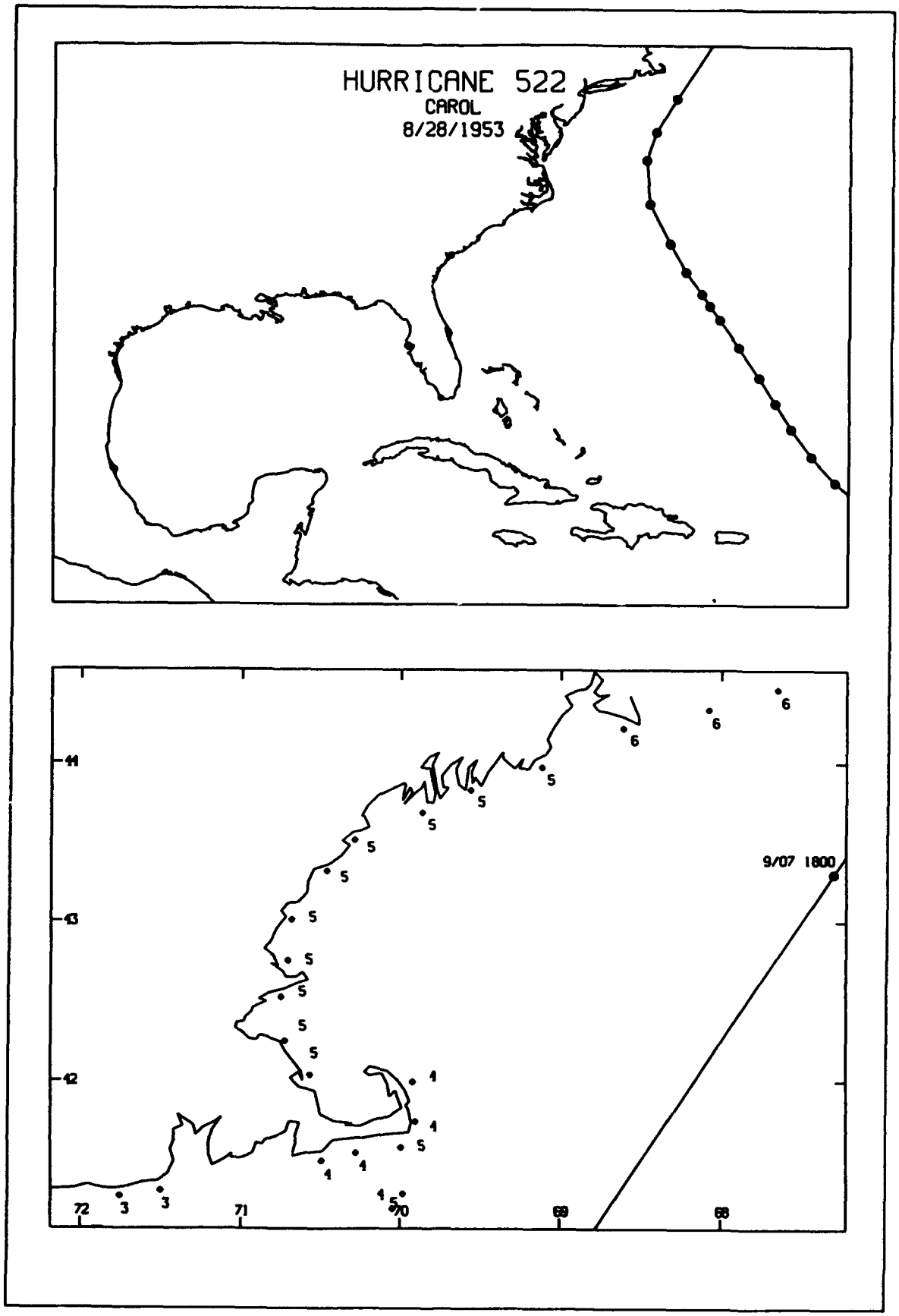
3


HURRICANE 522
CAROL
8/28/1953
9/07 1800
44
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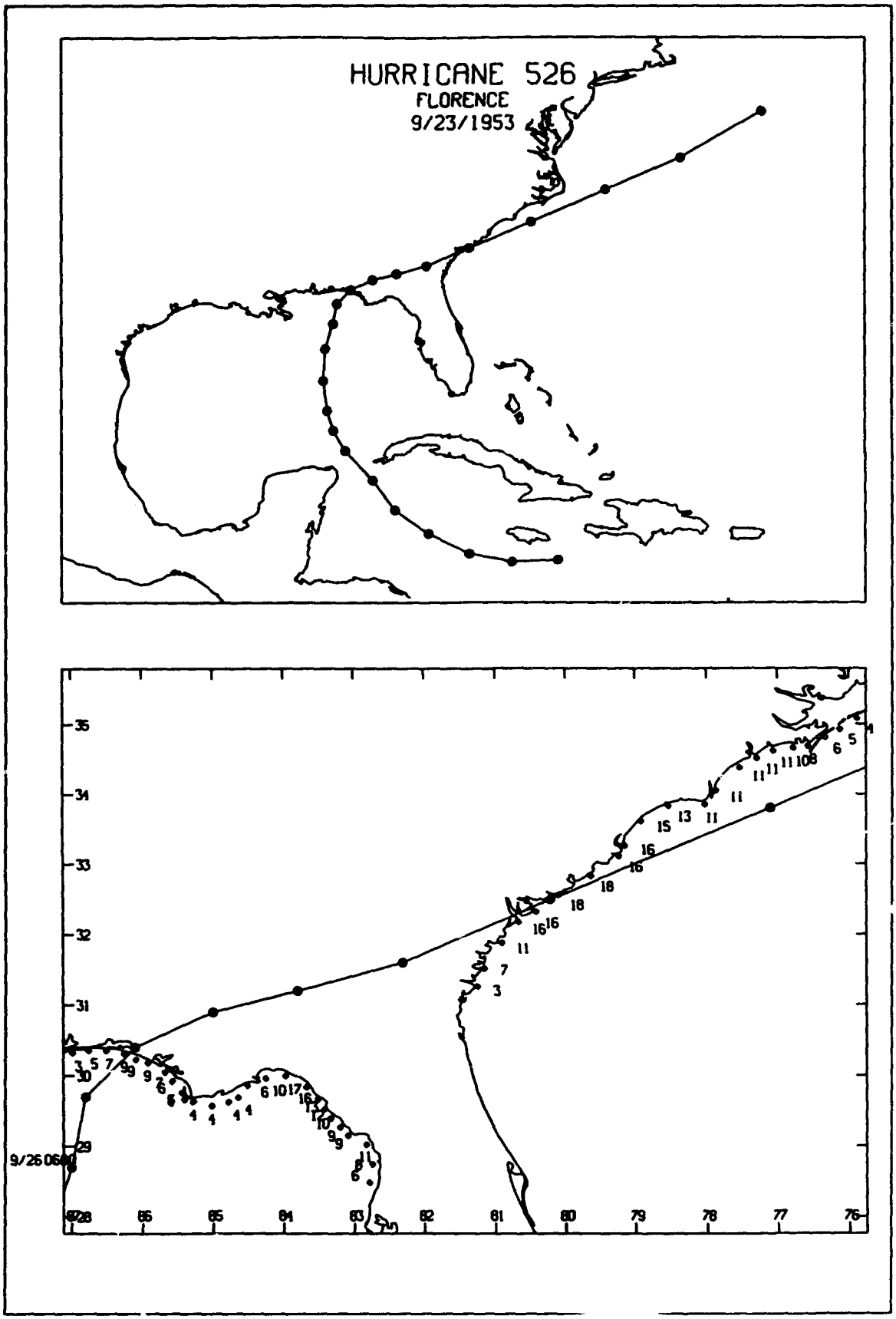
HURRICANE 526
FLORENCE
9/23/1953
35
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9/26 06
28
86
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84
83
82
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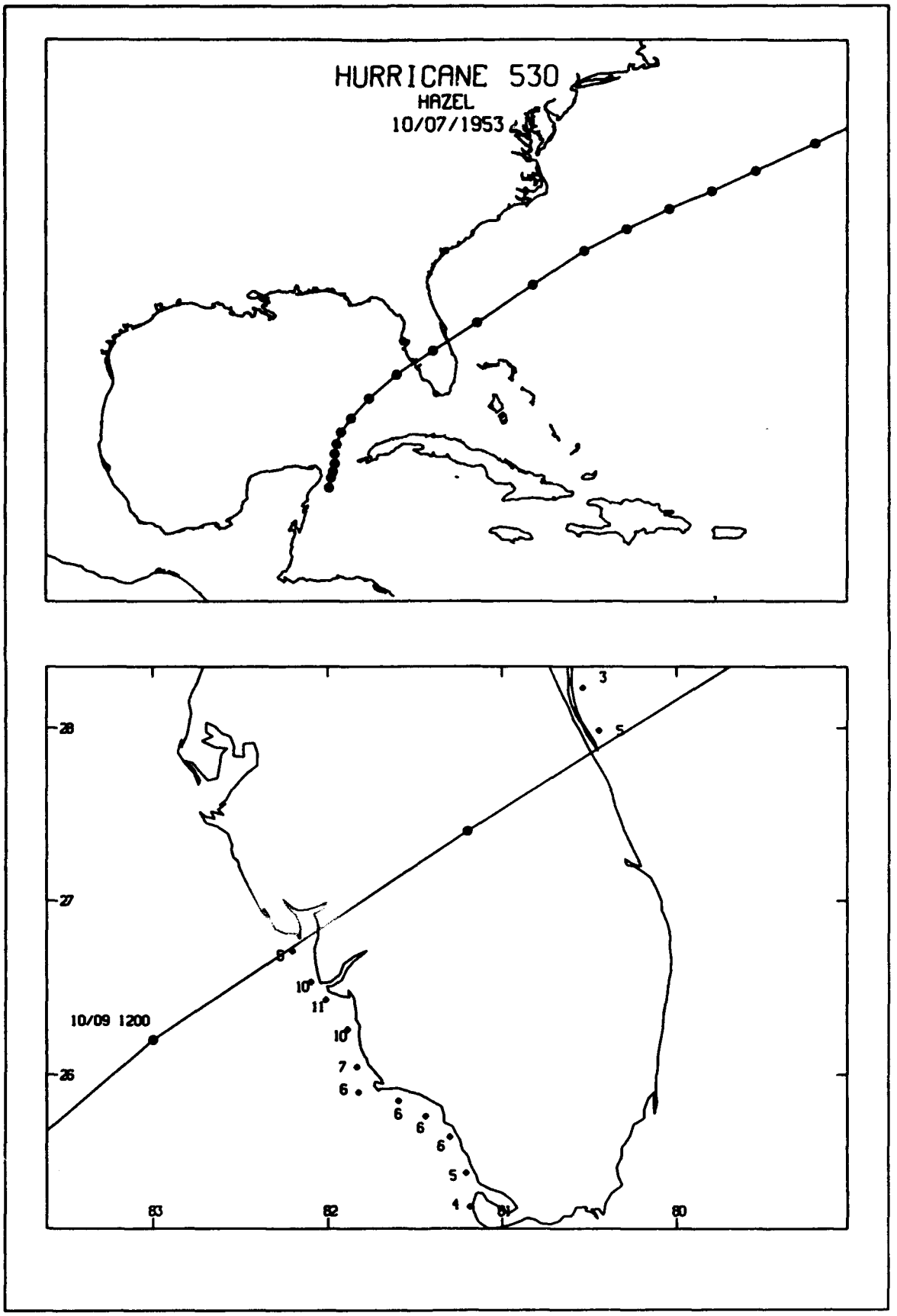
HURRICANE 530
HAZEL
10/07/1953
28
27
26
10/09 1200
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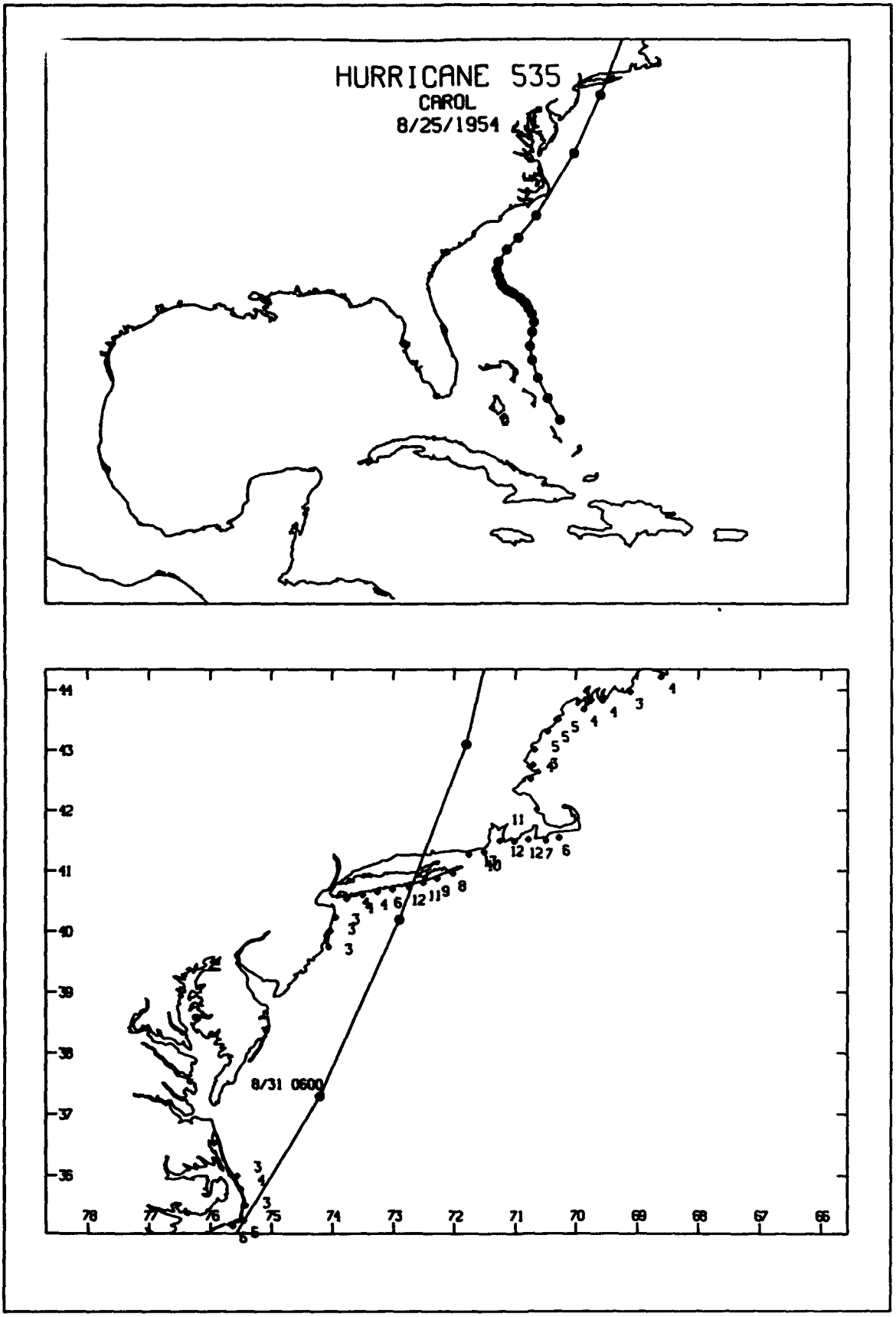
HURRICANE 535
CAROL
8/25/1954
8/31 0600
44
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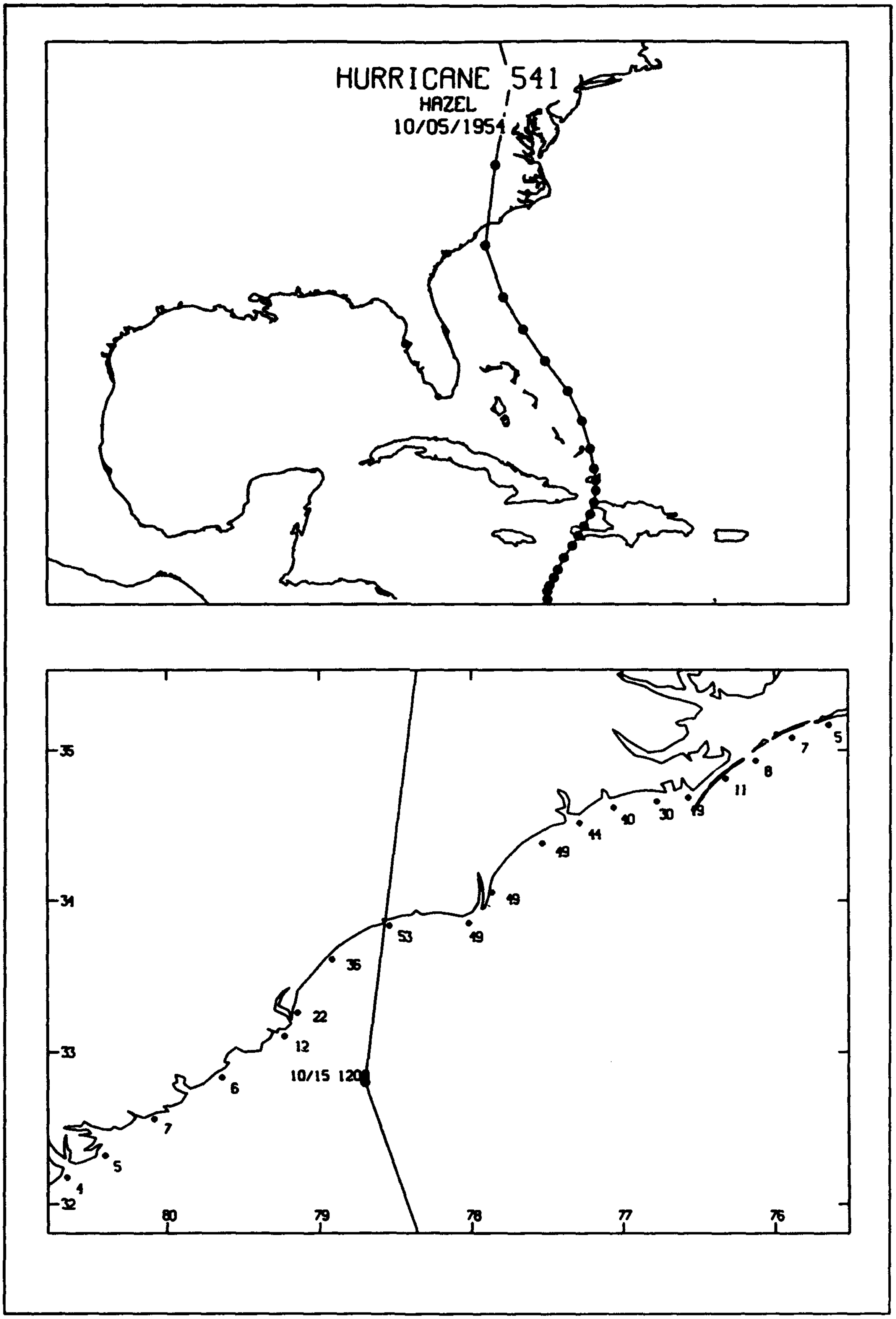
HURRICANE 541
HAZEL
10/05/1954
35
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80
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76
10/15 1200
53
49
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44
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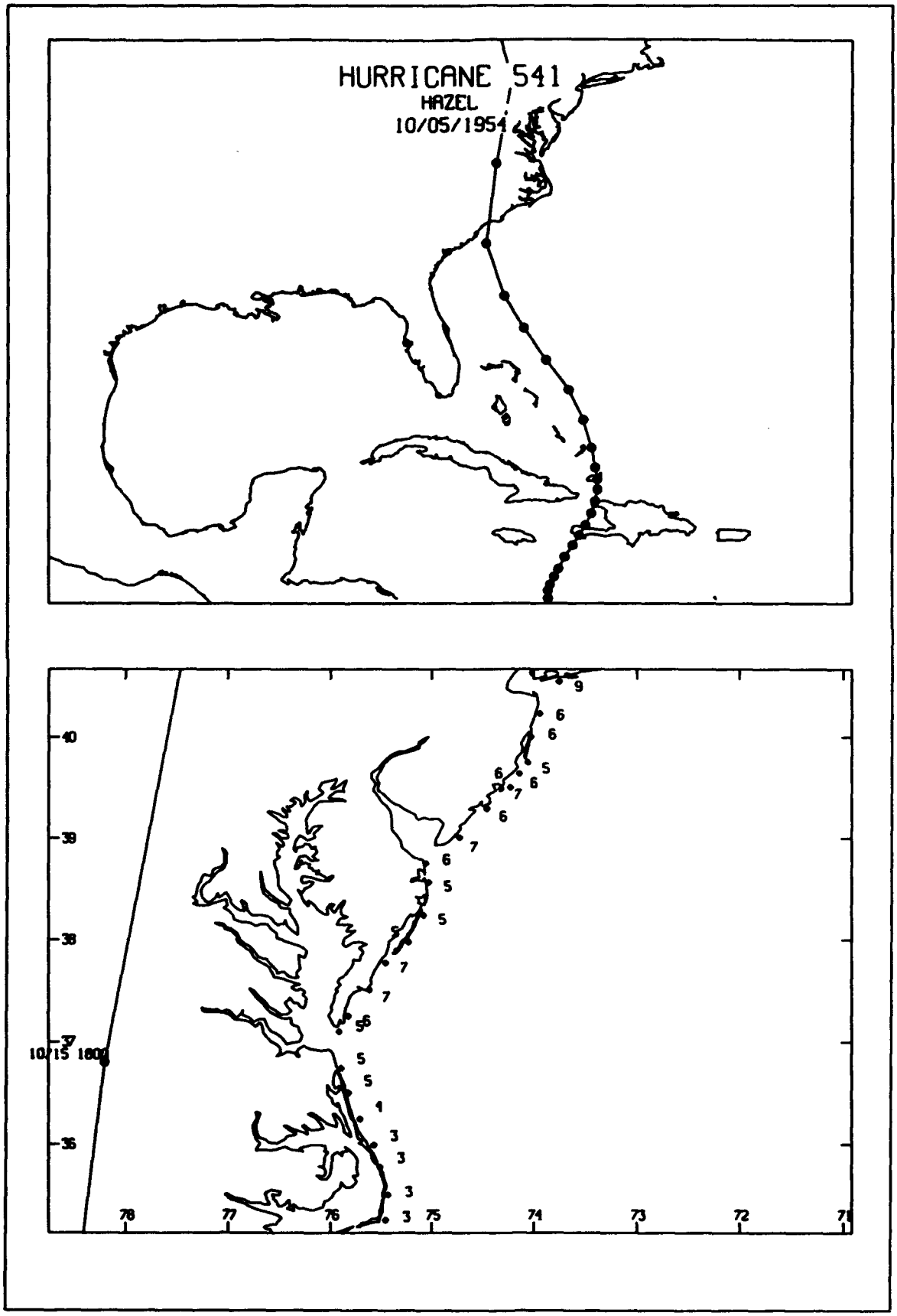
HURRICANE 541
HAZEL
10/05/1954
10/15 1800
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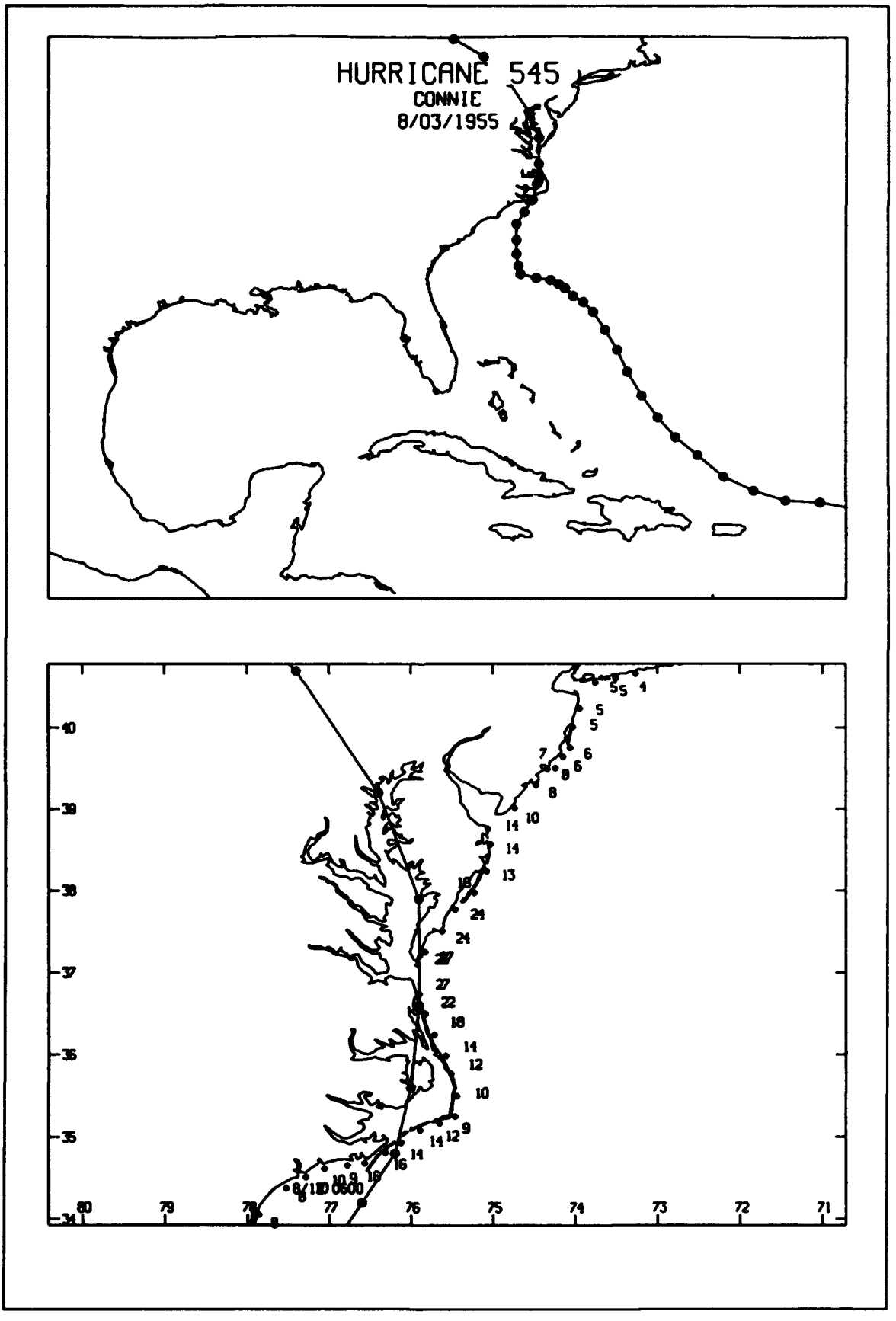
HURRICANE 545
CONNIE
8/03/1955
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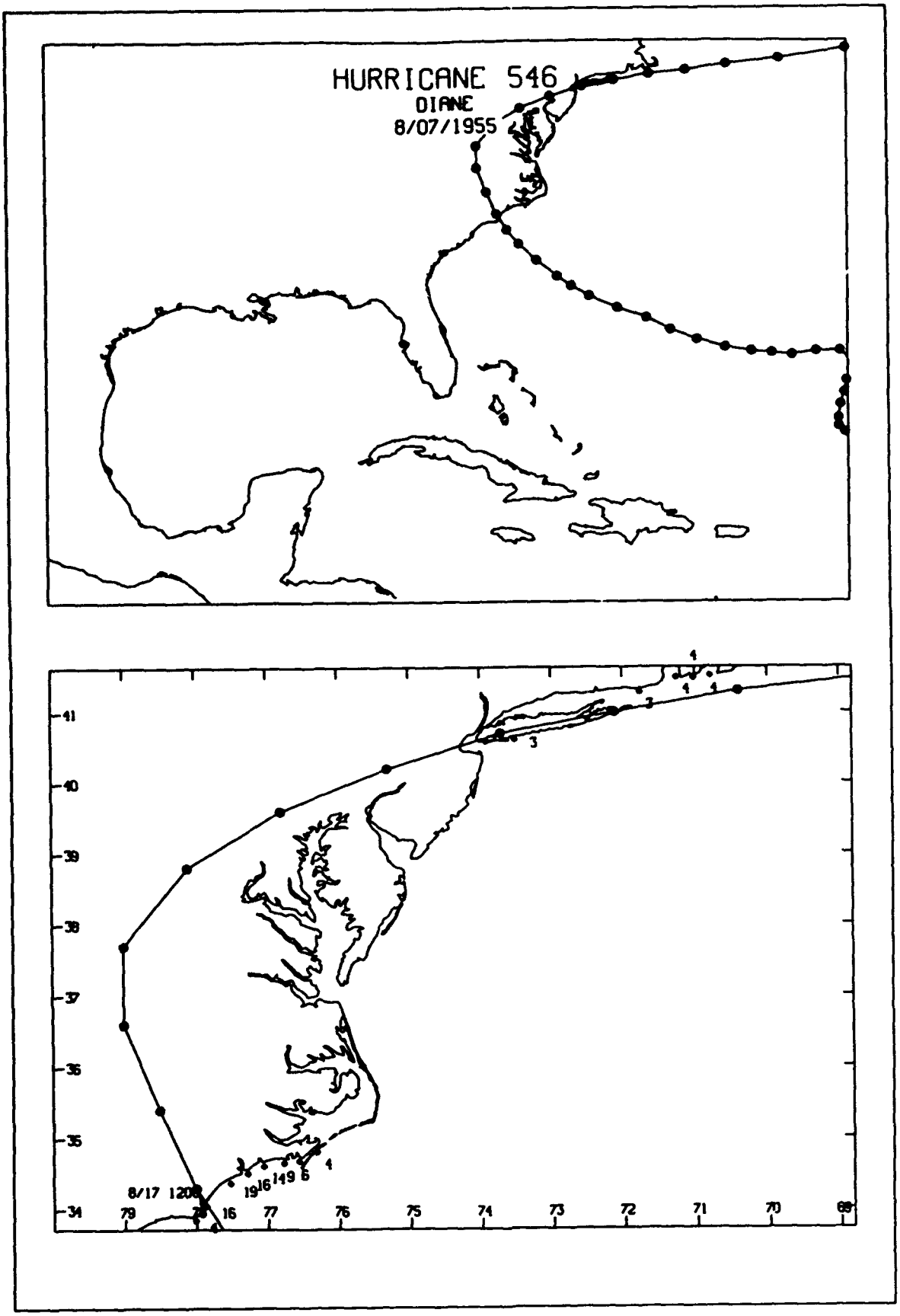
HURRICANE 546
DIANE
8/07/1955
41
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8/17 1200
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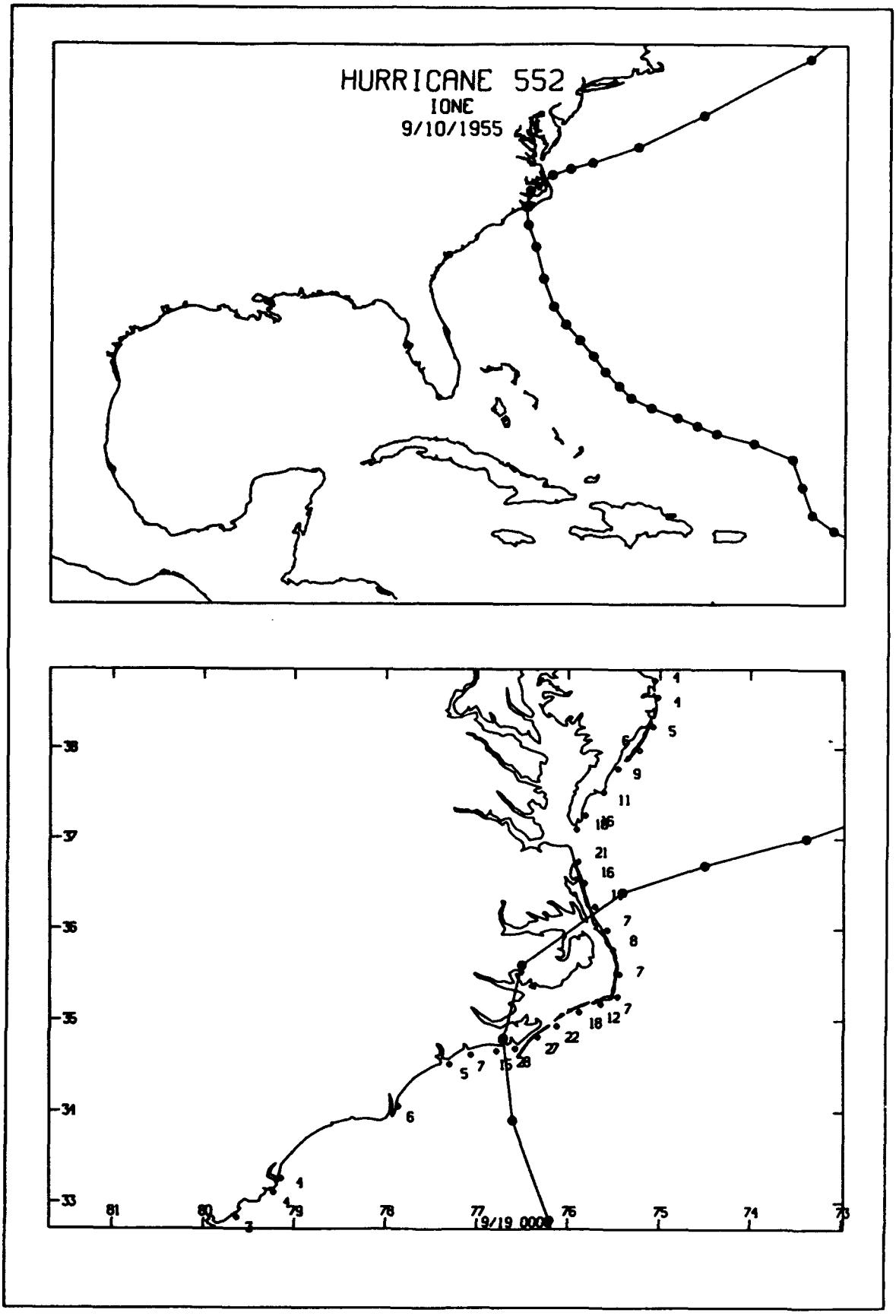
HURRICANE 552
IONE
9/10/1955
38
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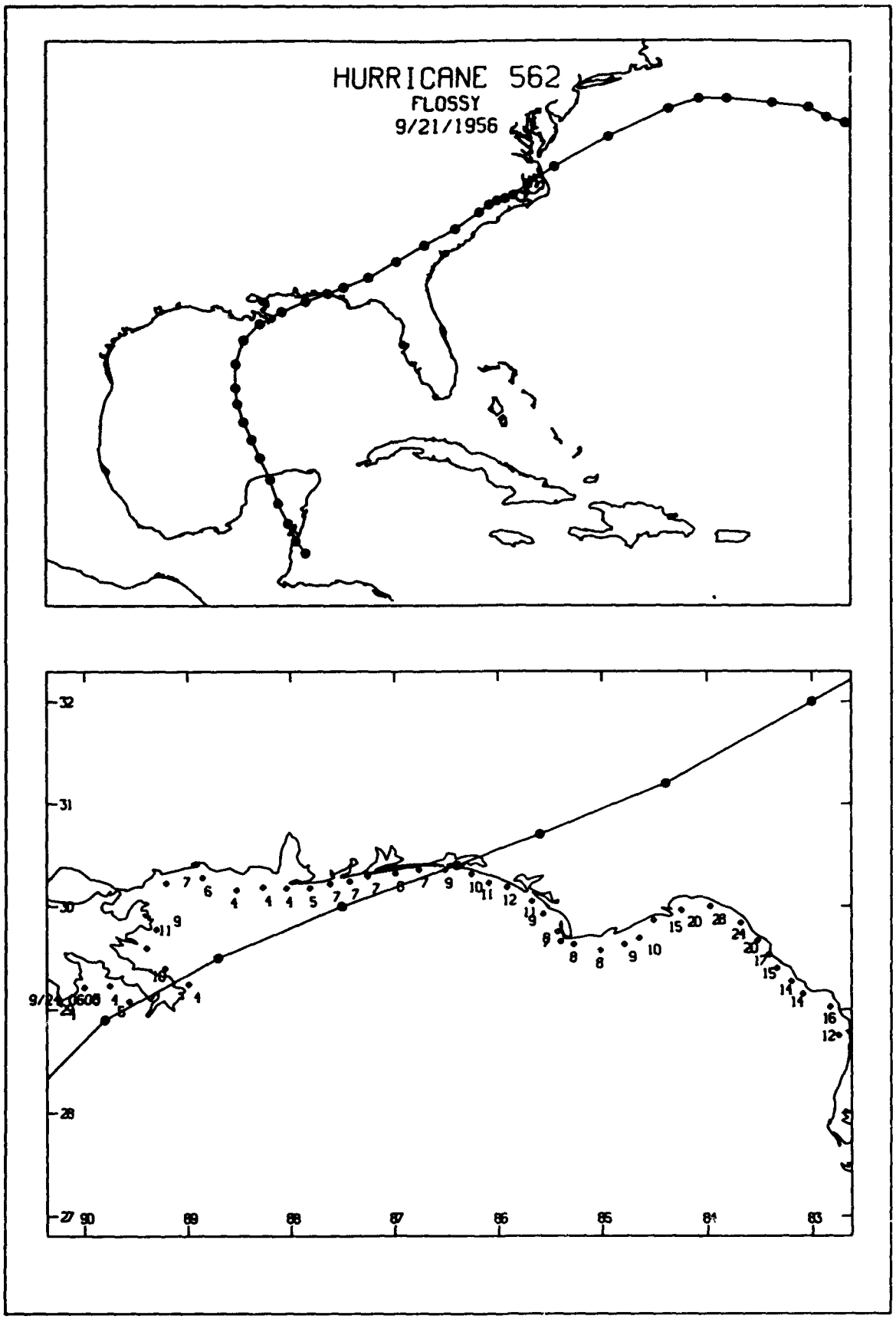
9/19 0000


HURRICANE 562
FLOSSY
9/21/1956
32
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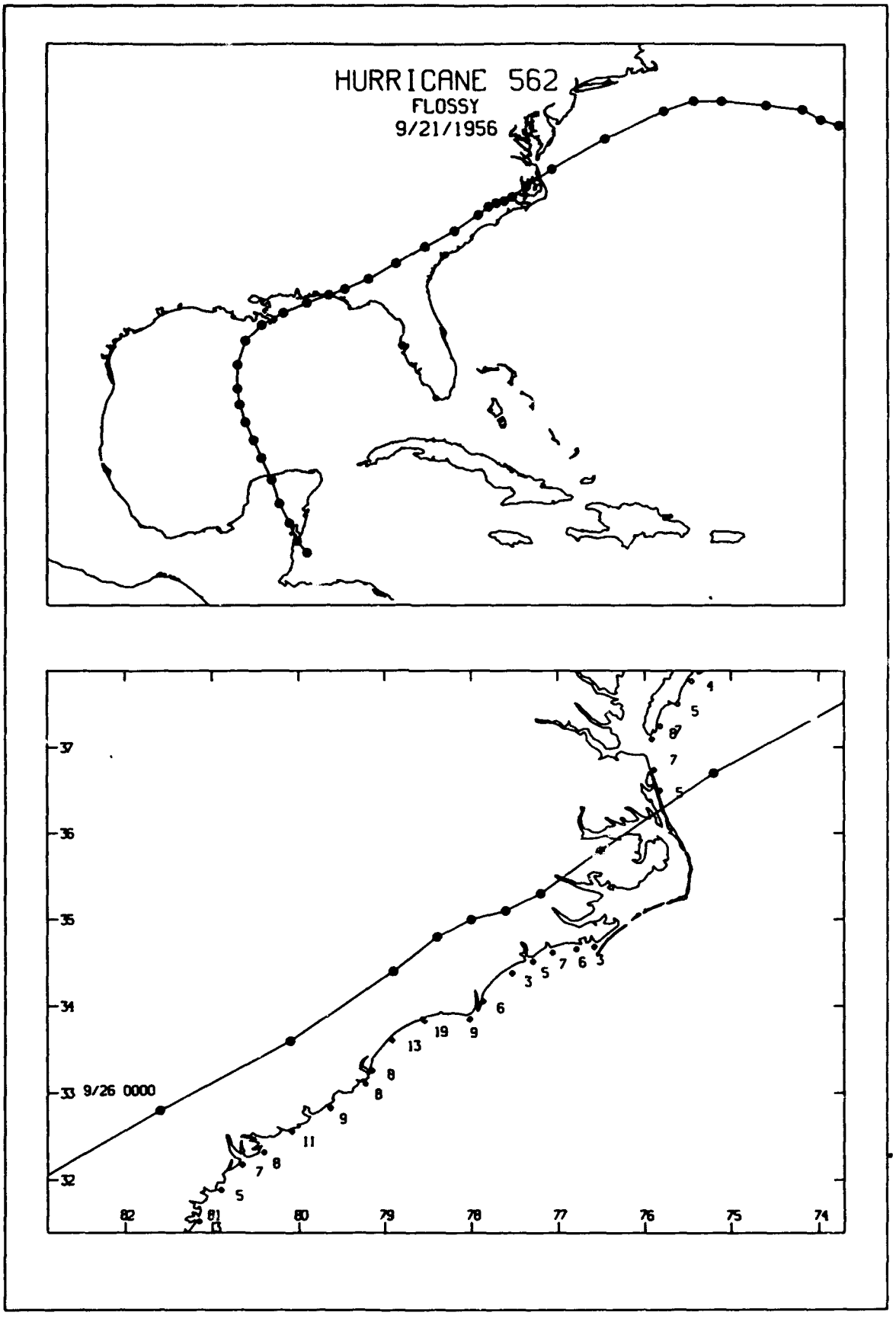
83


HURRICANE 562
FLOSSY
9/21/1956
37
36
35
34
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32
9/26 0000
82
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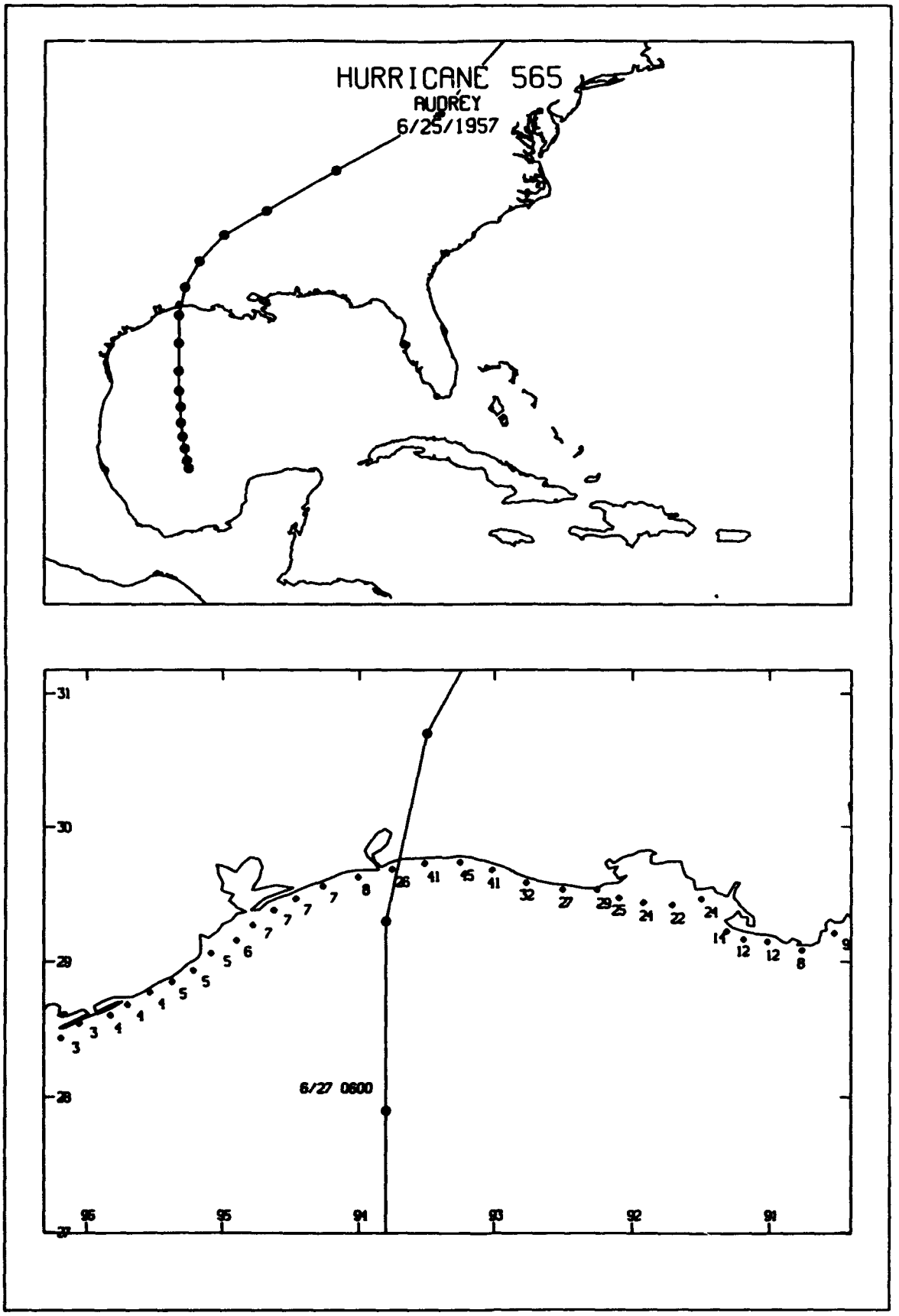
HURRICANE 565
AUDREY
6/25/1957
31
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6/27 0600
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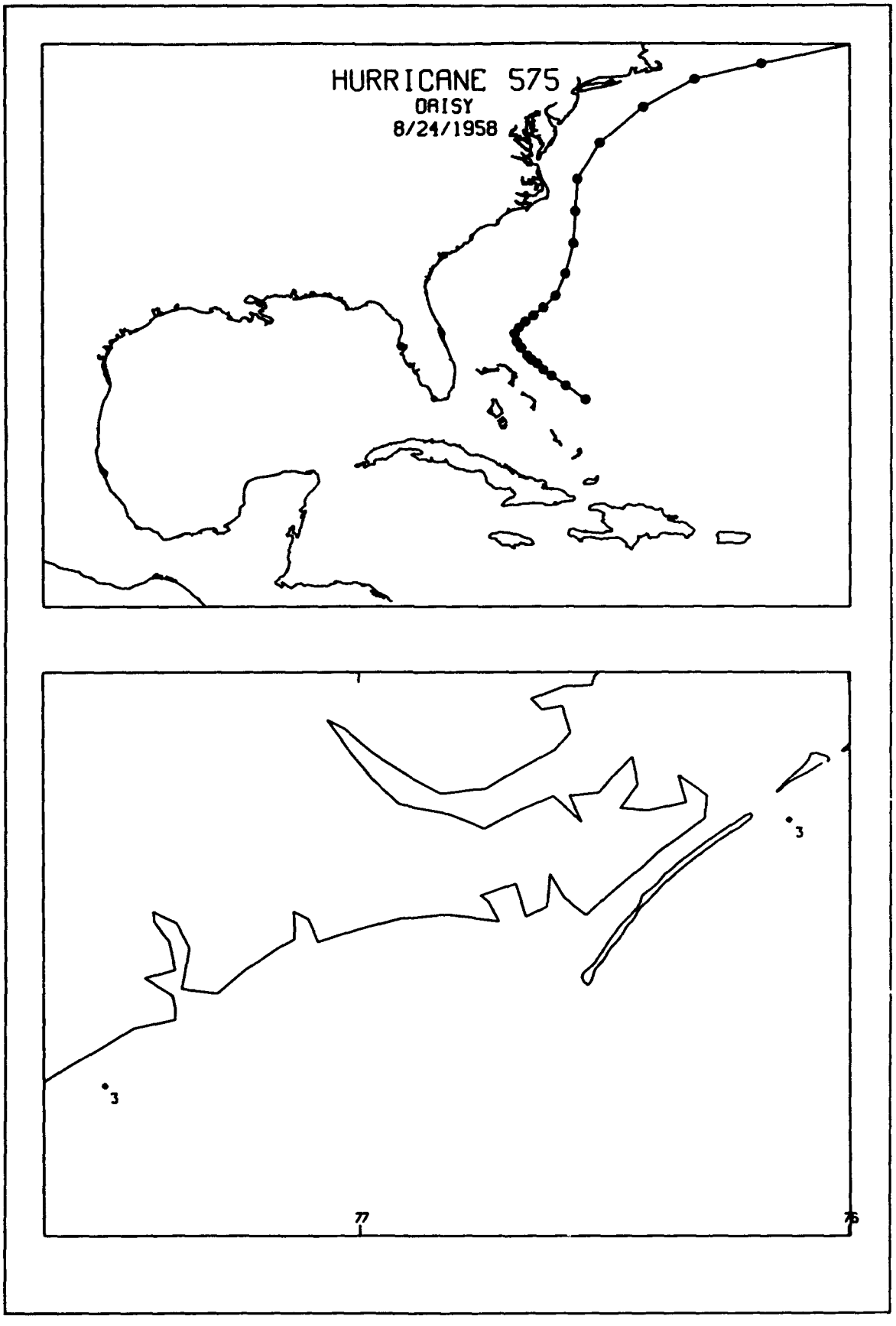
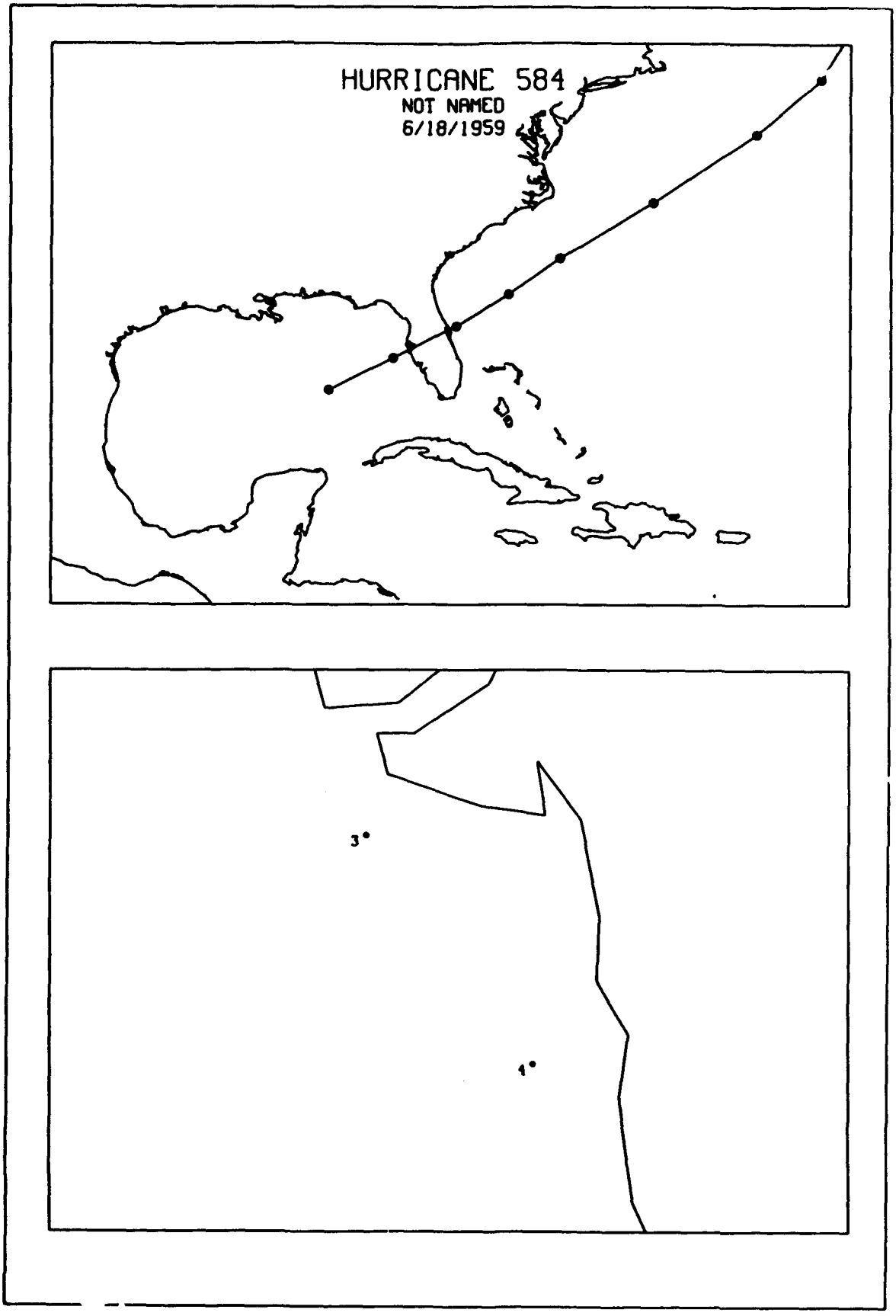
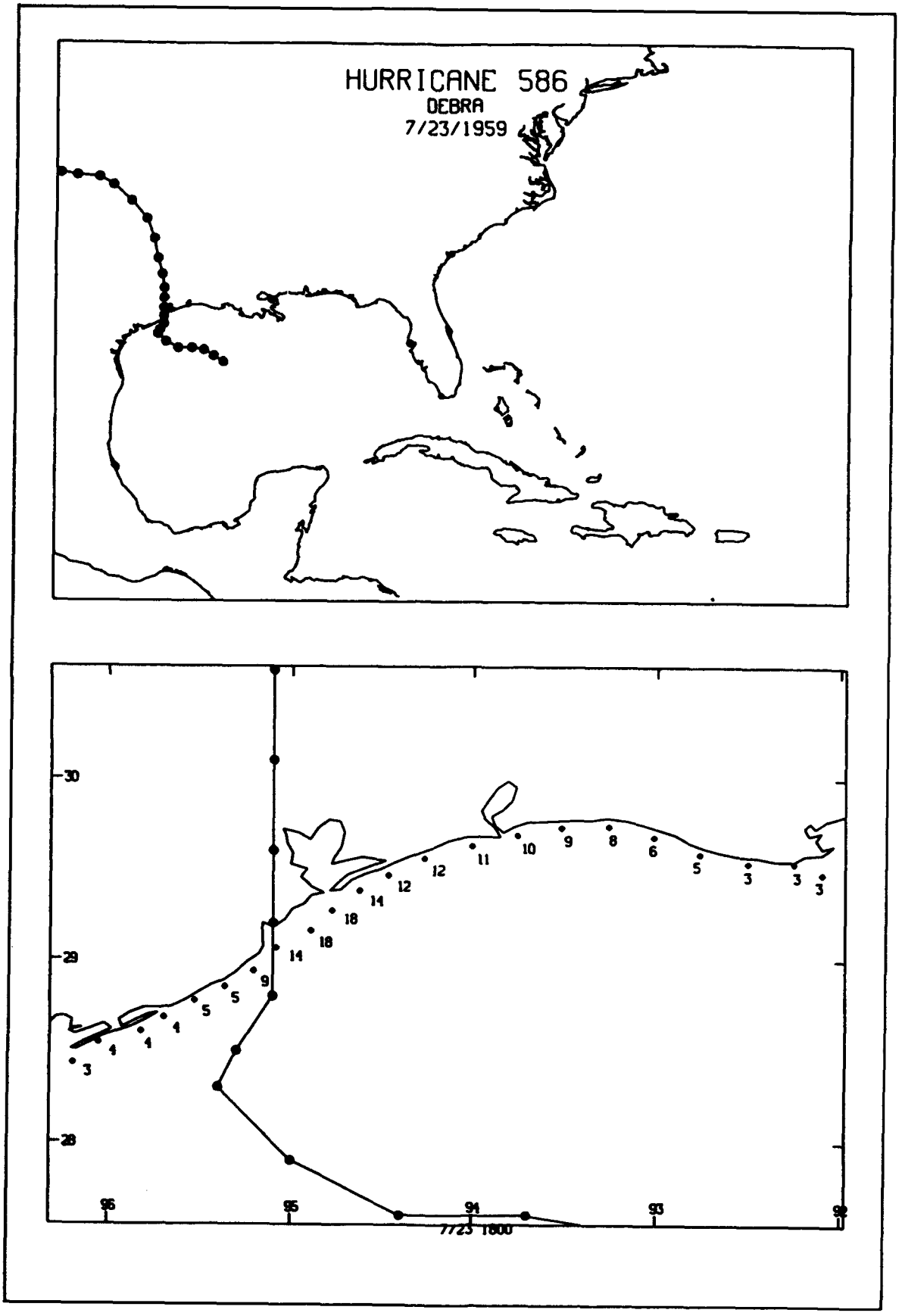

HURRICANE 575
DAISY
8/24/1958
3
3
77
76


HURRICANE 584
NOT NAMED
6/18/1959
3°
1°


HURRICANE 586
DEBRA
7/23/1959
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96
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92
7/23 1800
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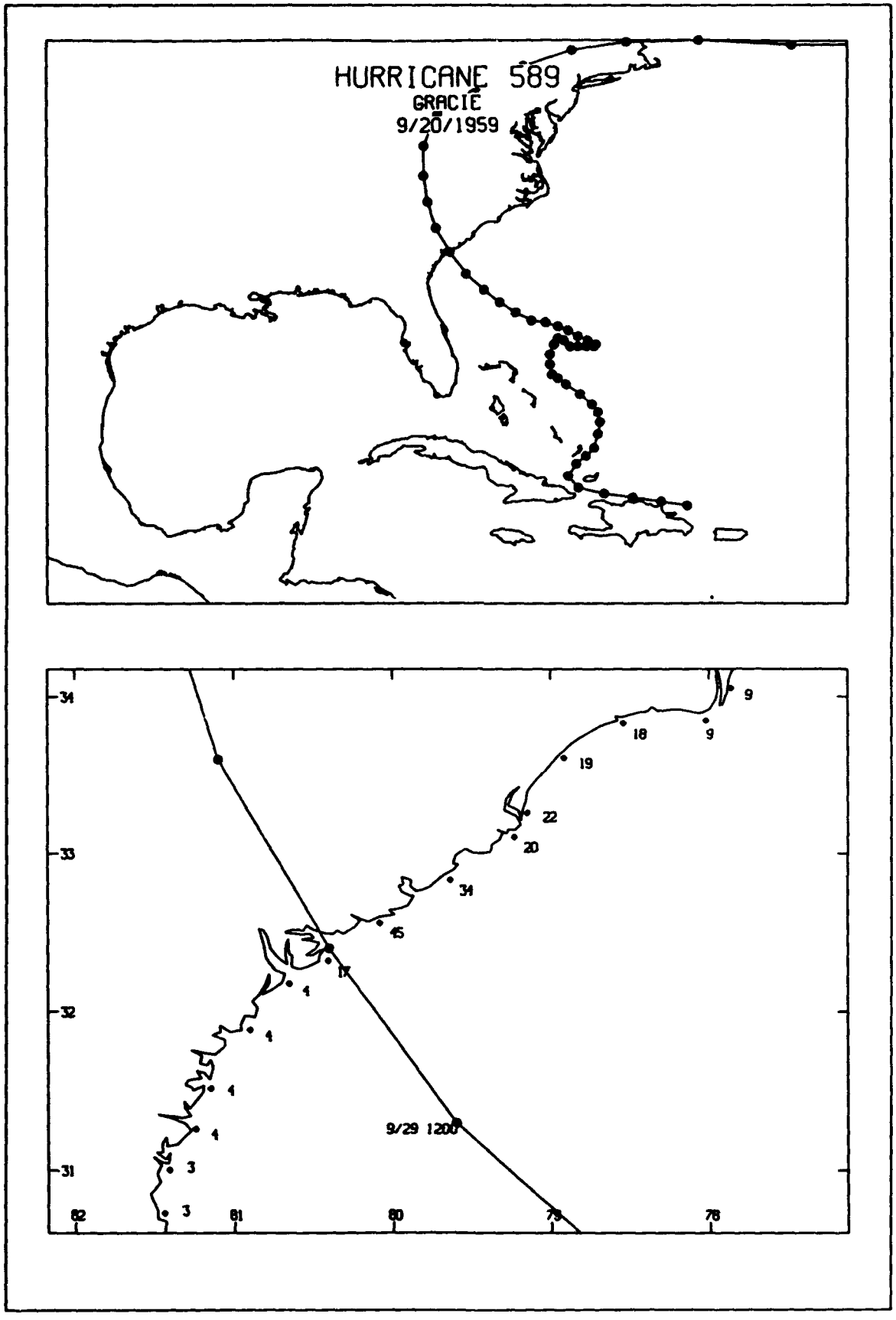
HURRICANE 589
GRACIE
9/20/1959
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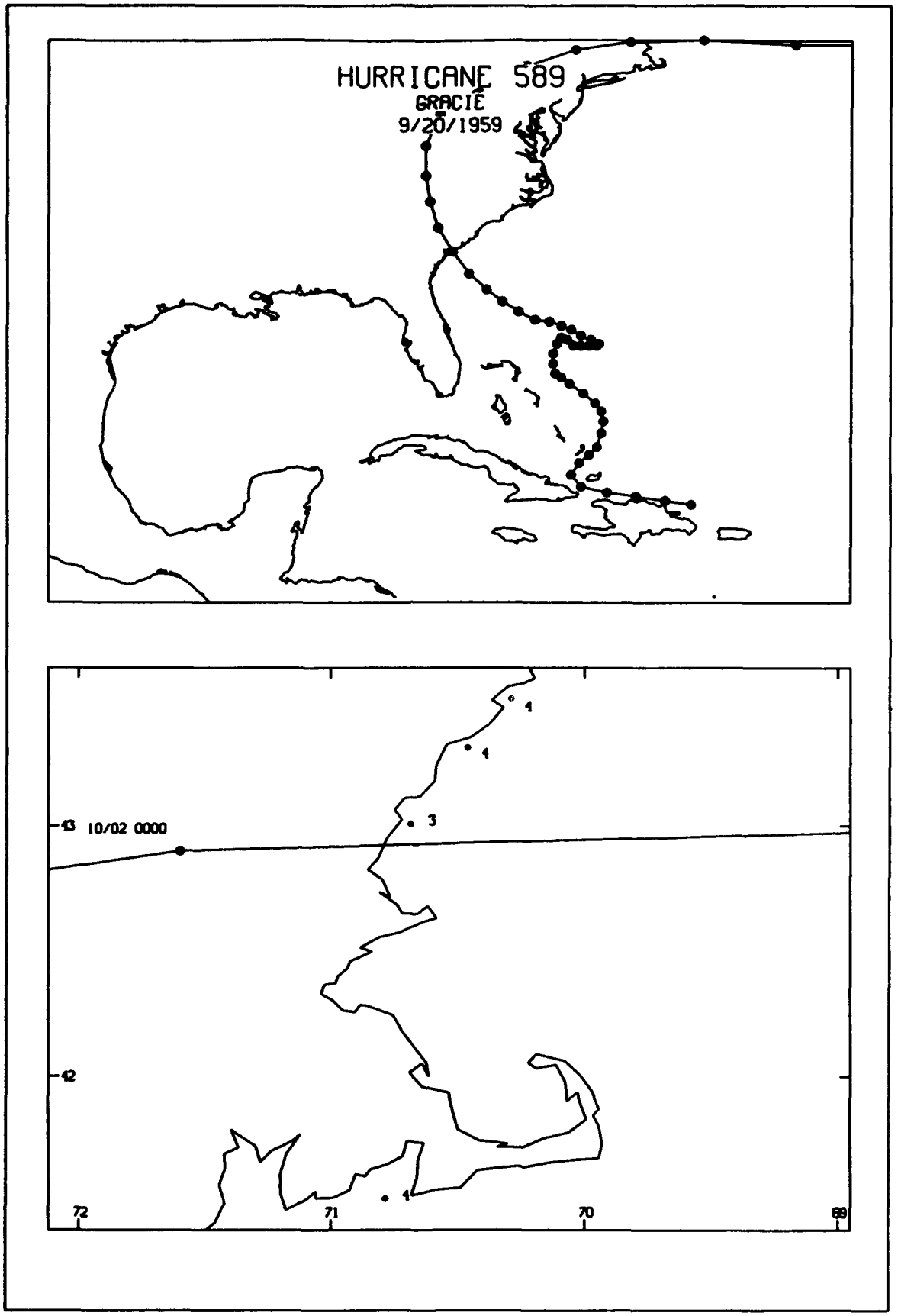
9/29 1200


HURRICANE 589
GRACIE
9/20/1959
43
10/02 0000
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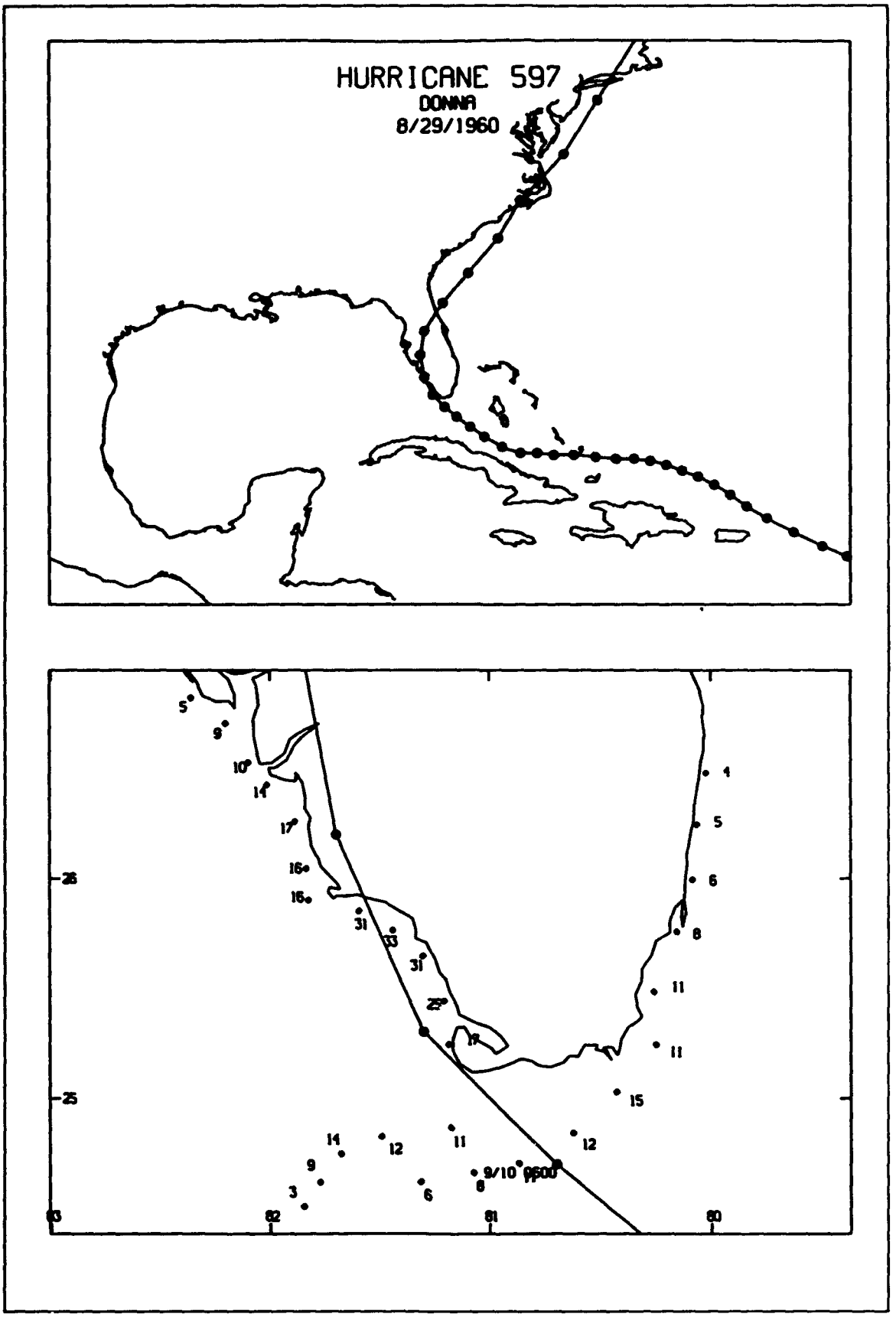
HURRICANE 597
DONNA
8/29/1960
26
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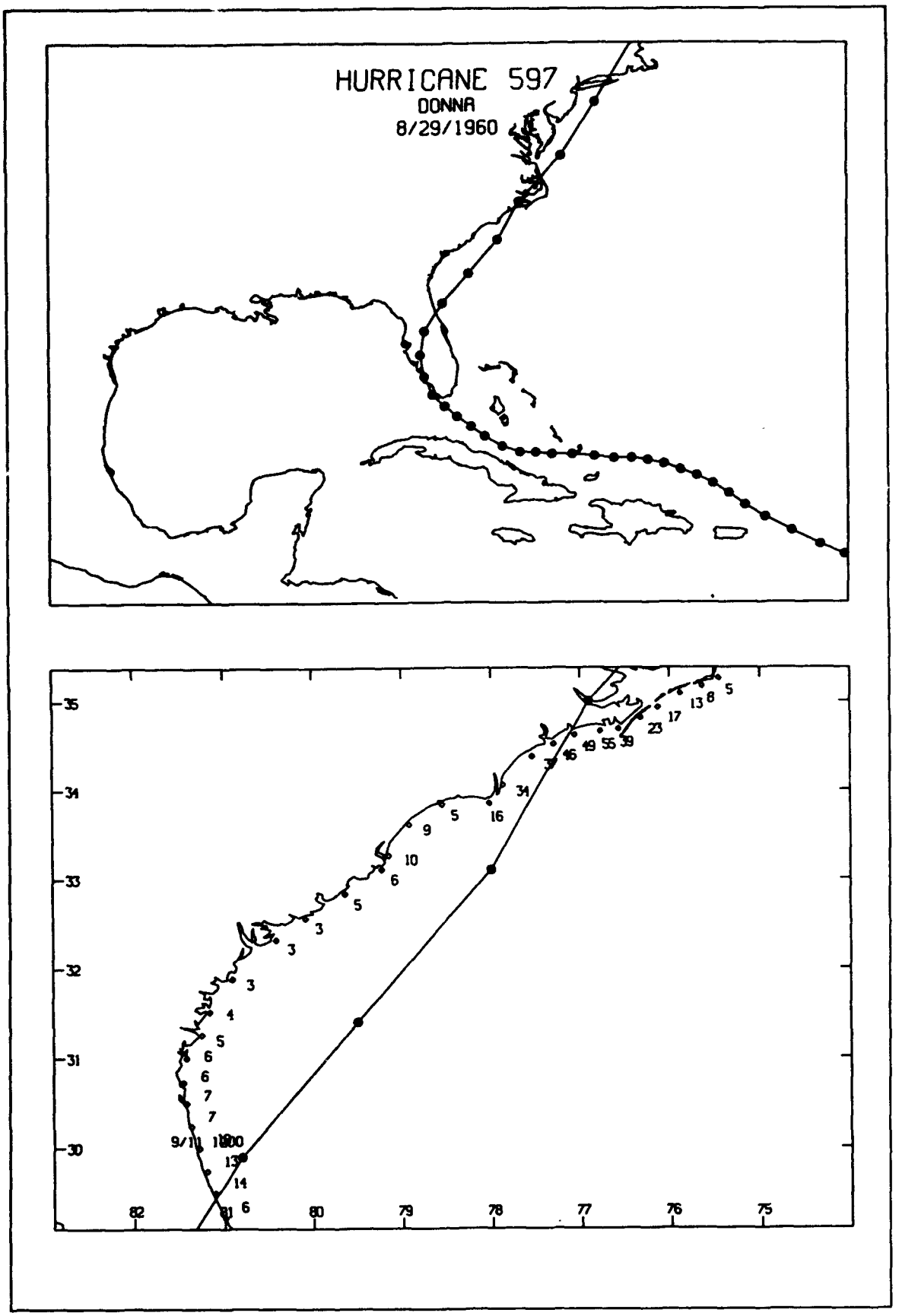
HURRICANE 597
DONNA
8/29/1960
35
34
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32
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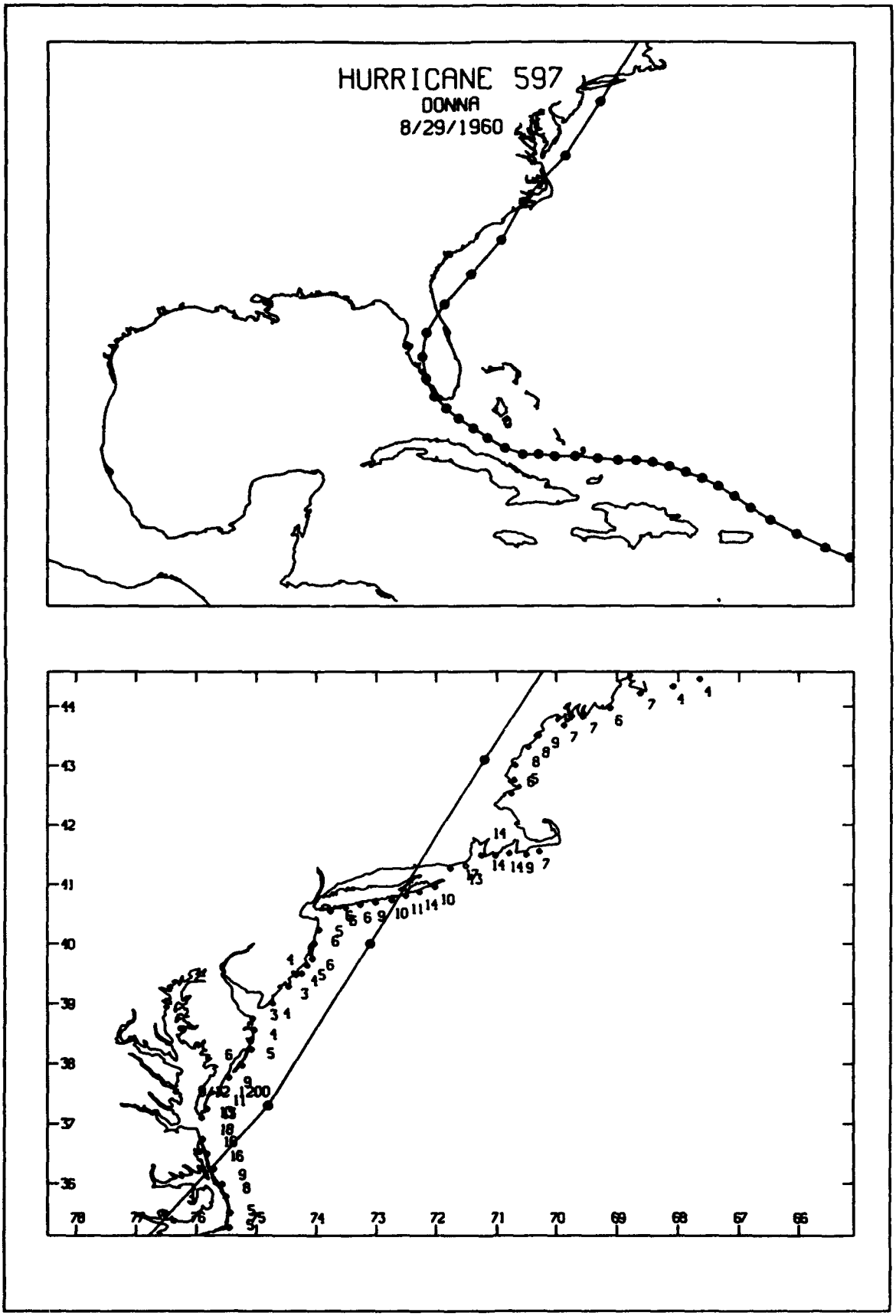
HURRICANE 597
DONNA
8/29/1960
44
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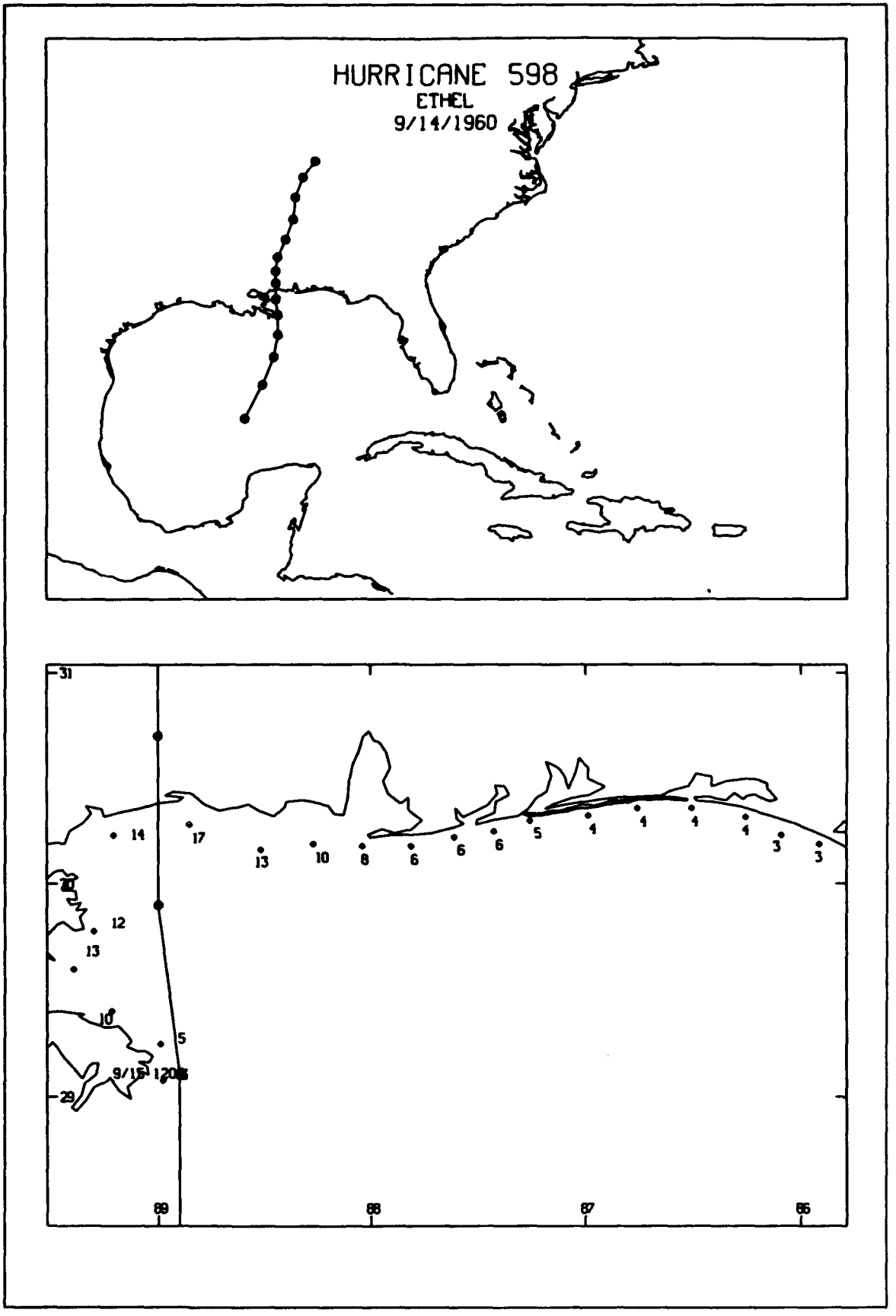
HURRICANE 598
ETHEL
9/14/1960
31
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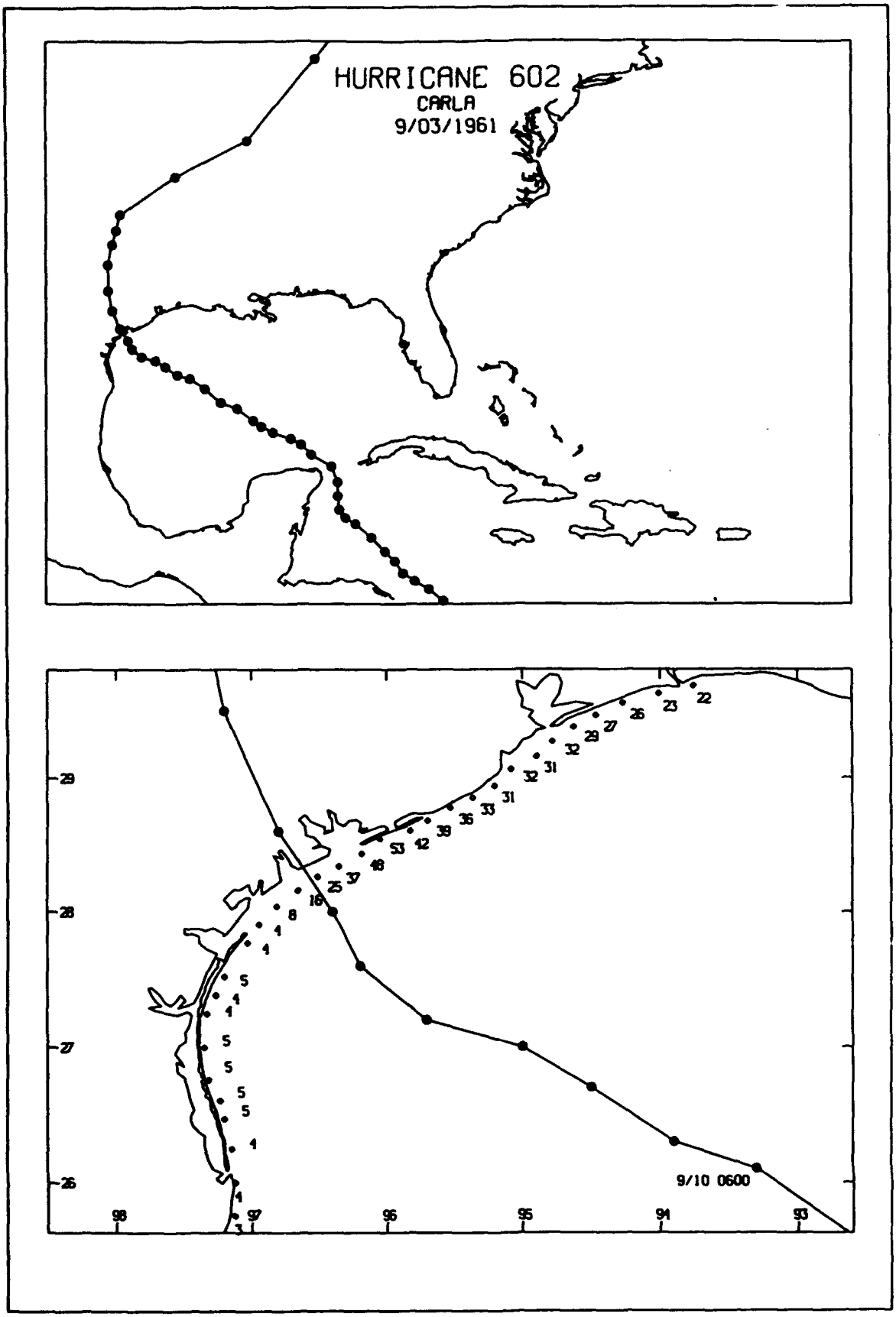
HURRICANE 602
CARLA
9/03/1961
29
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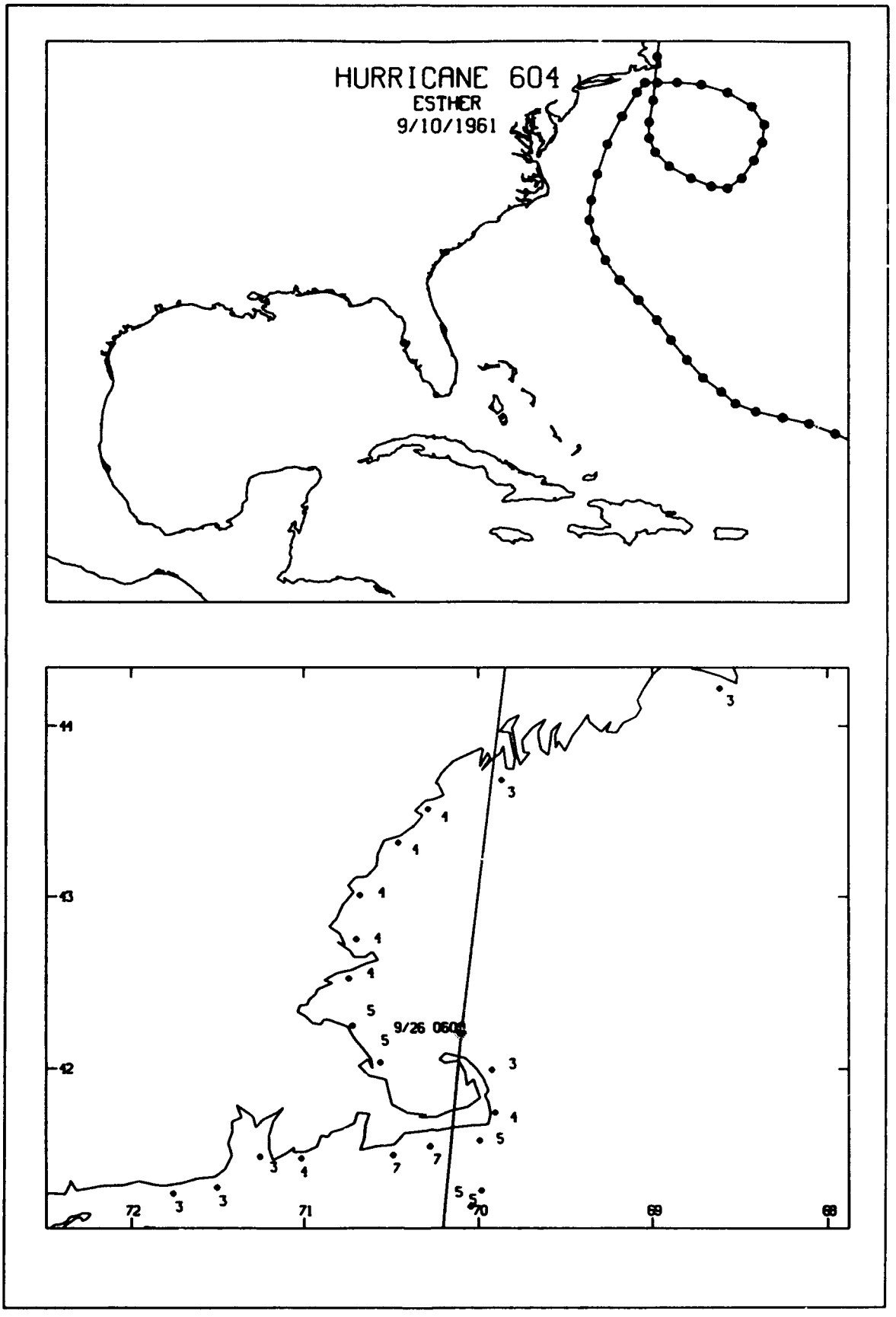
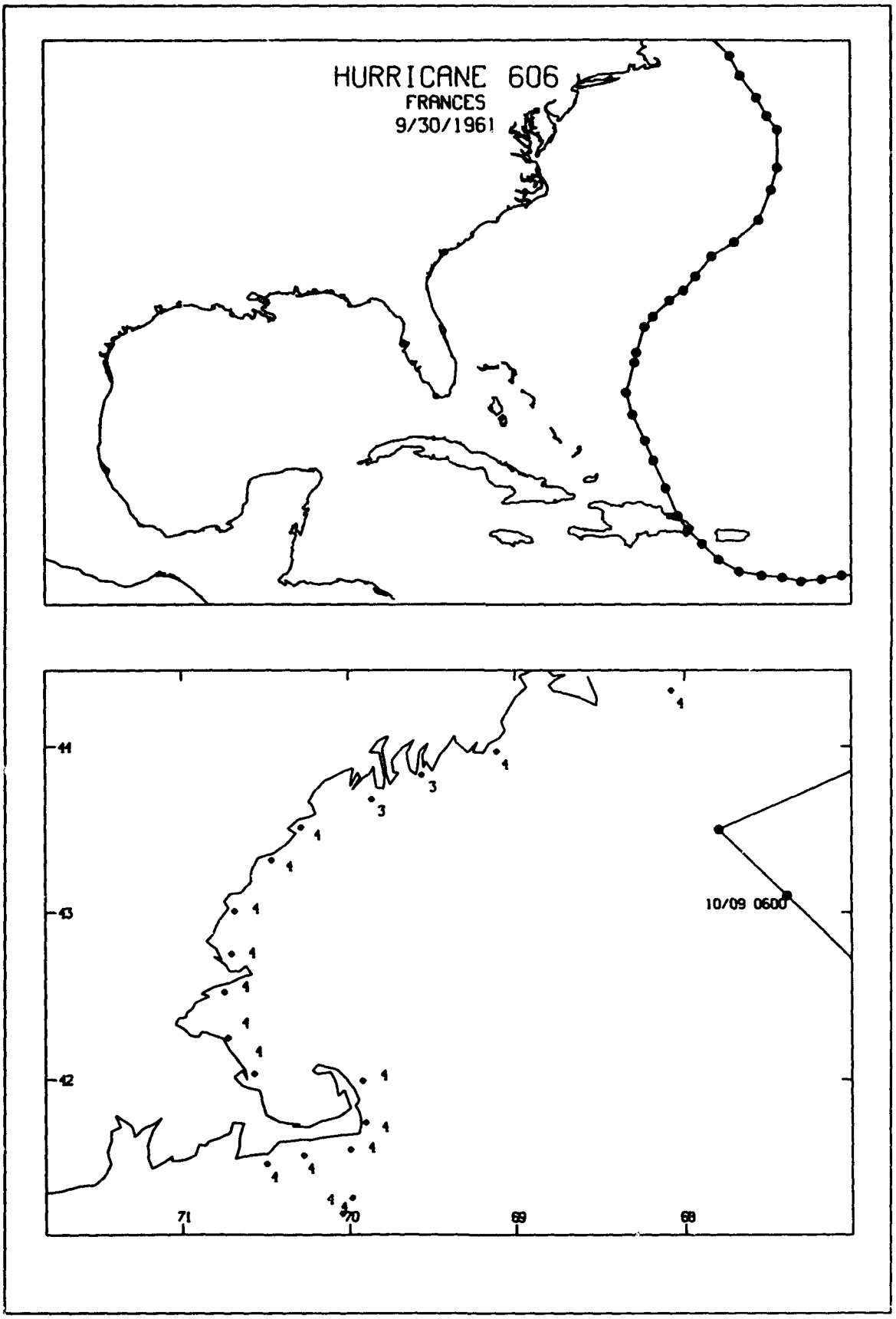
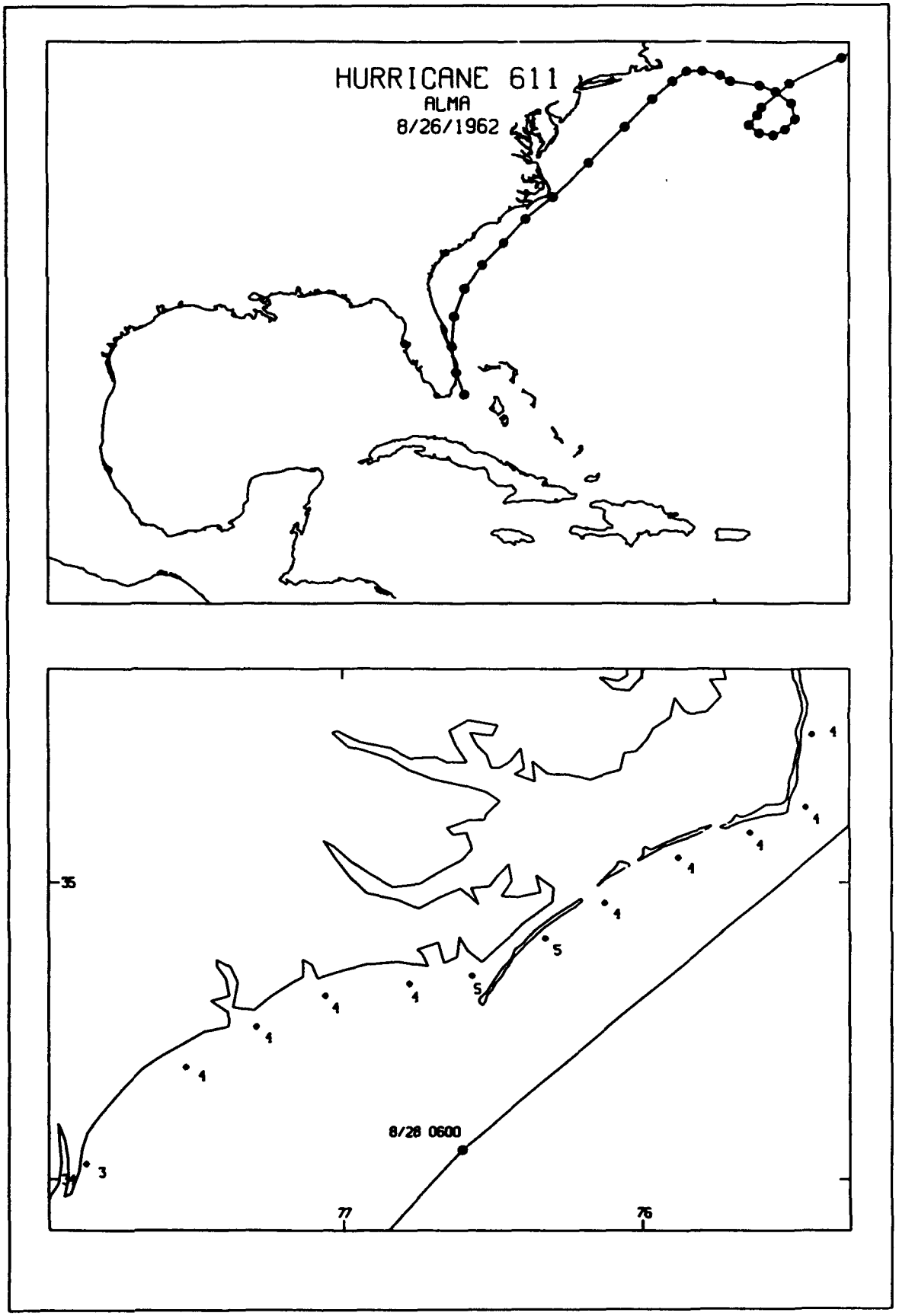
93
9/10 0600


HURRICANE 604
ESTHER
9/10/1961
44
43
42
9/26 0600
72
71
70
69
68


HURRICANE 606
FRANCES
9/30/1961
10/09 0600
44
43
42
71
70
69
68


HURRICANE 611
ALMA
8/26/1962
35
1
1
1
1
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8/28 0600
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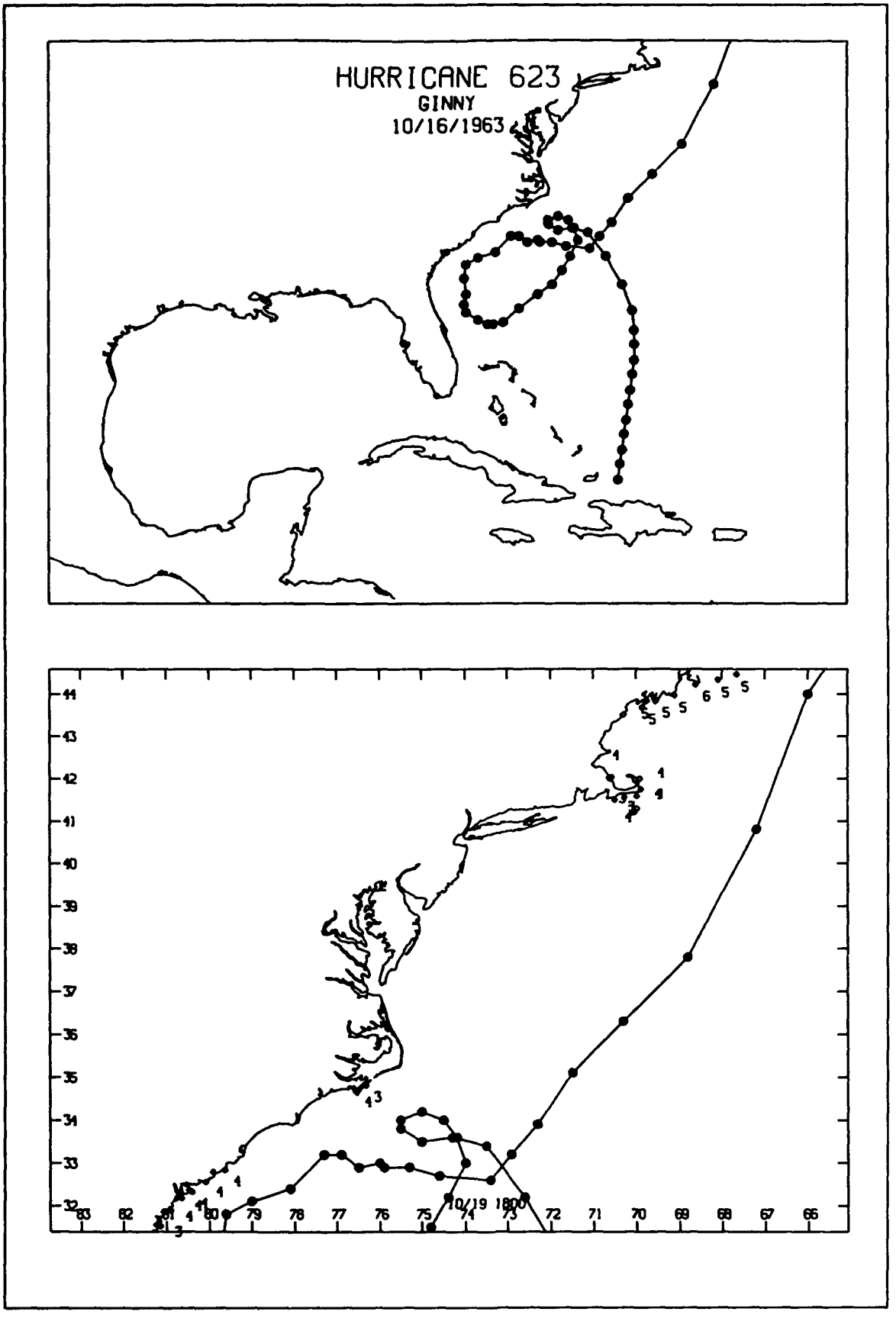
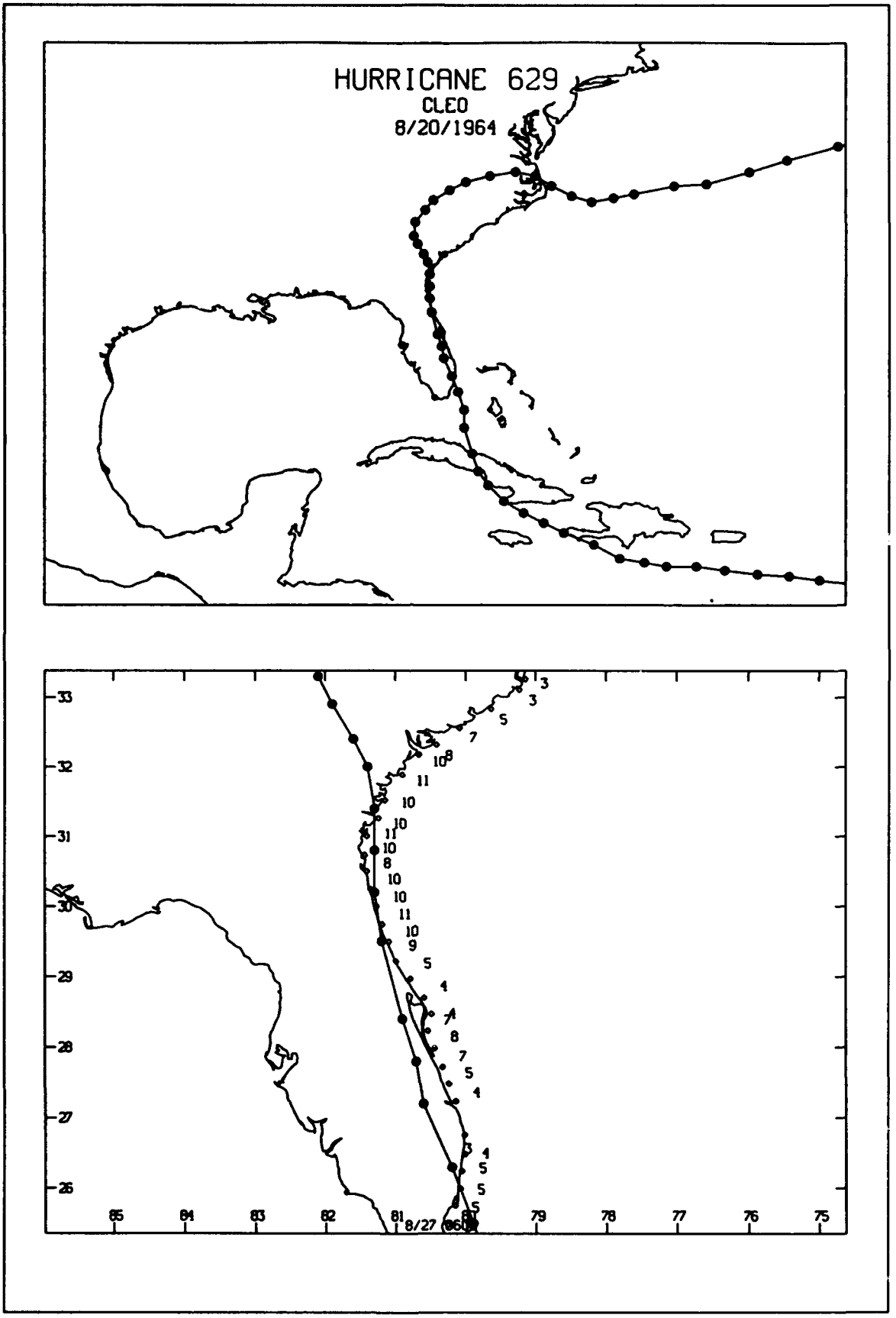

HURRICANE 623
GINNY
10/16/1963
10/19 1800


HURRICANE 629
CLEO
8/20/1964
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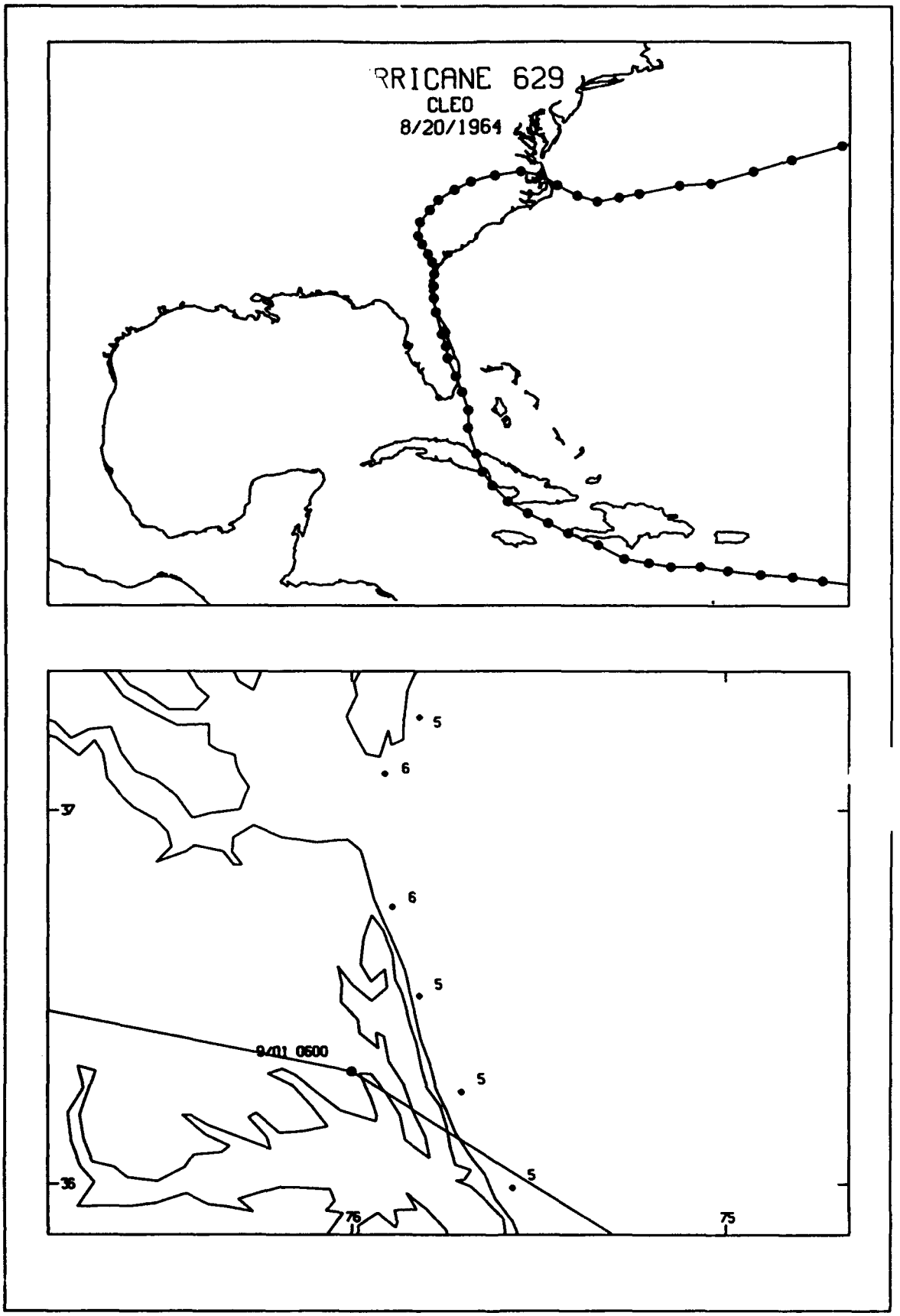
8/27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CLEO
8/20/1964
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9/01 0600
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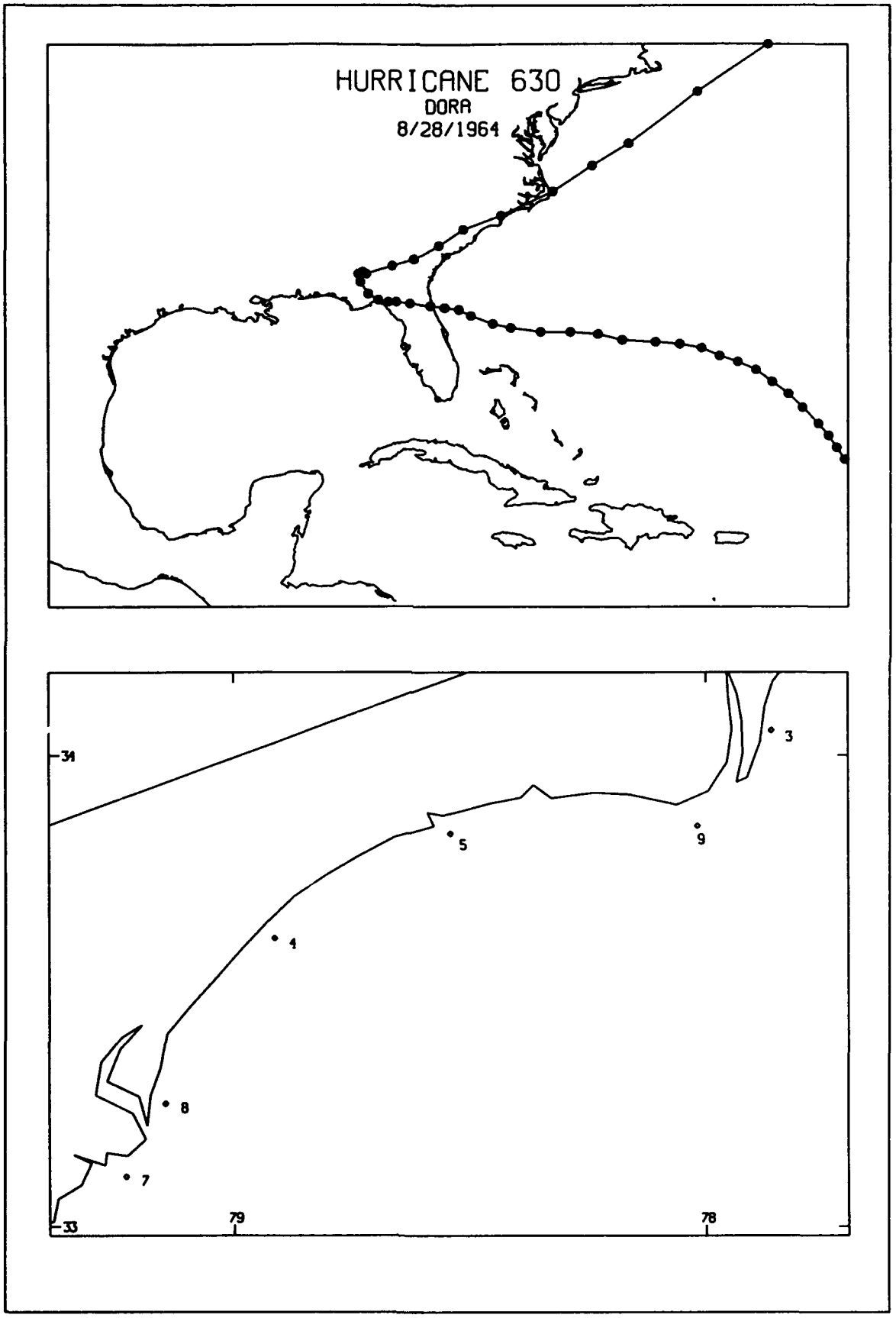
HURRICANE 630
DORA
8/28/1964
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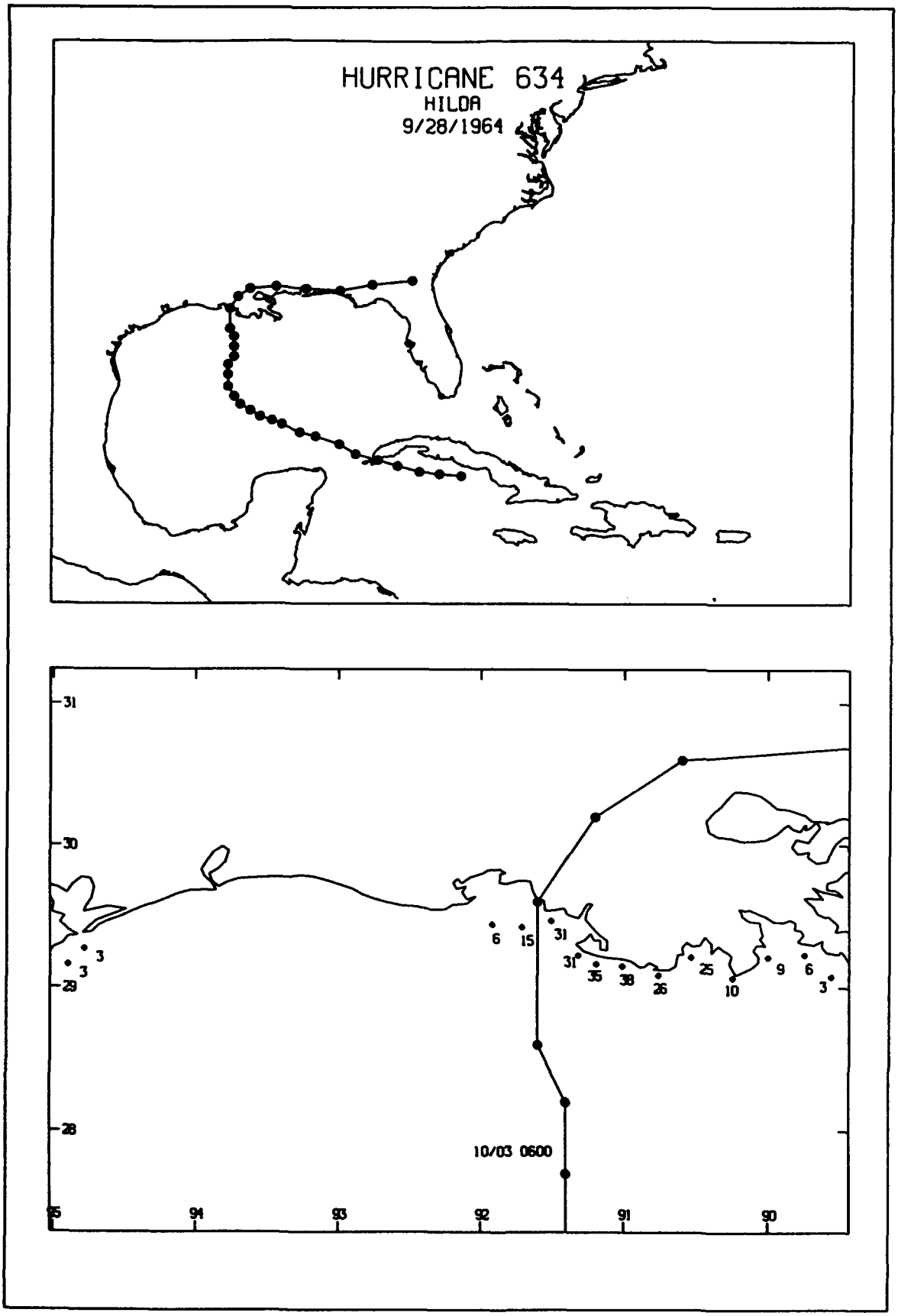
HURRICANE 634
HILDA
9/28/1964
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10/03 0600
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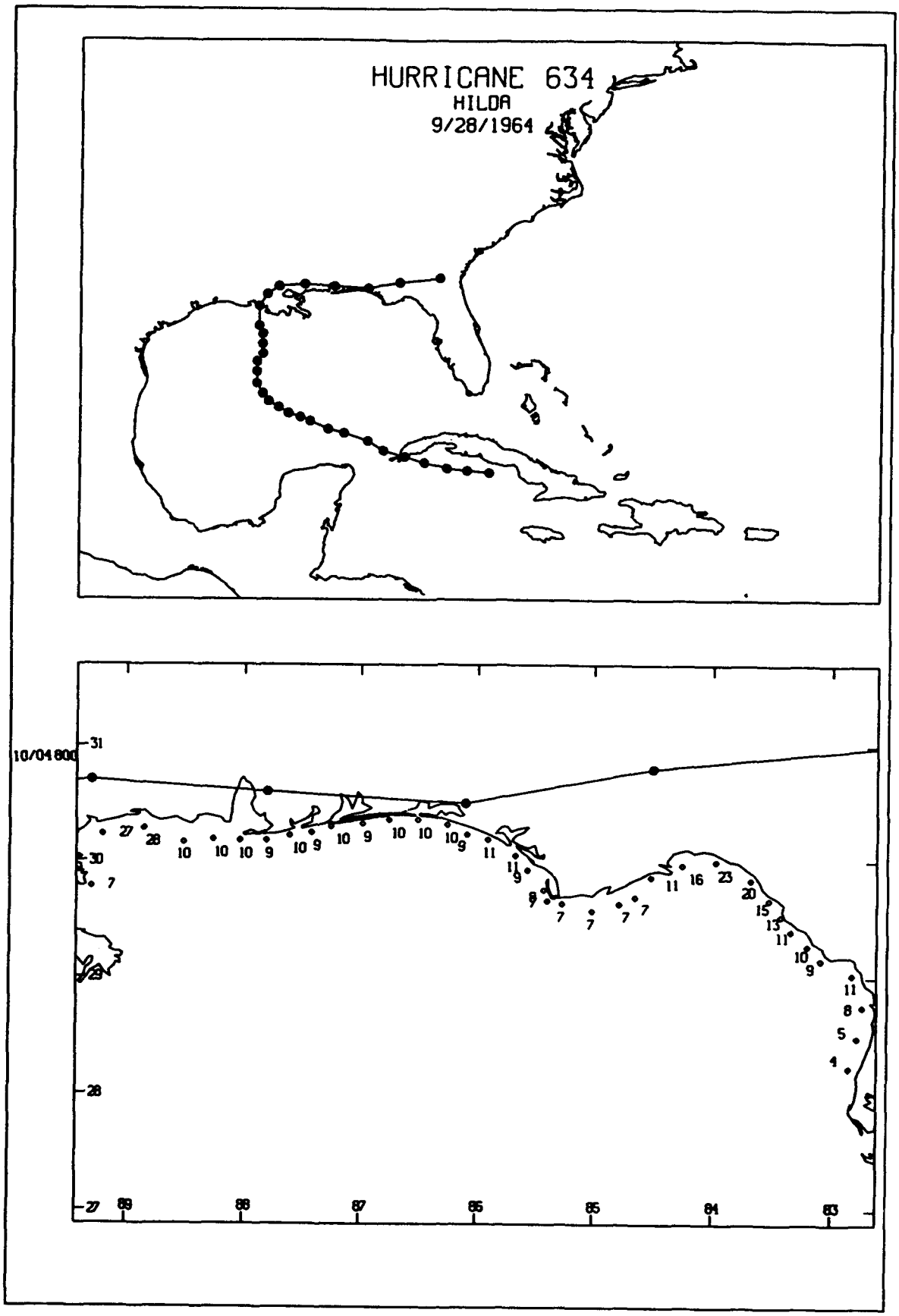
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HILDA
9/28/1964
10/04 800
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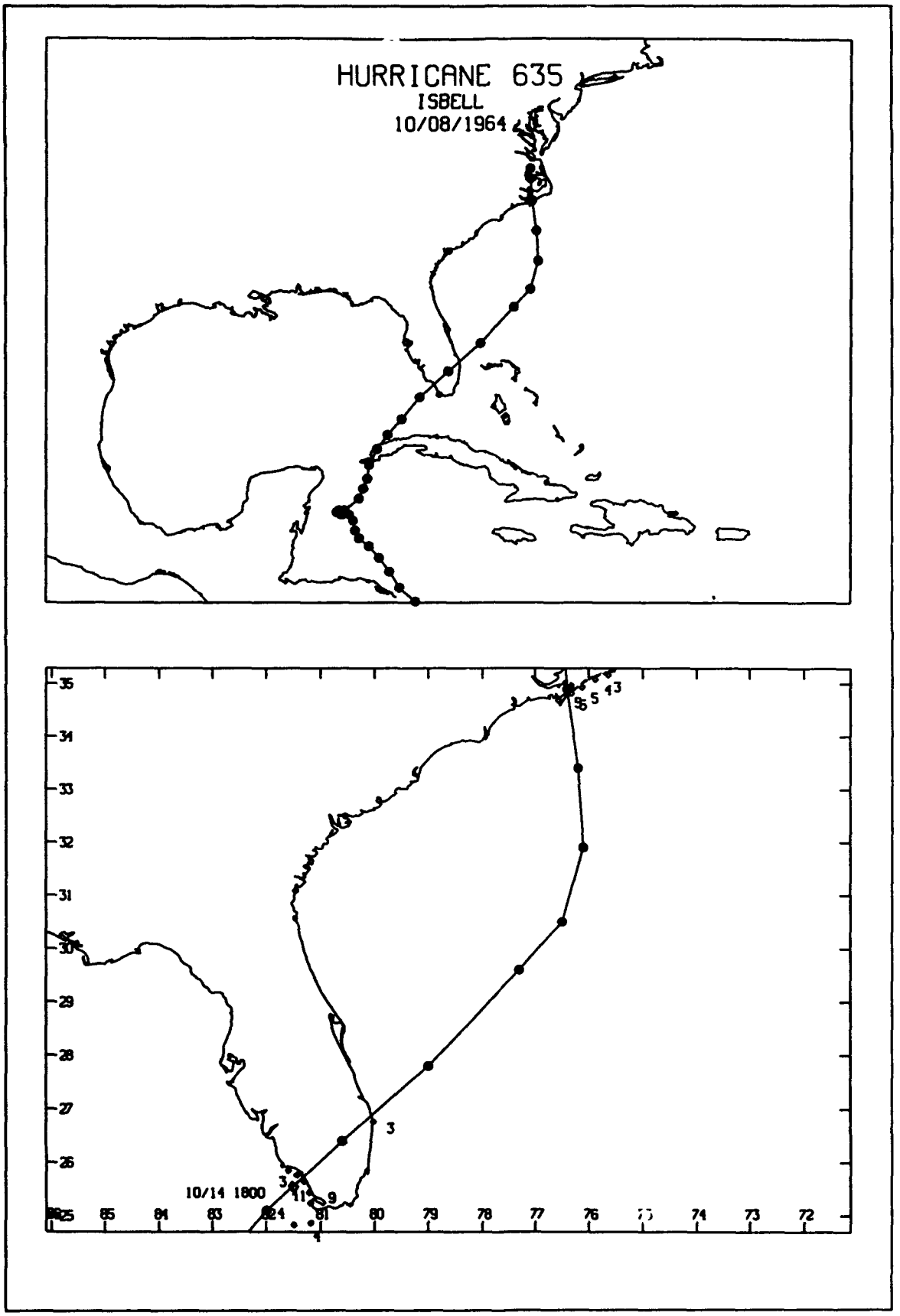
HURRICANE 635
ISBELL
10/08/1964
10/14 1800
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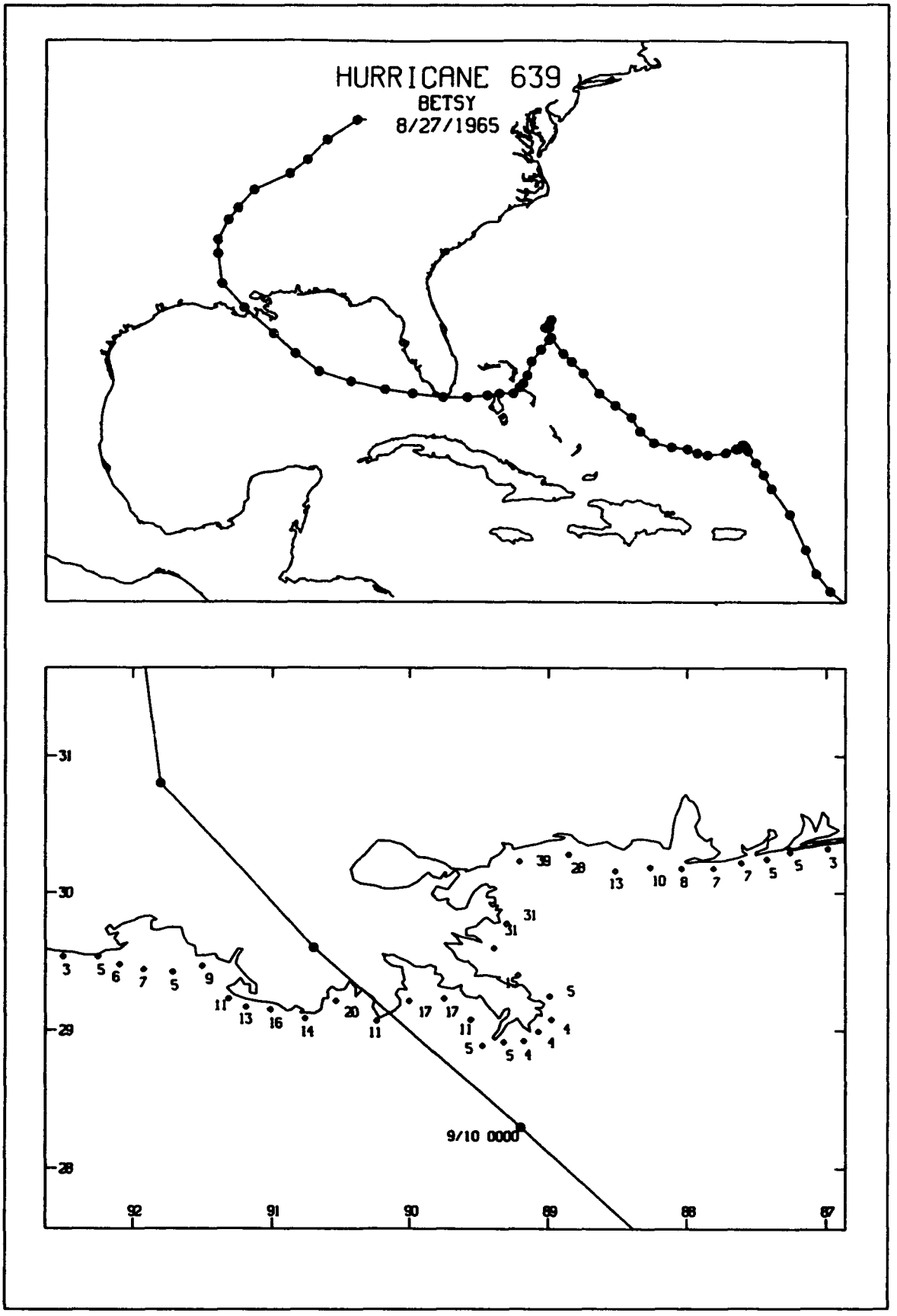
HURRICANE 639
BETSY
8/27/1965
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92
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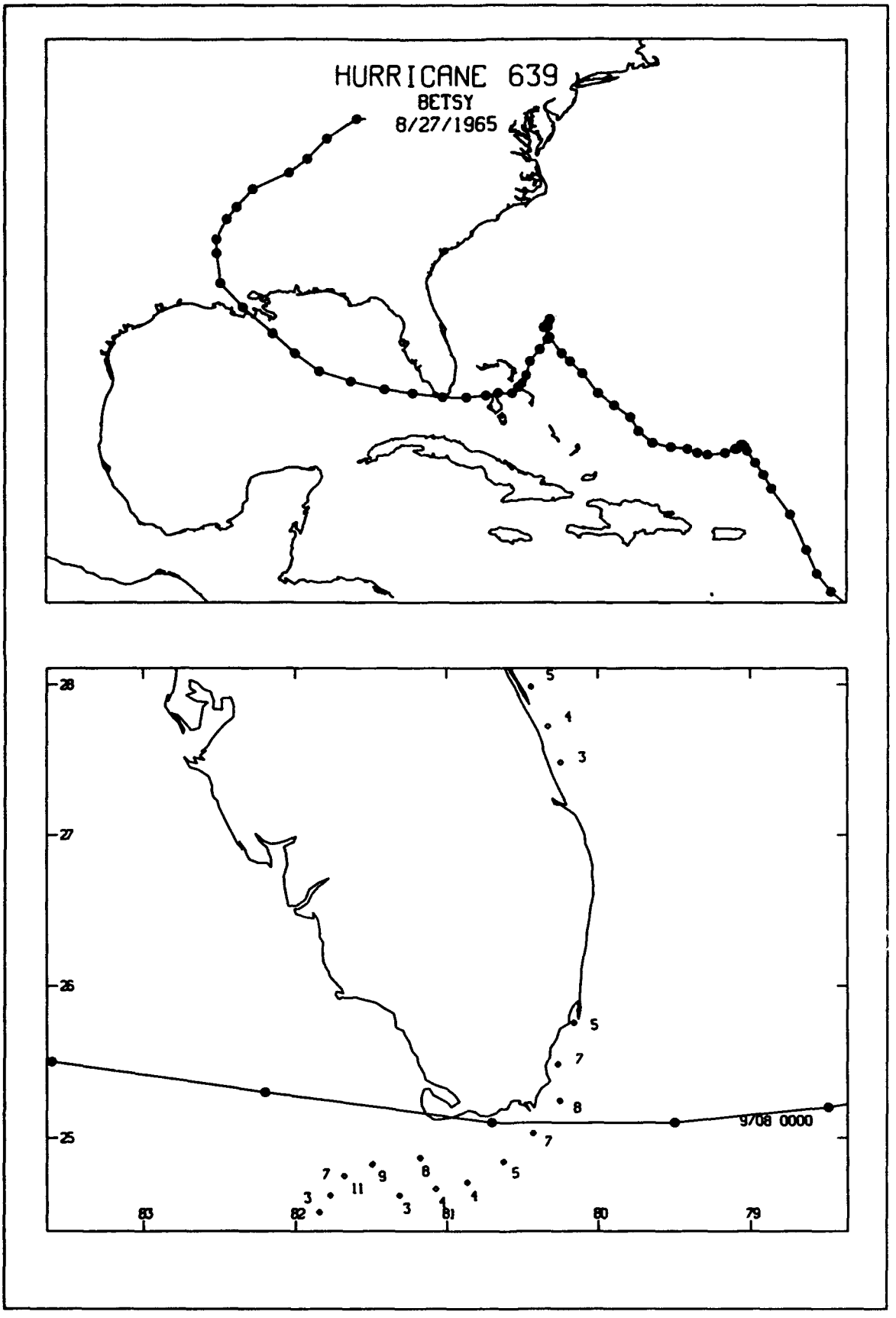
9/10 0000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BETSY
8/27/1965
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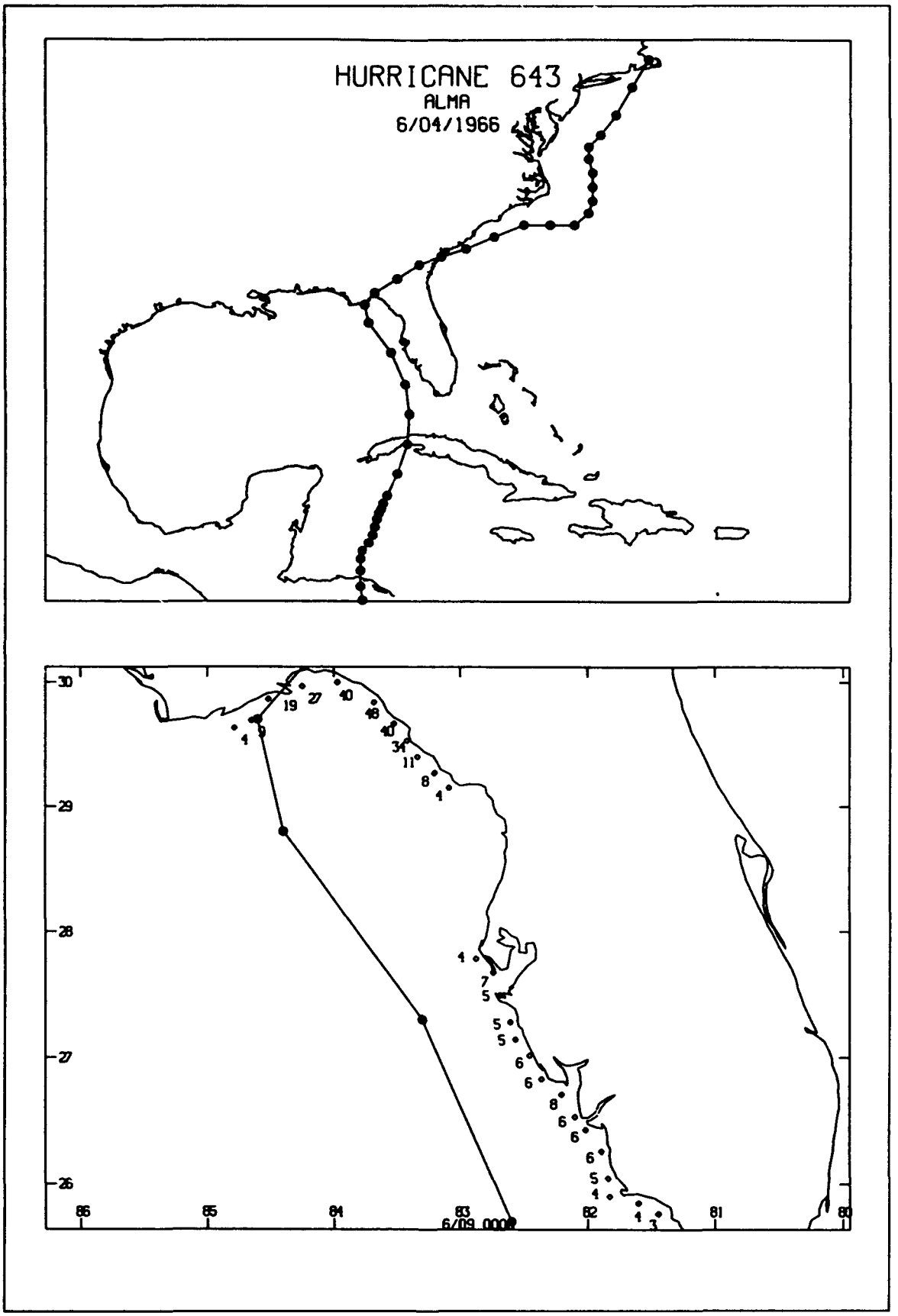
9708 0000


HURRICANE 643
ALMA
6/04/1966
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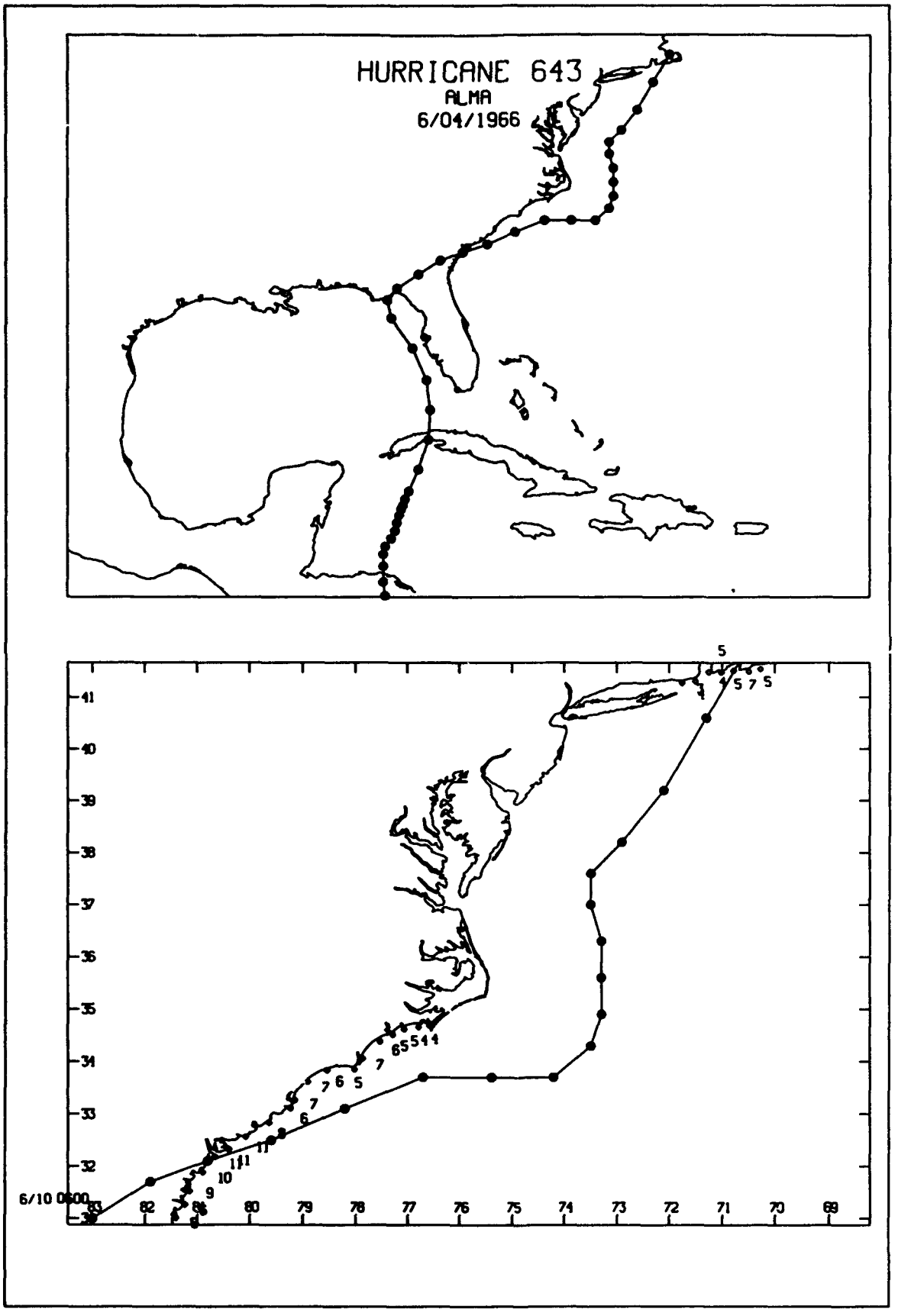
6/09 0000


HURRICANE 643
ALMA
6/04/1966
6/10 0600
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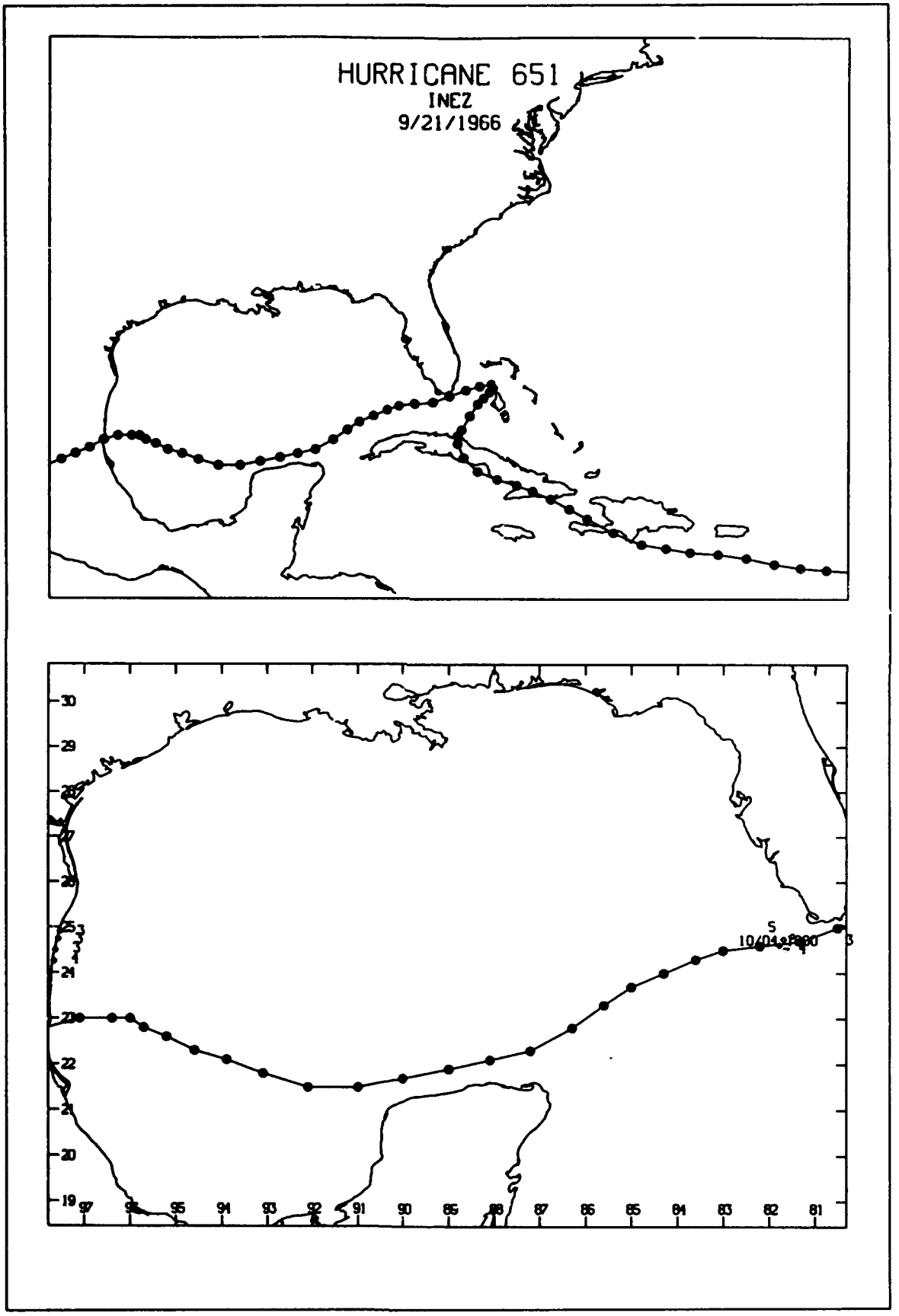
HURRICANE 651
INEZ
9/21/1966
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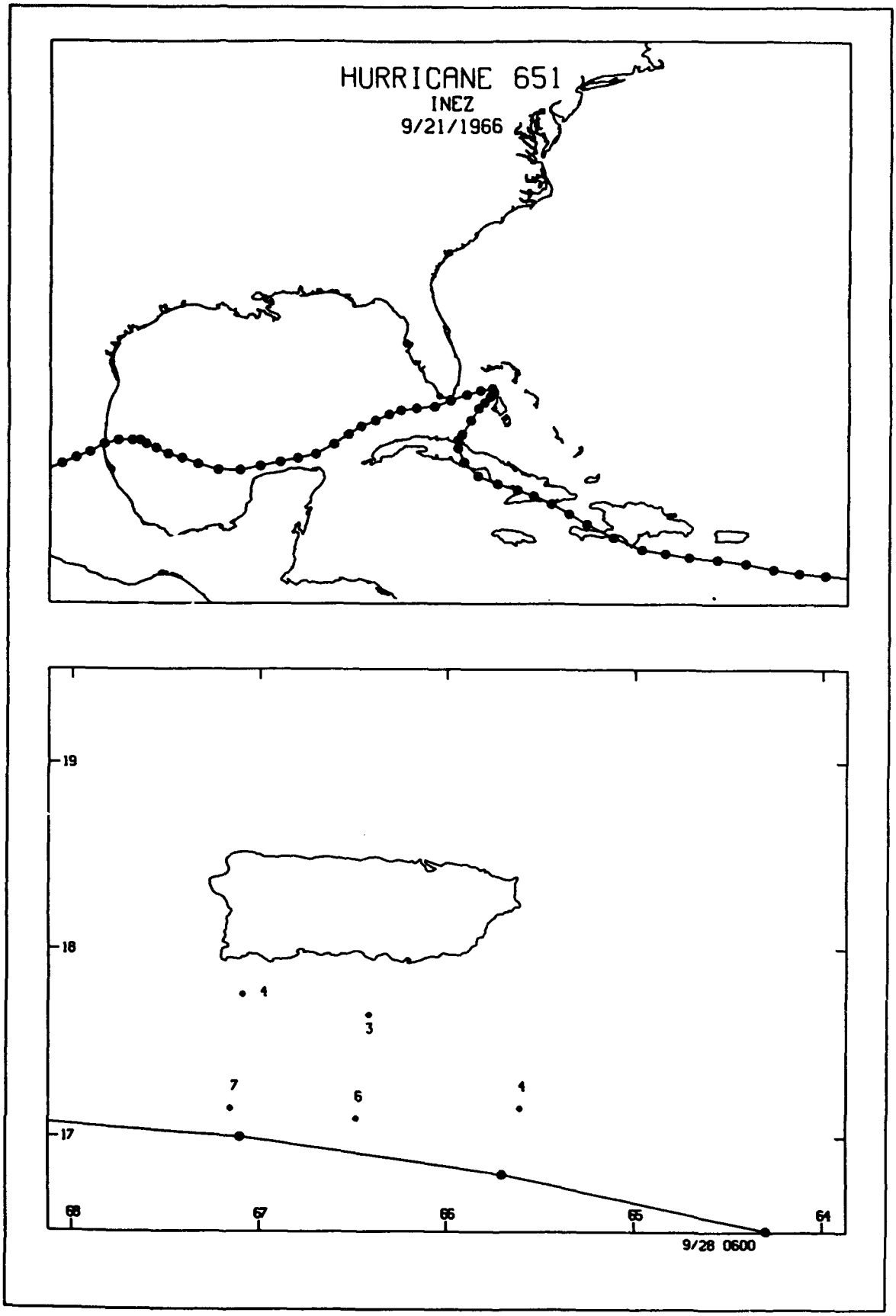
HURRICANE 651
INEZ
9/21/1966
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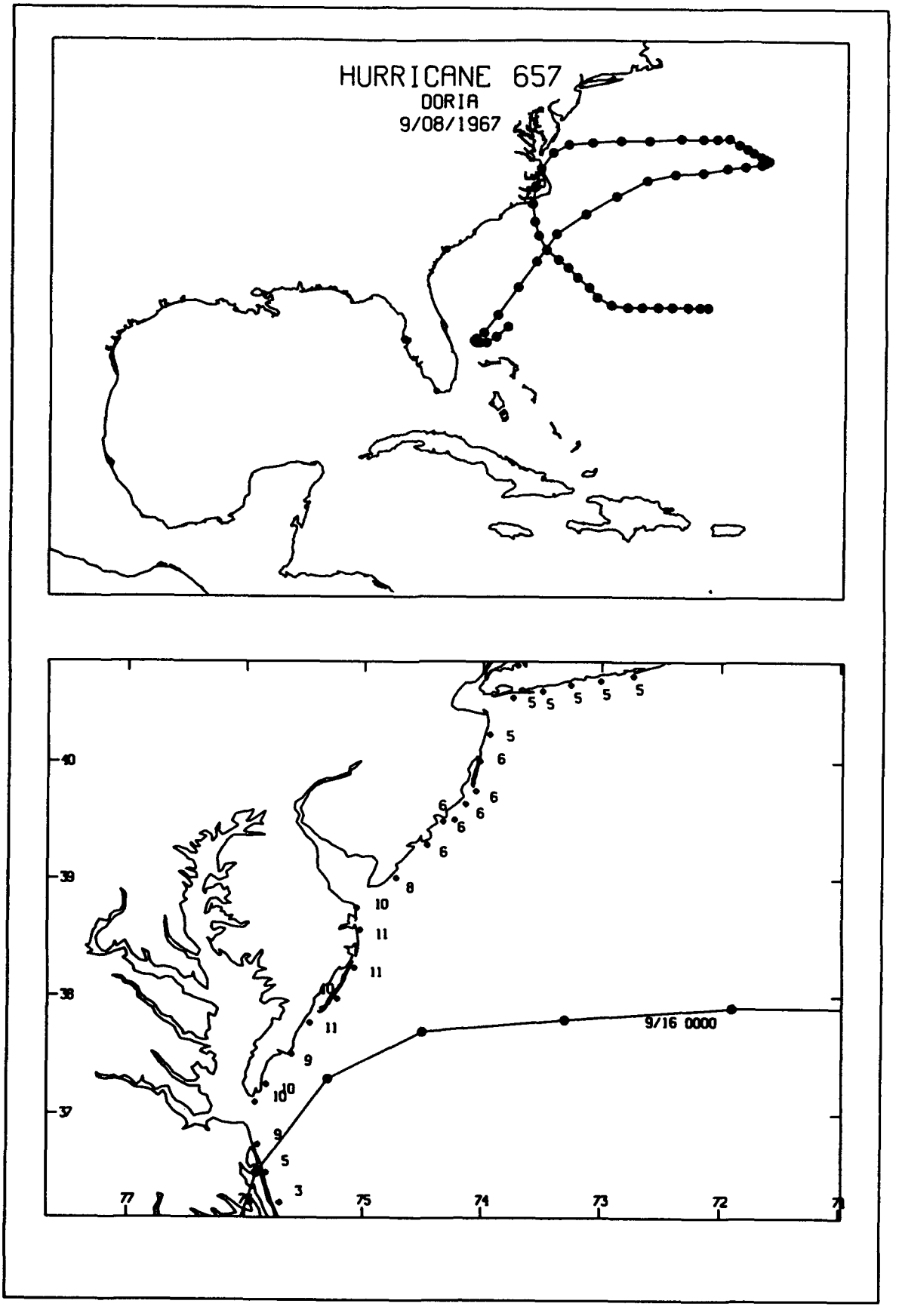
9/28 0600


HURRICANE 657
DORIA
9/08/1967
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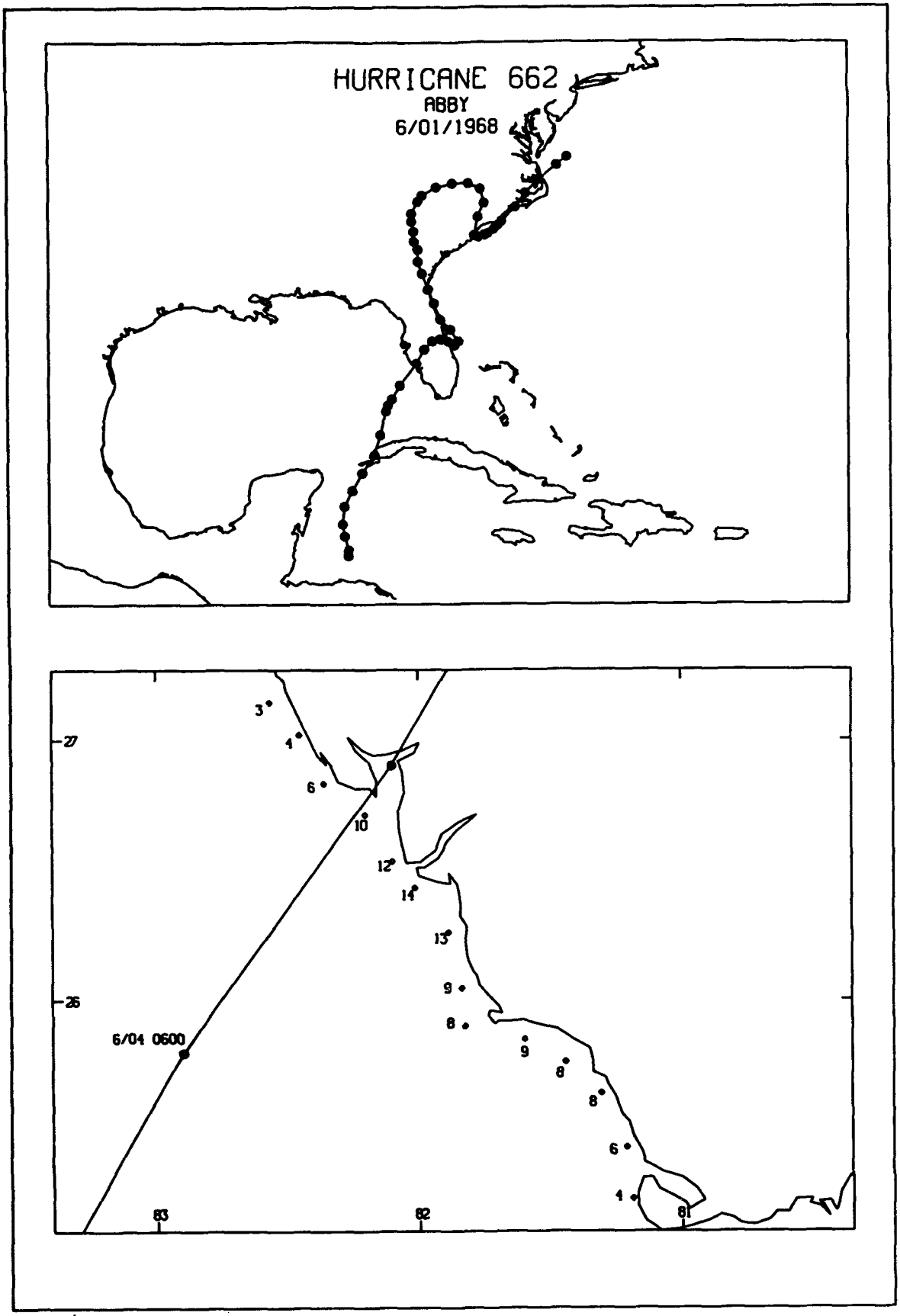
9/16 0000


HURRICANE 662
ABBY
6/01/1968
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6/04 0600
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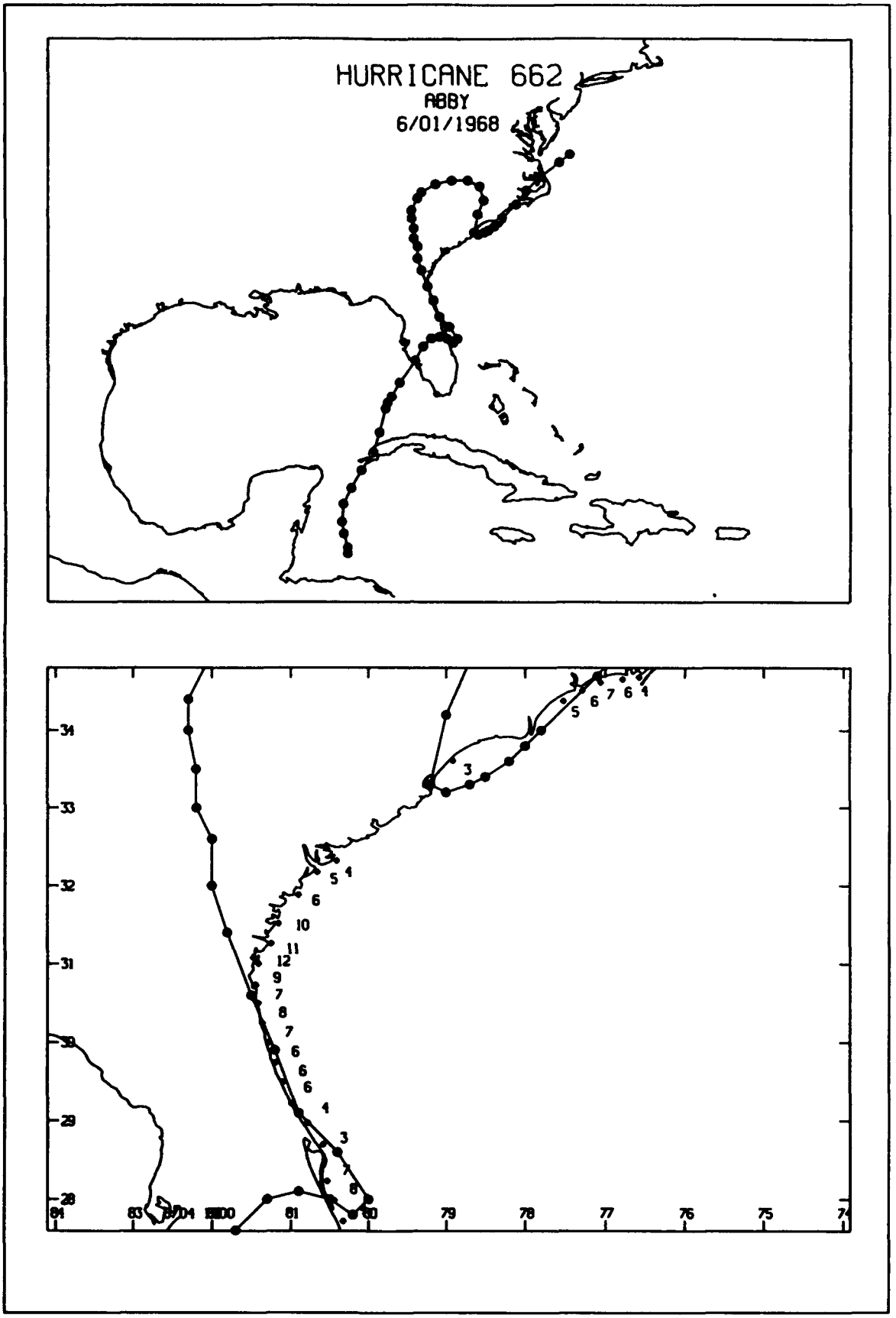
HURRICANE 662
ABBY
6/01/1968
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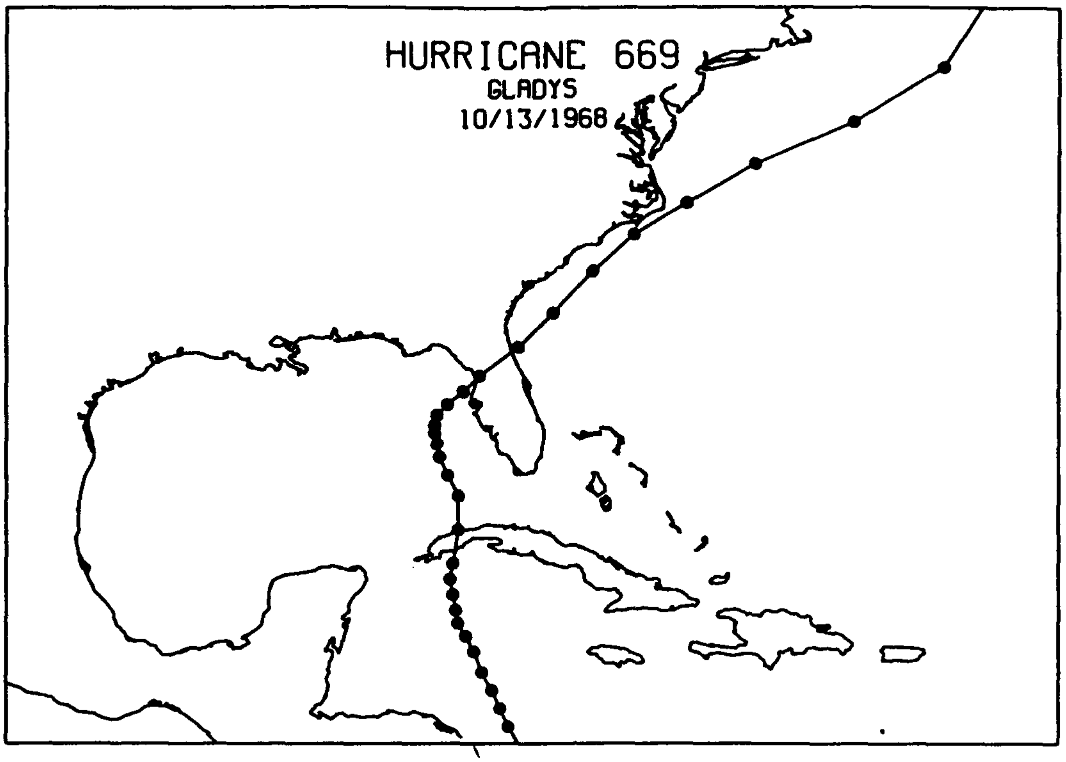
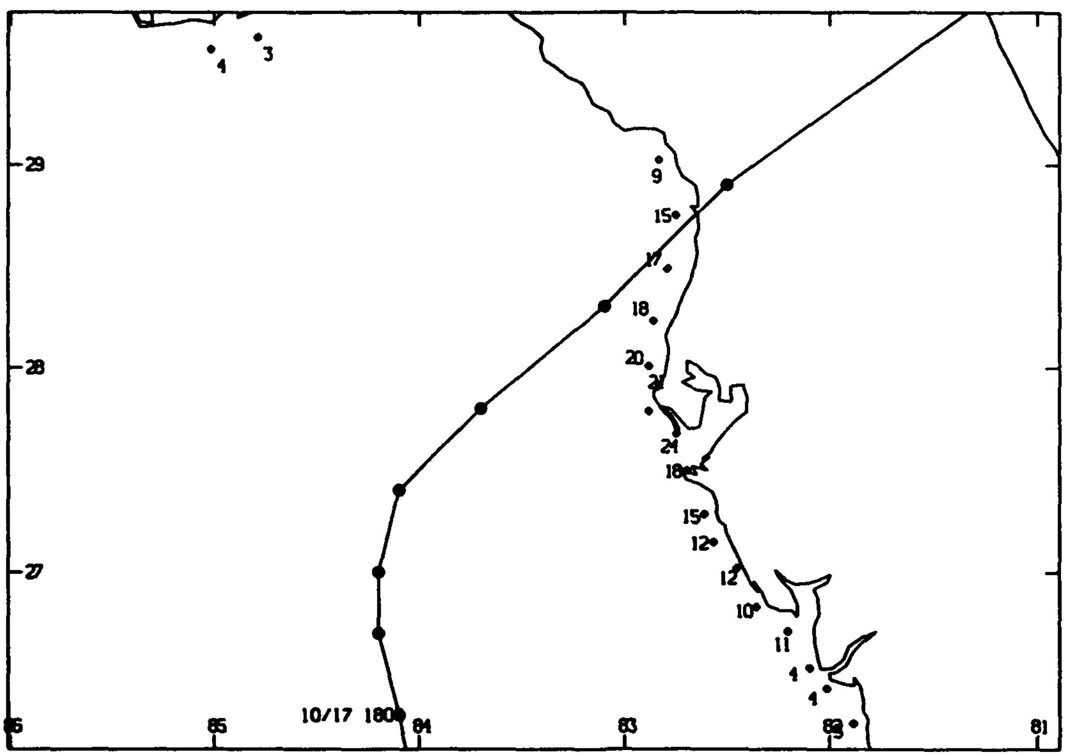

HURRICANE 669
GLADYS
10/13/1968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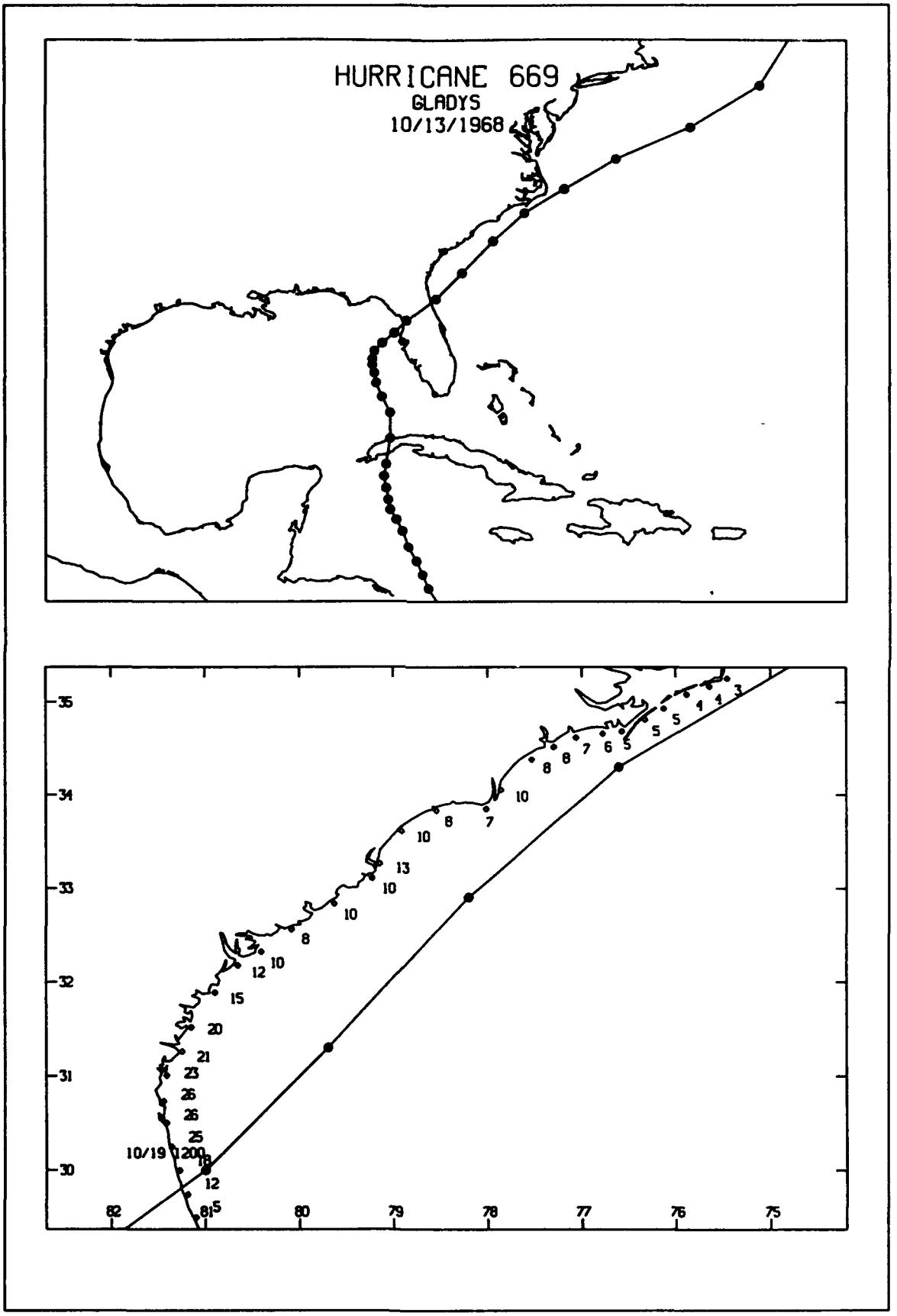
10/17 1800


HURRICANE 669
GLADYS
10/13/1968
35
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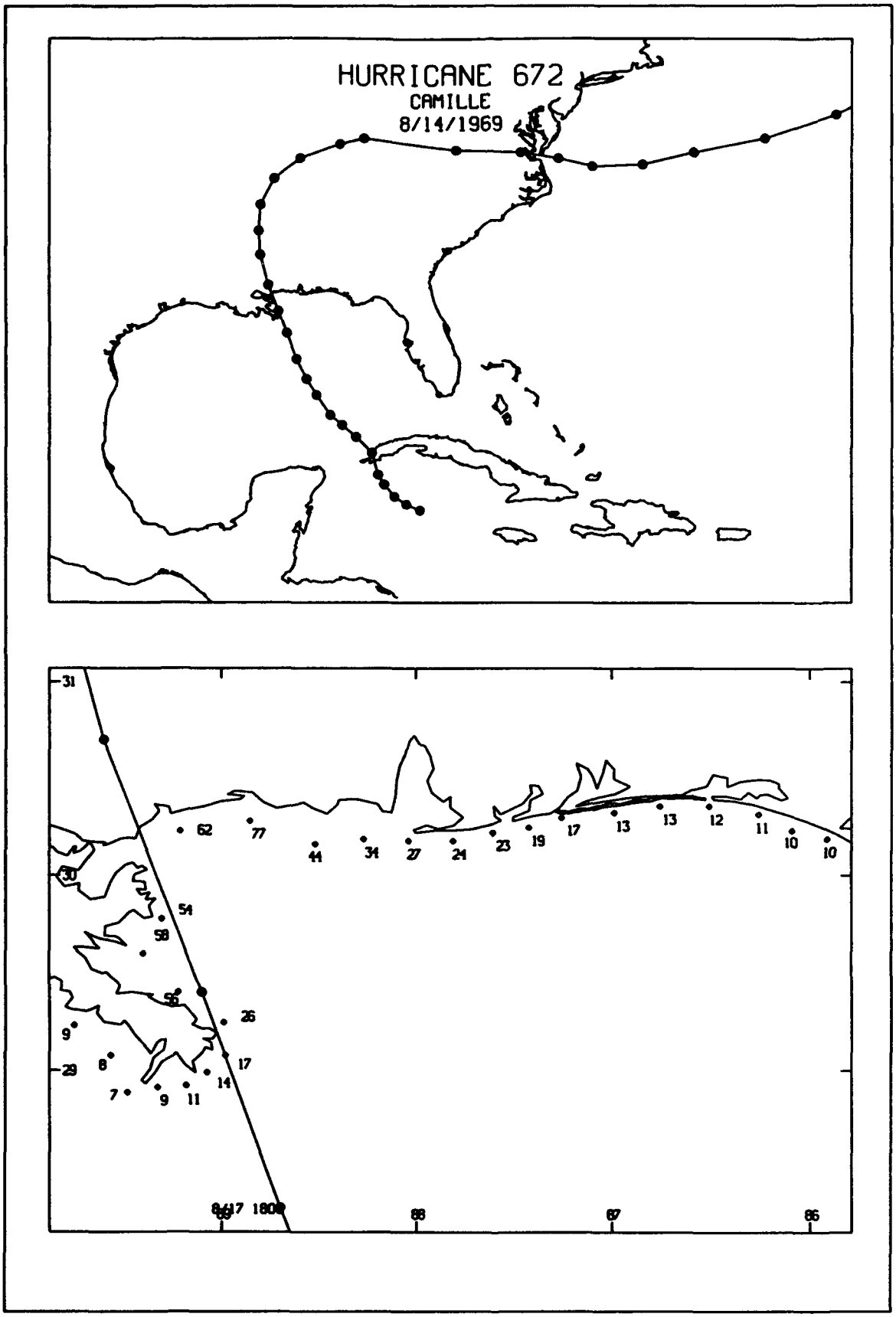
10/19 1200


HURRICANE 672
CAMILLE
8/14/1969
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8/17 1800
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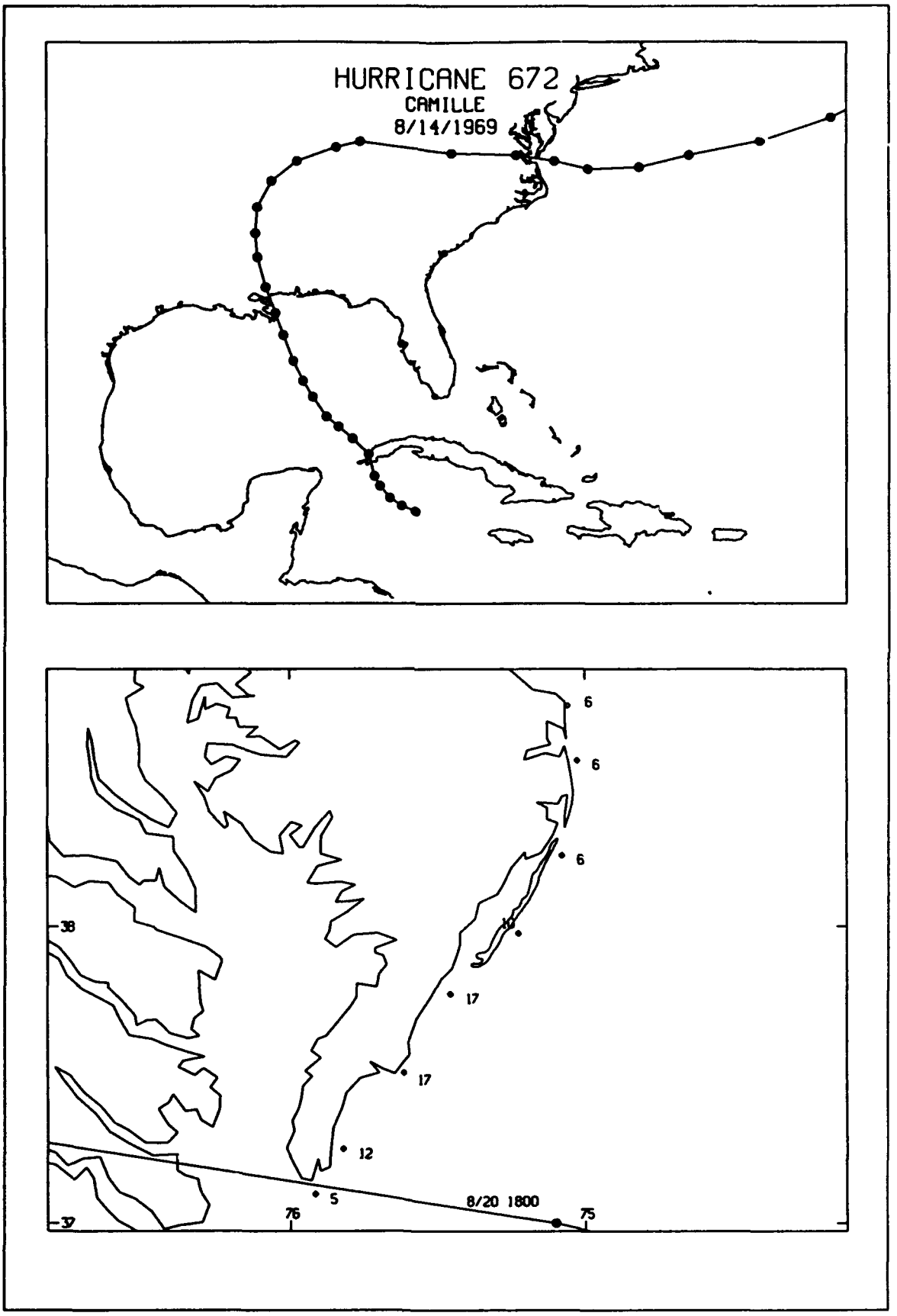
HURRICANE 672
CAMILLE
8/14/1969
6
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38
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8/20 1800
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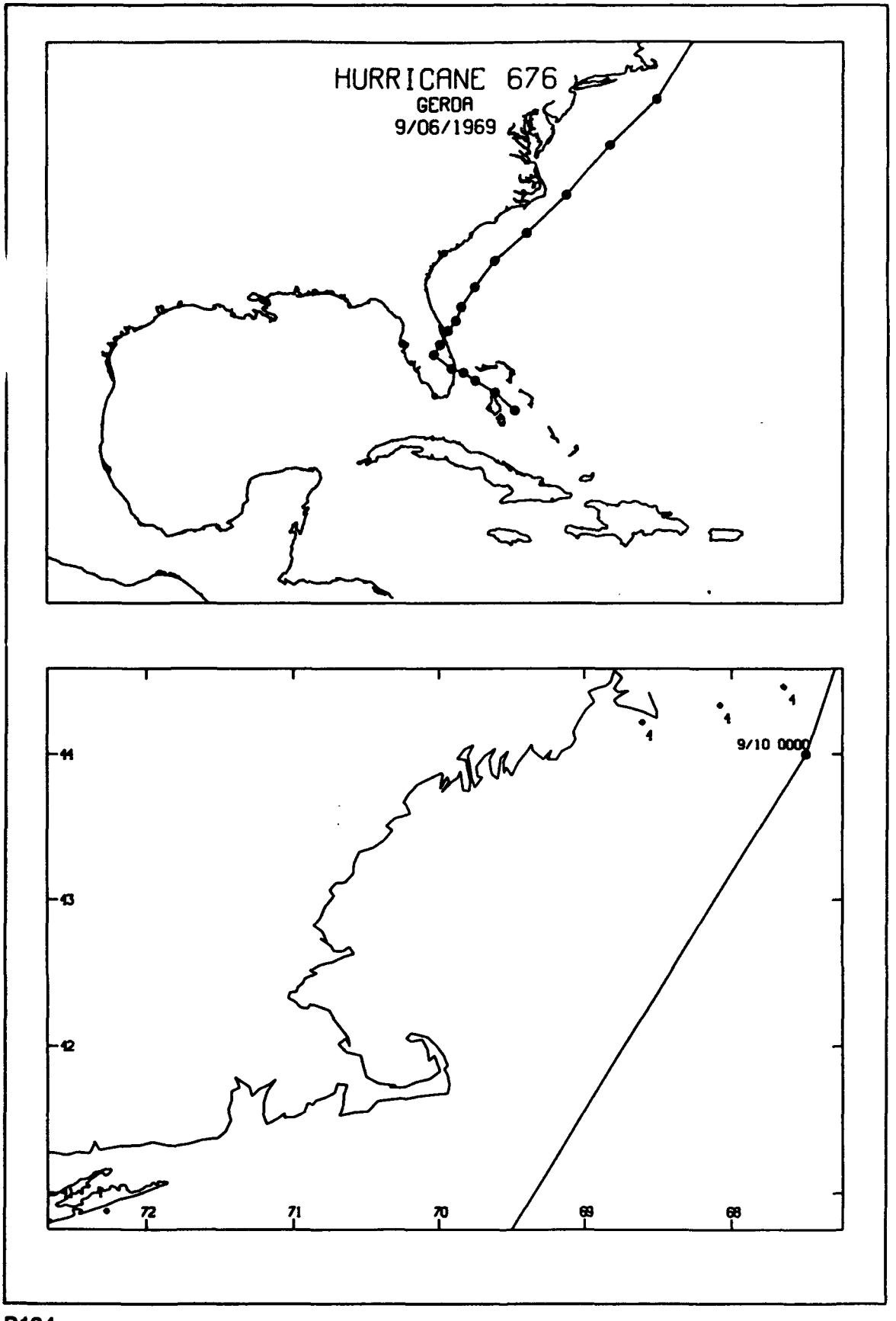
76
75


HURRICANE 676
GERDA
9/06/1969
9/10 0000
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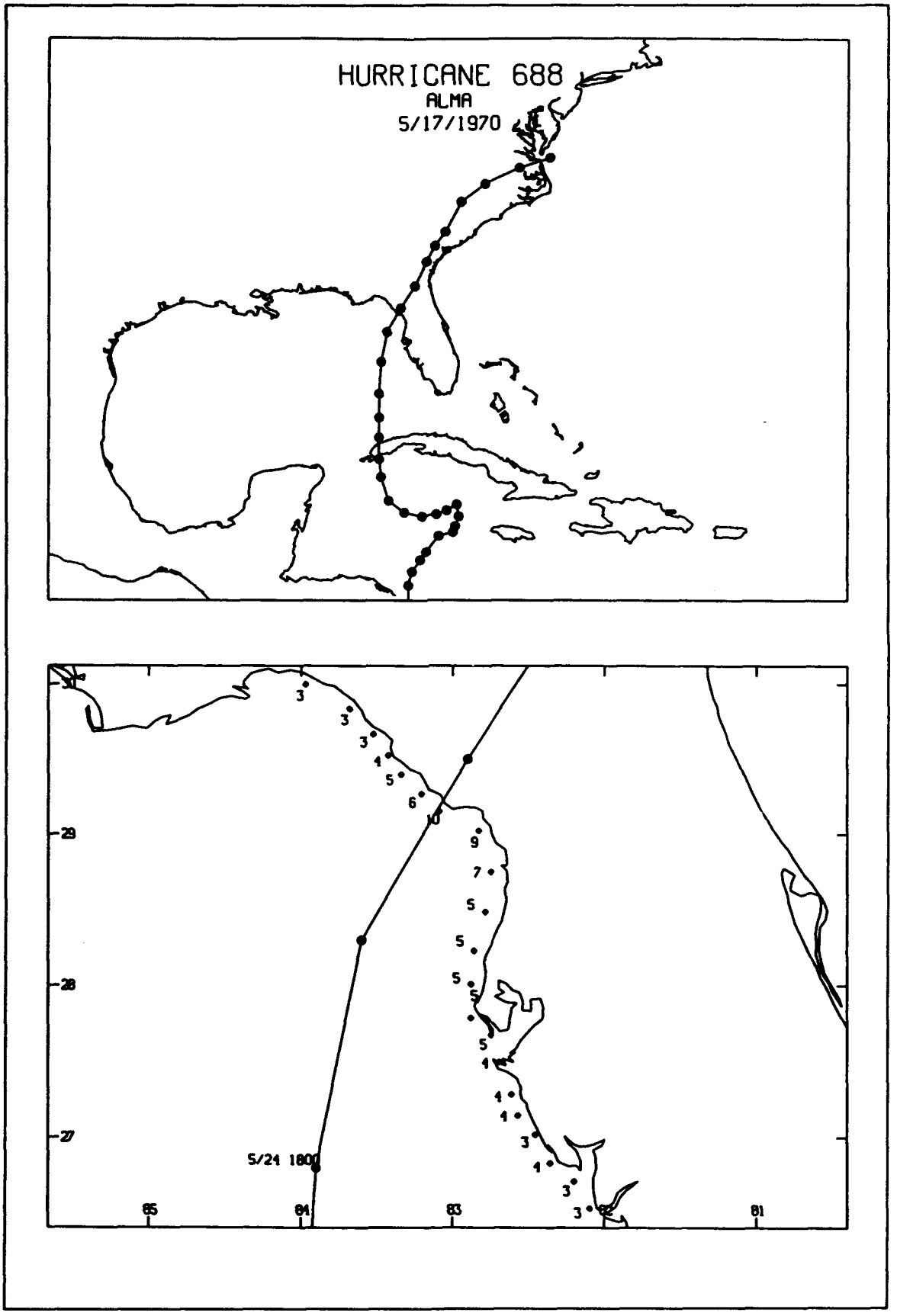
HURRICANE 688
ALMA
5/17/1970
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5/24 1800
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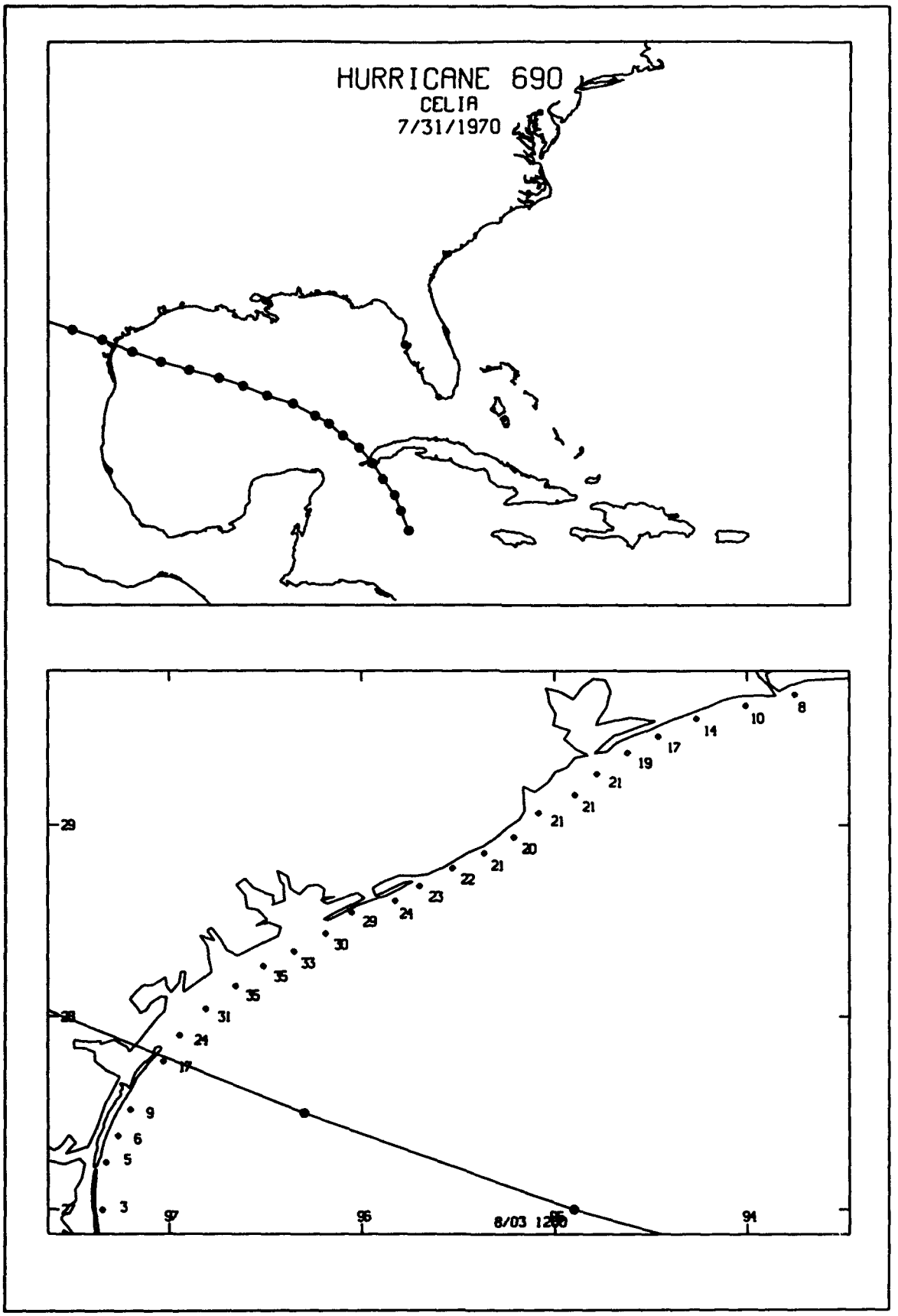
HURRICANE 690
CELIA
7/31/1970
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8/03 12
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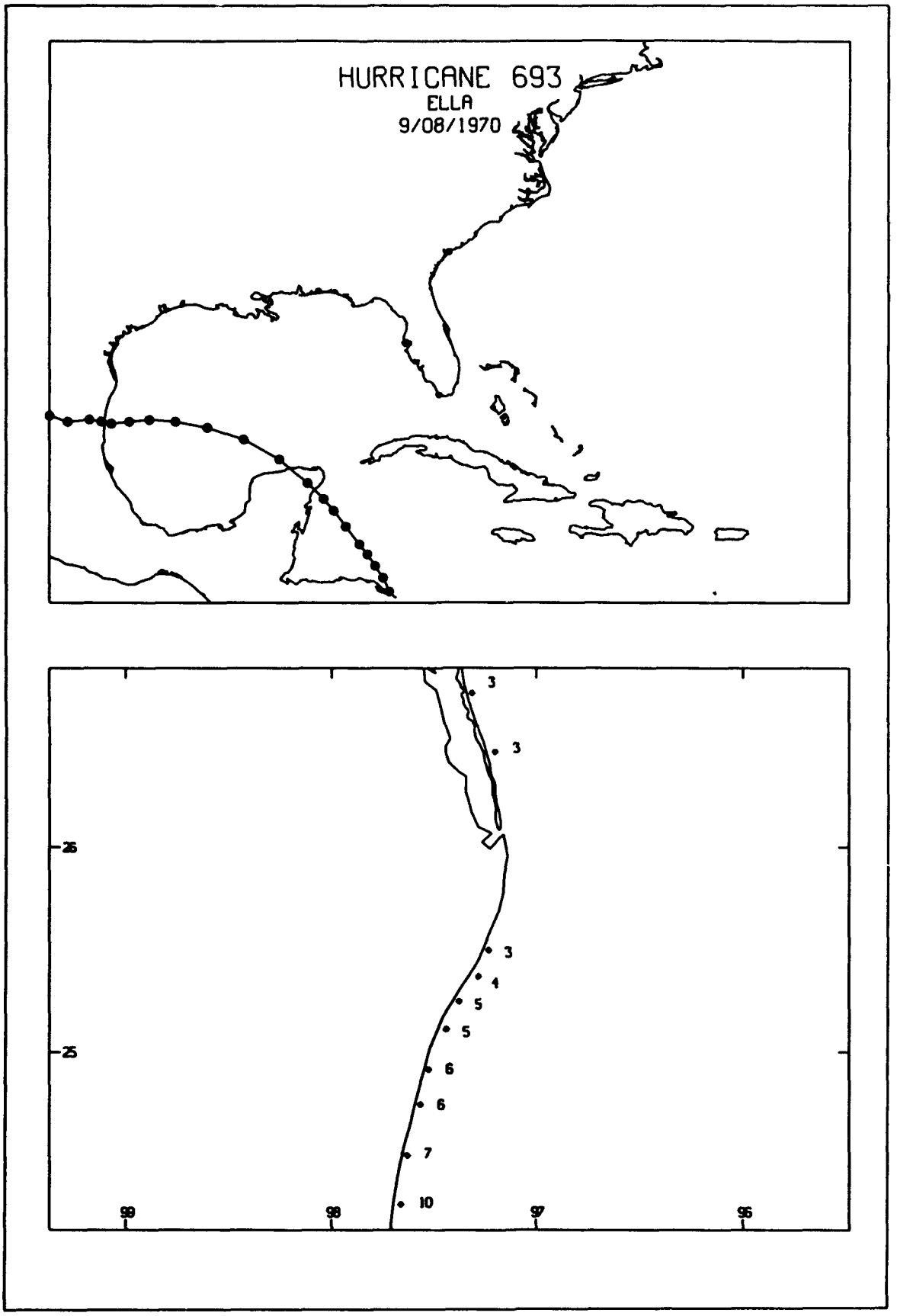
HURRICANE 693
ELLA
9/08/1970
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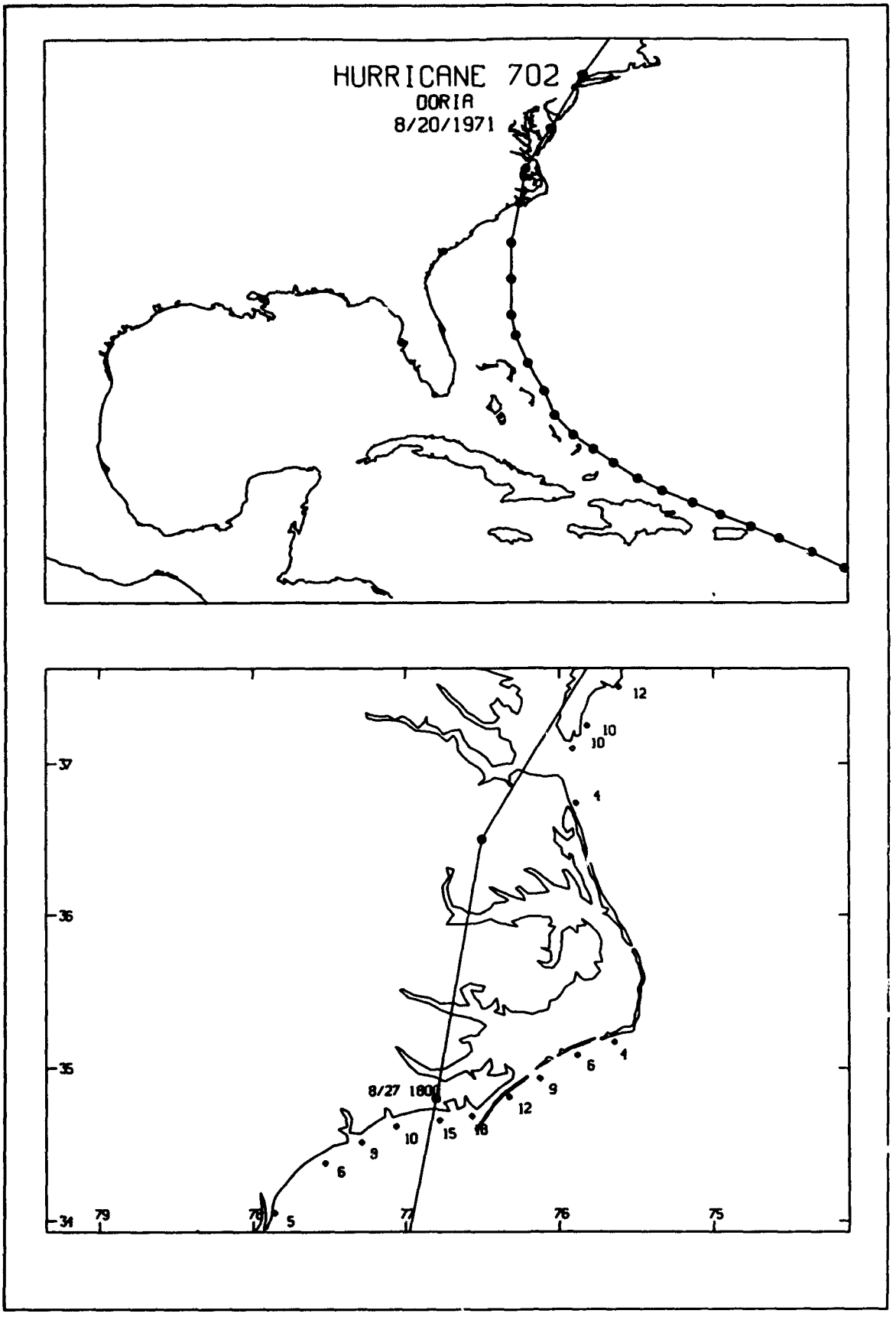
HURRICANE 702
DORIA
8/20/1971
8/27 1800
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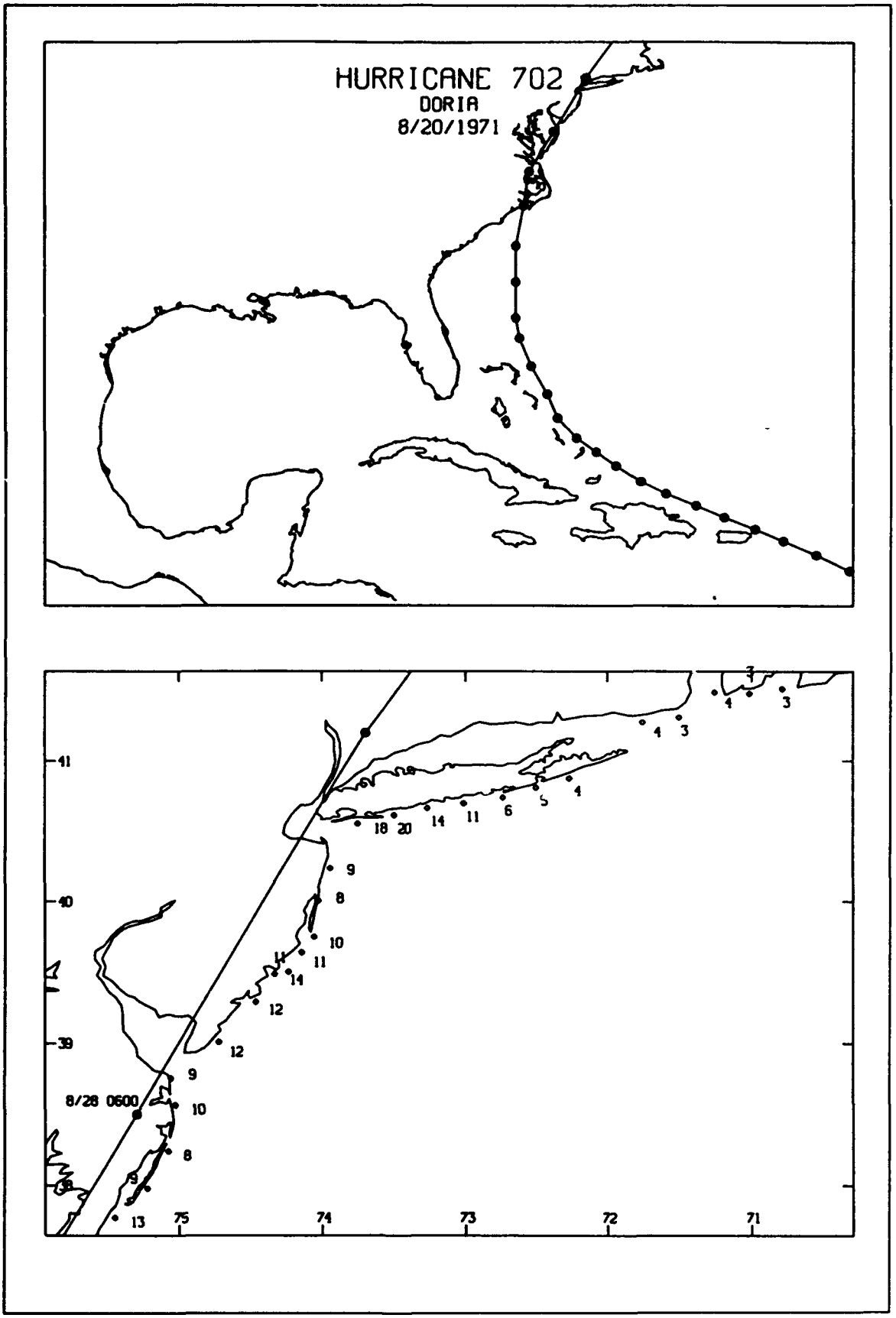
HURRICANE 702
DORIA
8/20/1971
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8/28 0600
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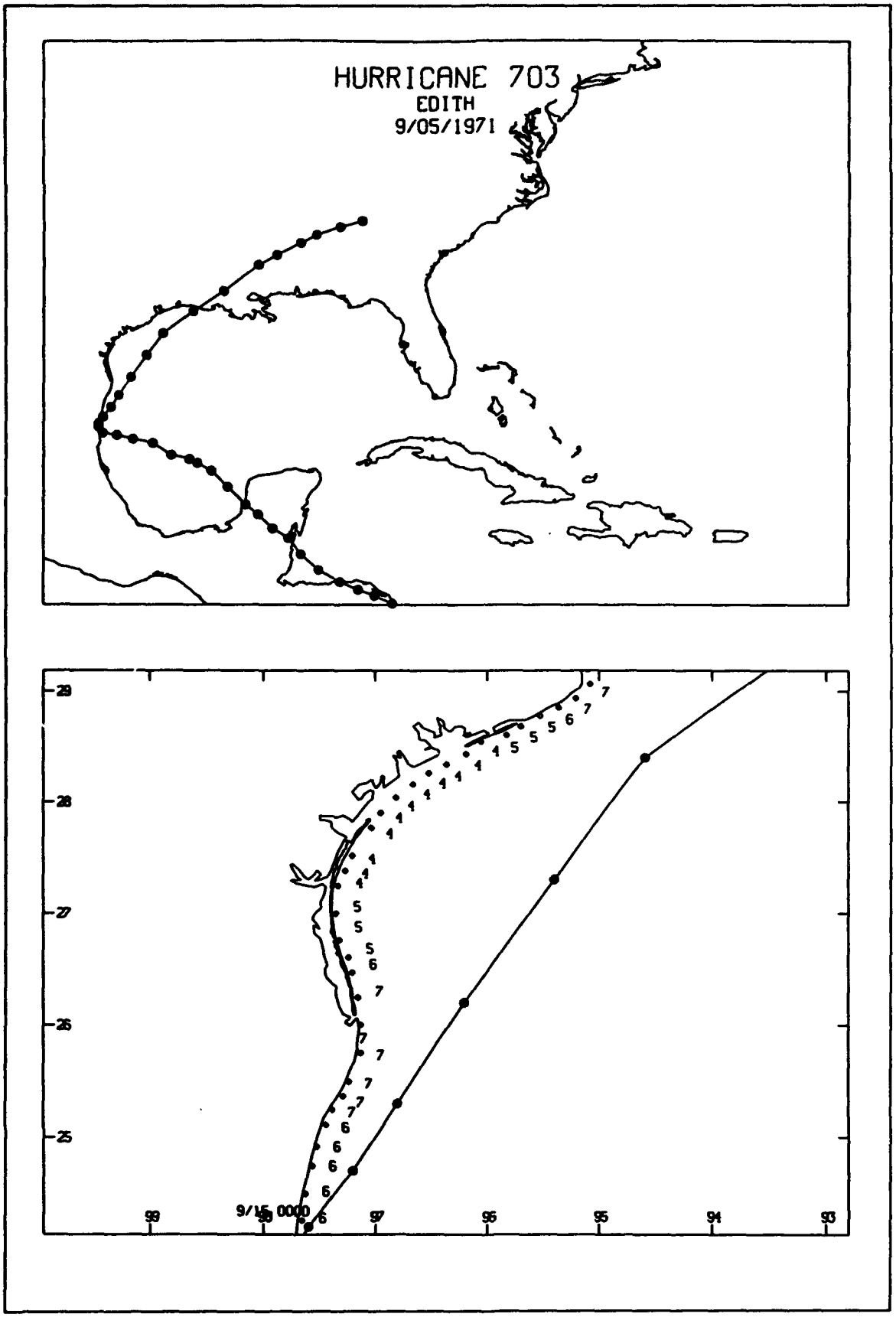
HURRICANE 703
EDITH
9/05/1971
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9/15 0000
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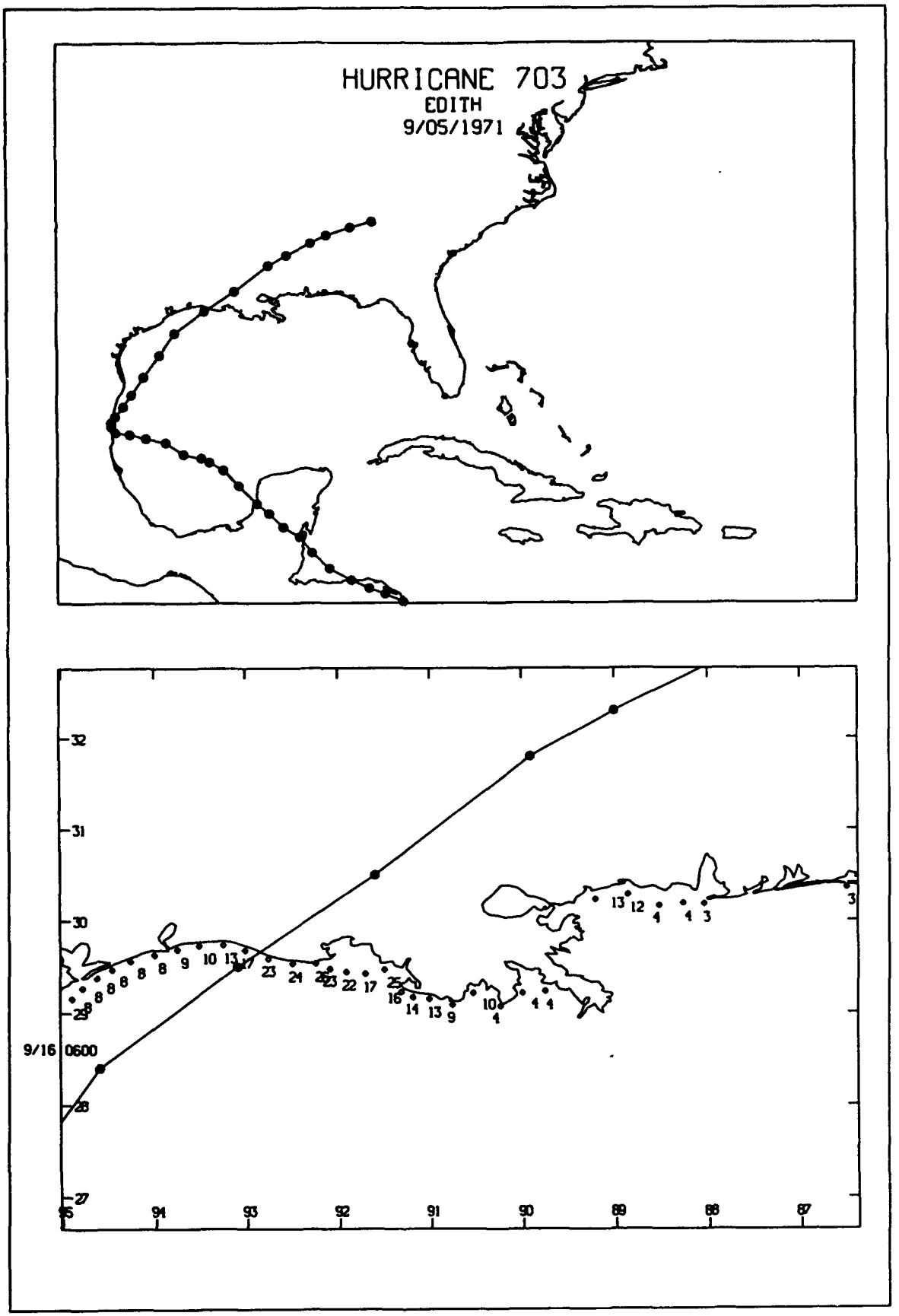
HURRICANE 703
EDITH
9/05/1971
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9/16 0600
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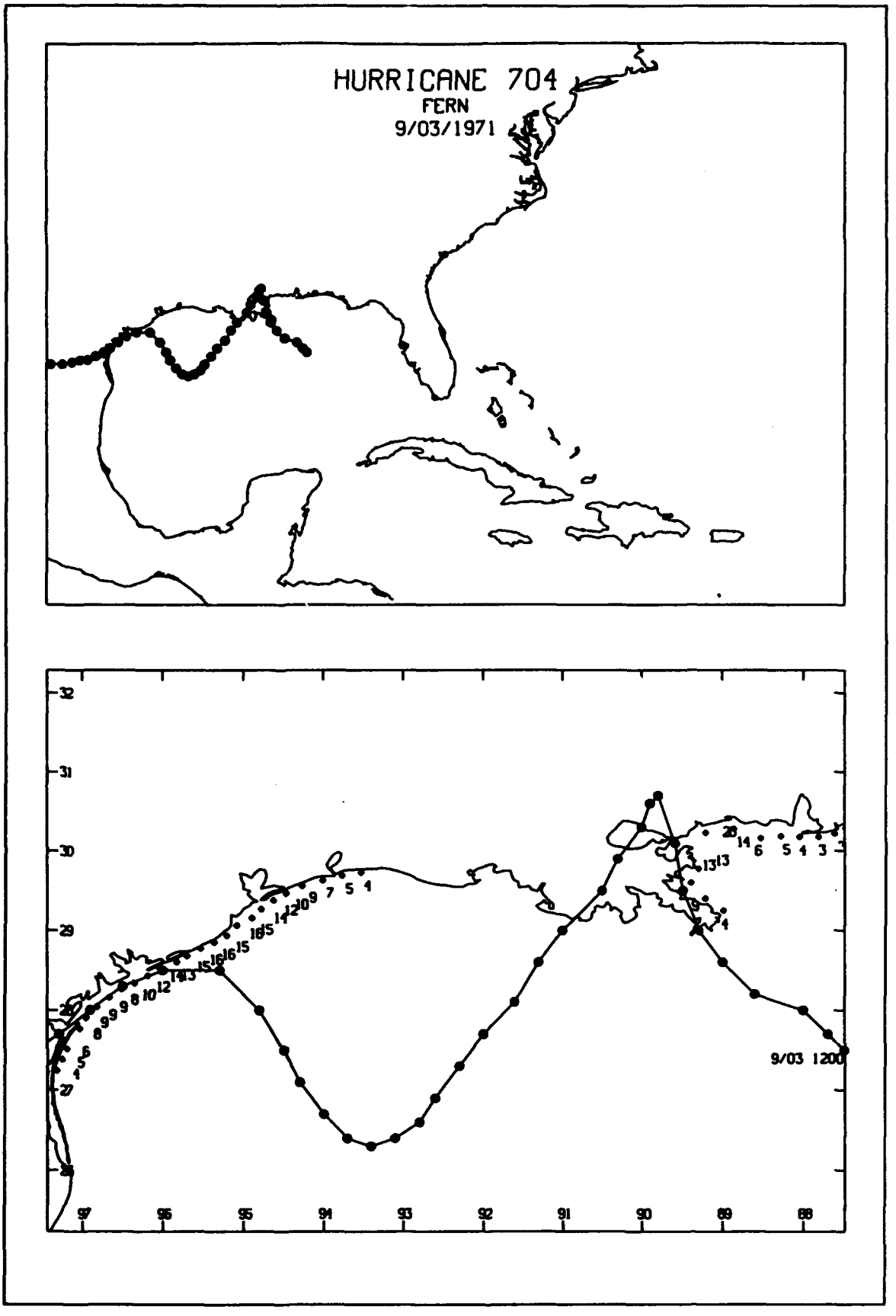
HURRICANE 704
FERN
9/03/1971
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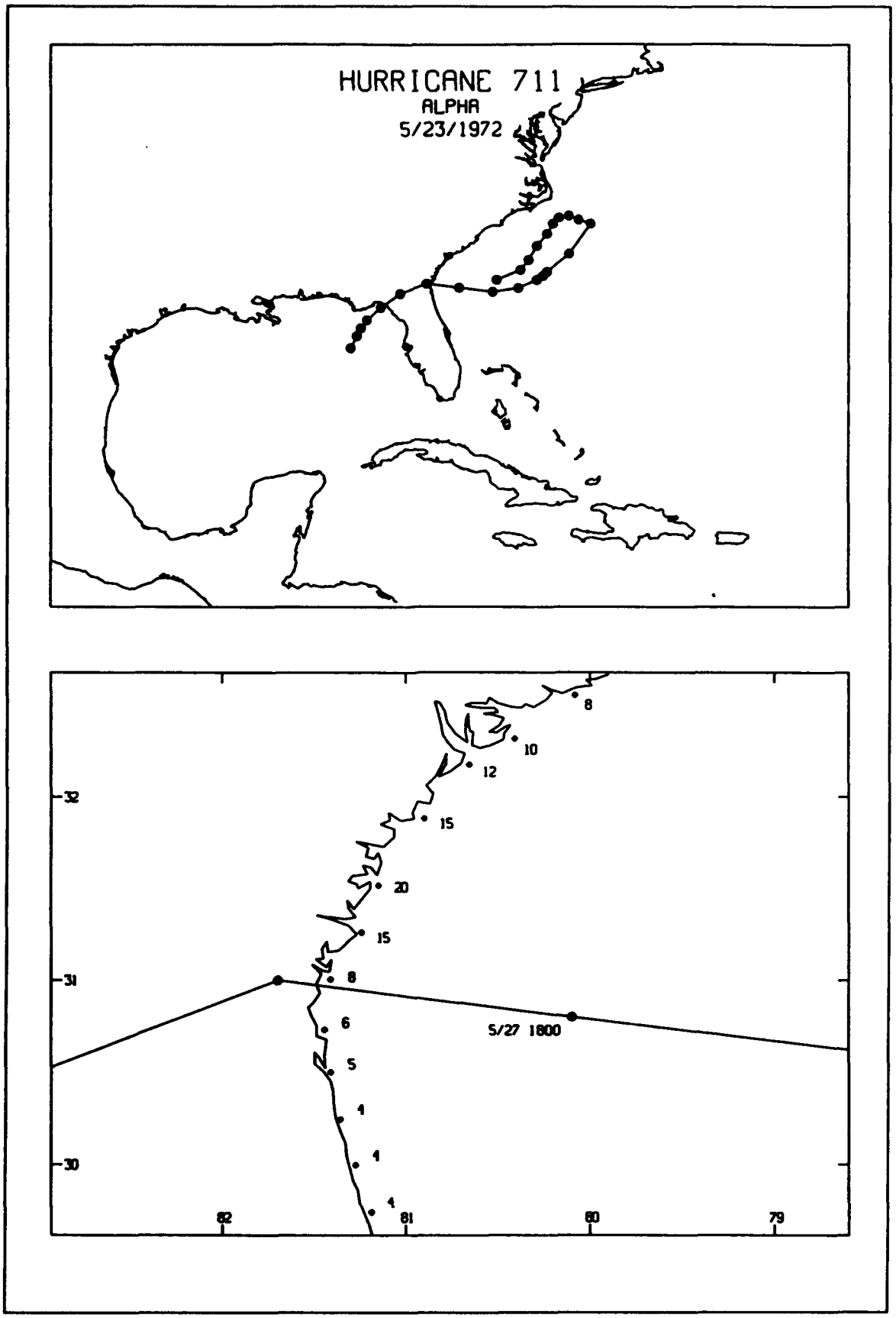
9/03 1200


HURRICANE 711
ALPHA
5/23/1972
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5/27 1800
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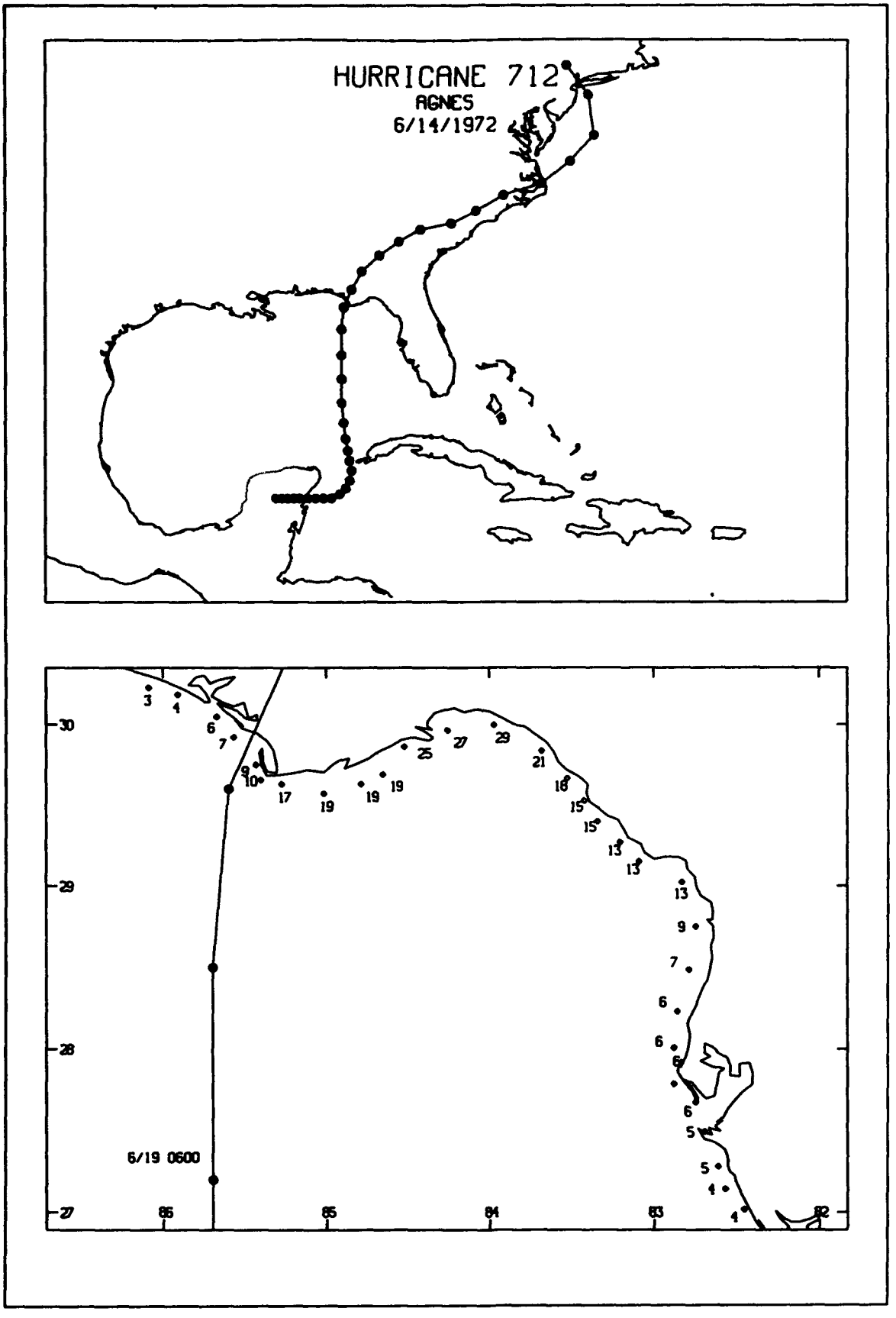
HURRICANE 712
AGNES
6/14/1972
6/19 0600
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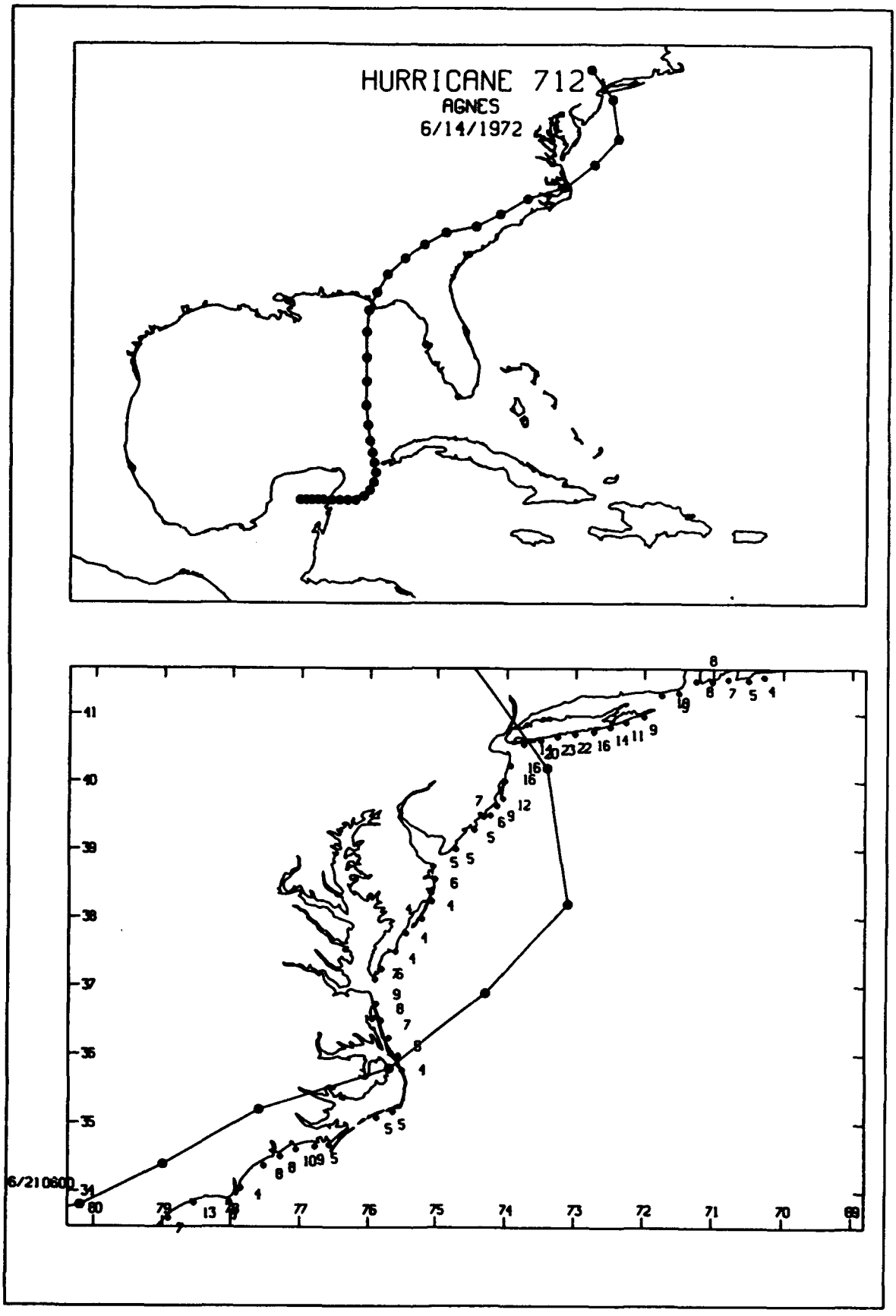
HURRICANE 712
AGNES
6/14/1972
6/21 0600
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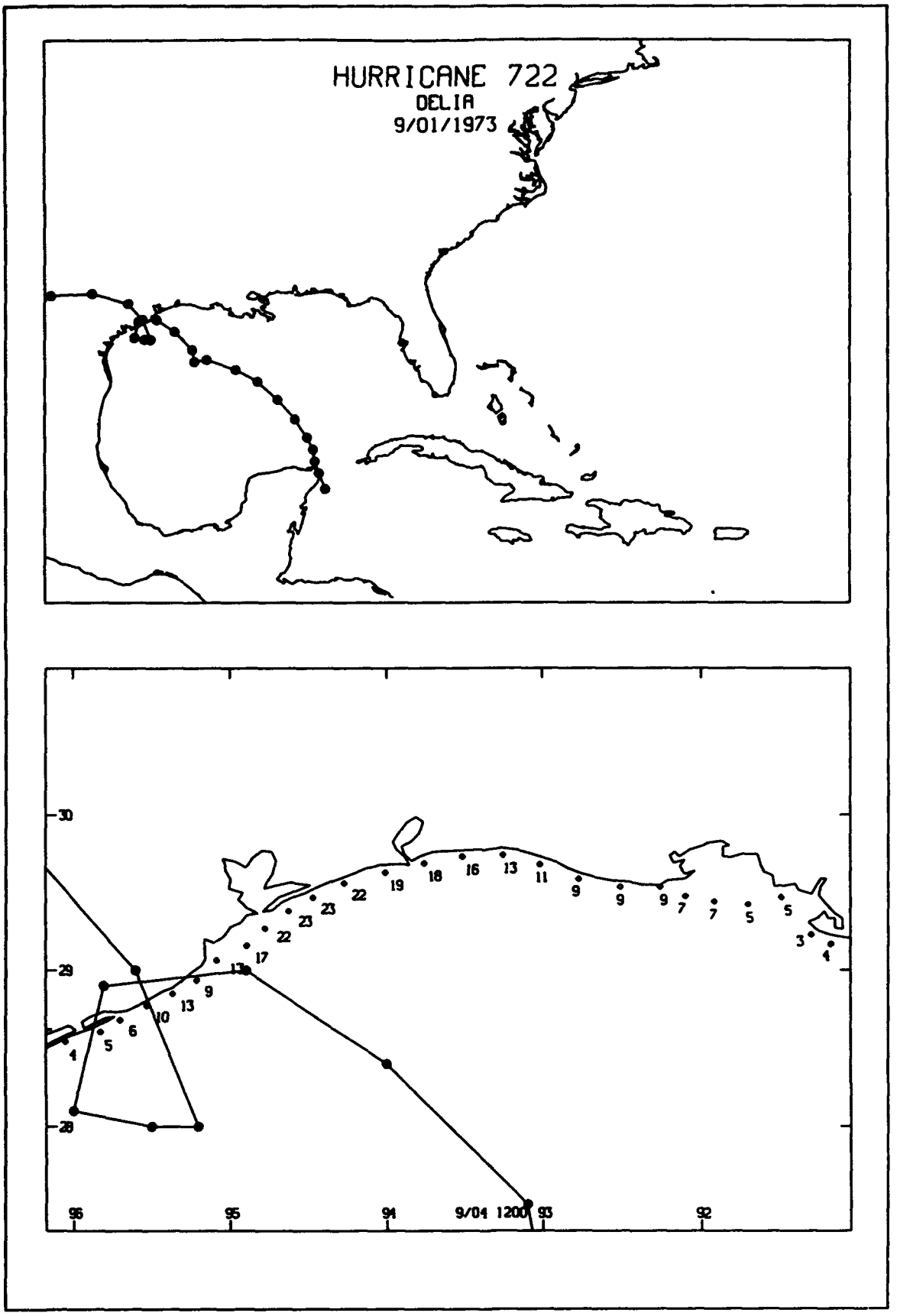
HURRICANE 722
DELIA
9/01/1973
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9/04 1200
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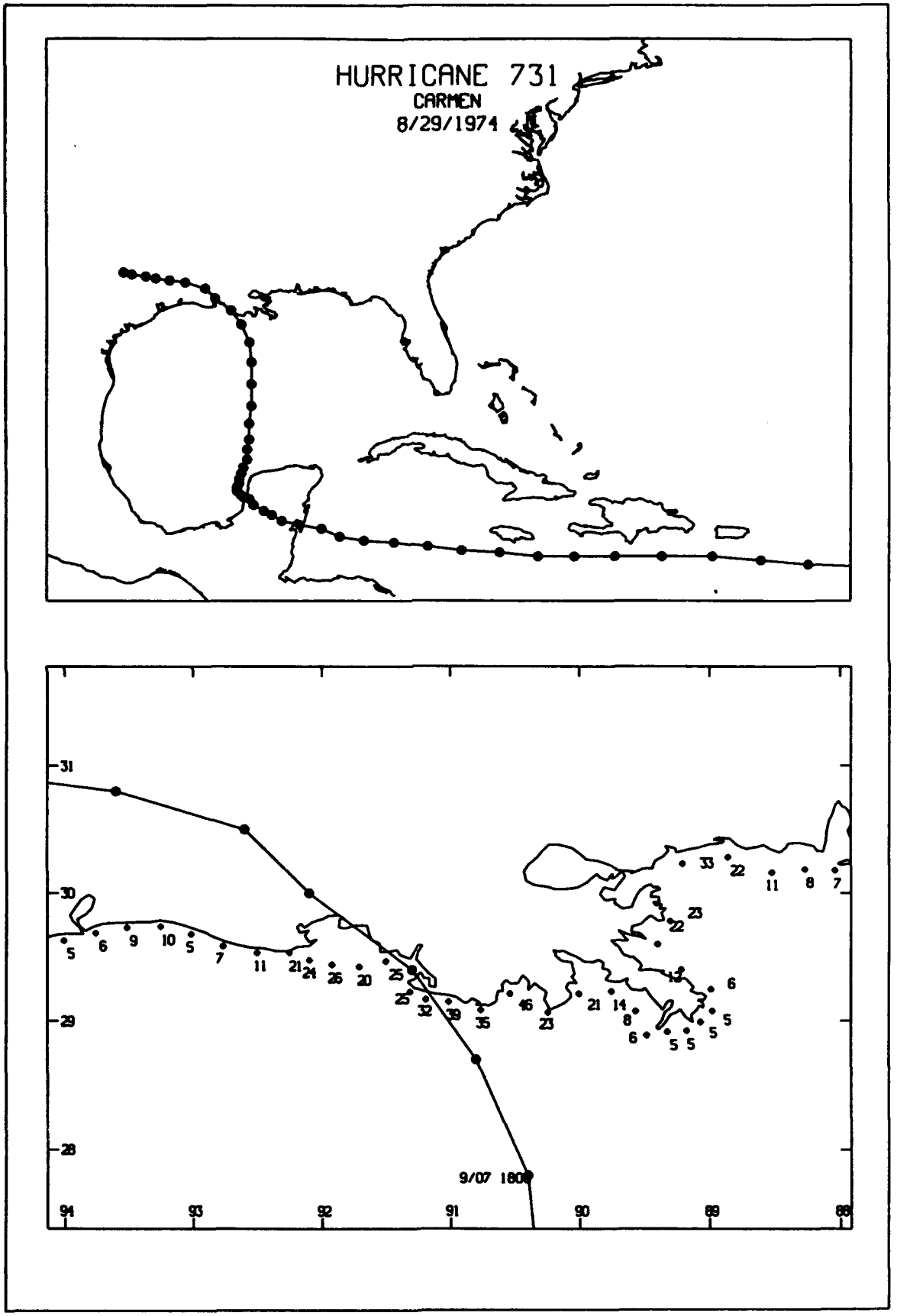
HURRICANE 731
CARMEN
8/29/1974
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9/07 1800
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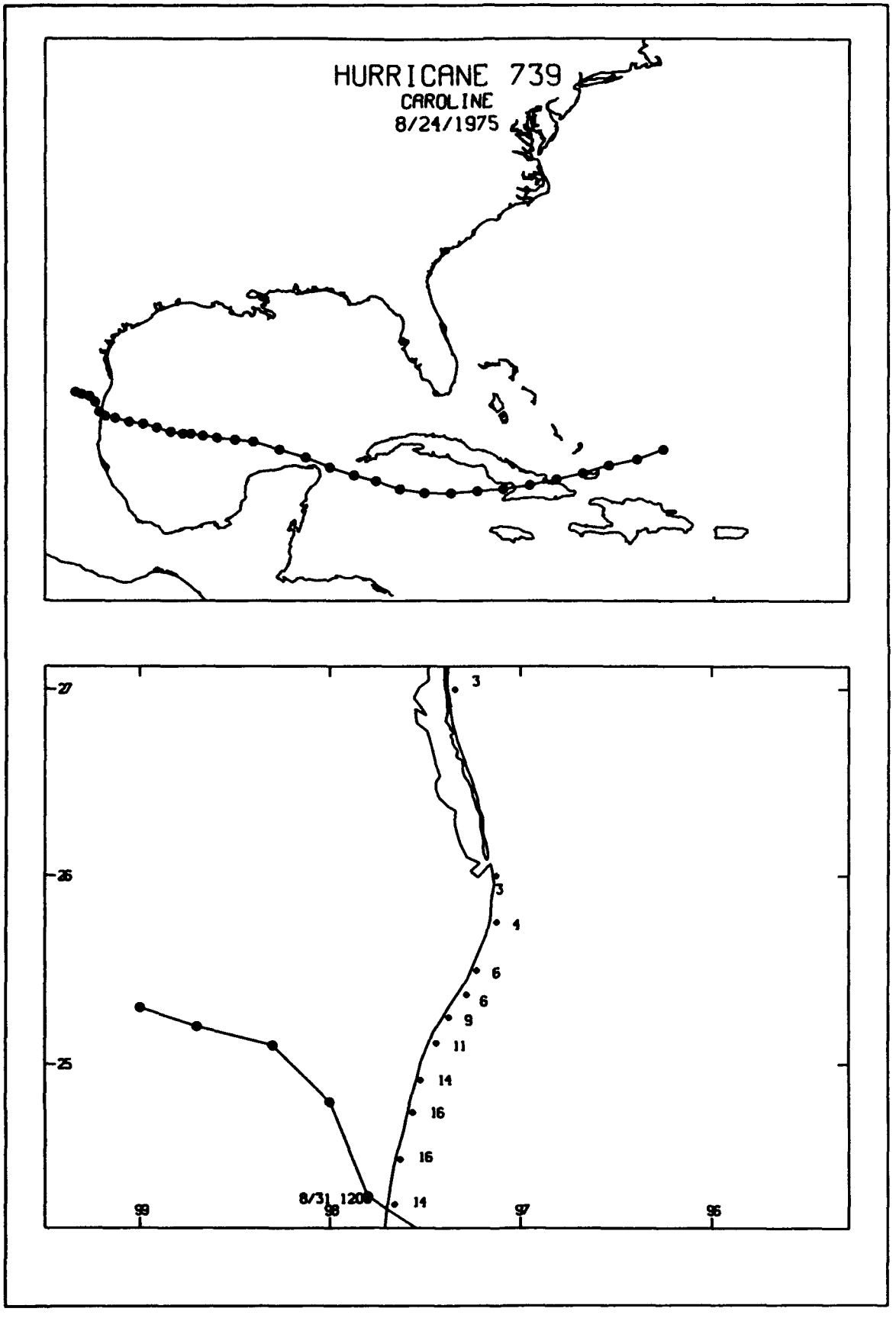
HURRICANE 739
CAROLINE
8/24/1975
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8/31 1200
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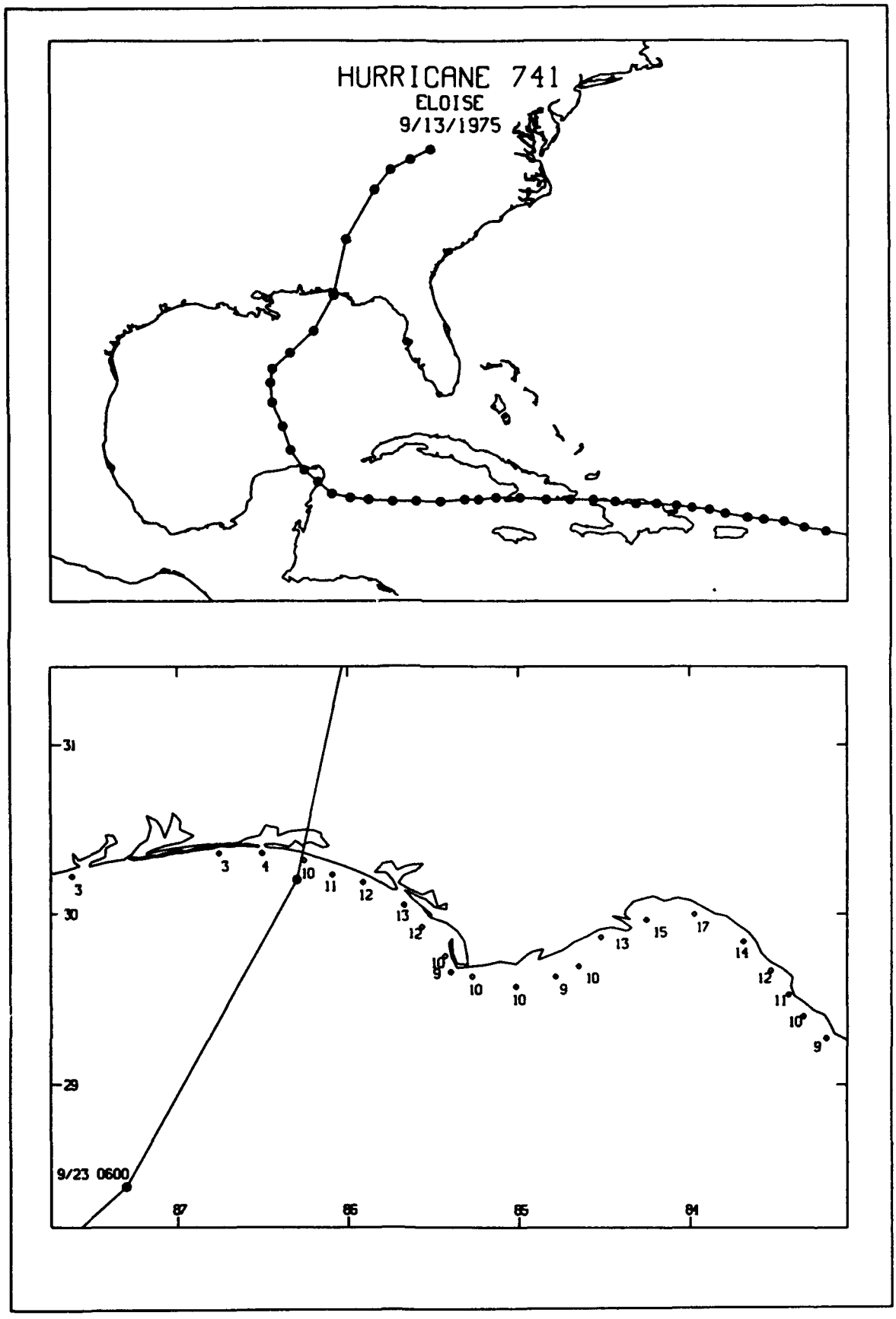
HURRICANE 741
ELOISE
9/13/1975
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9/23 0600
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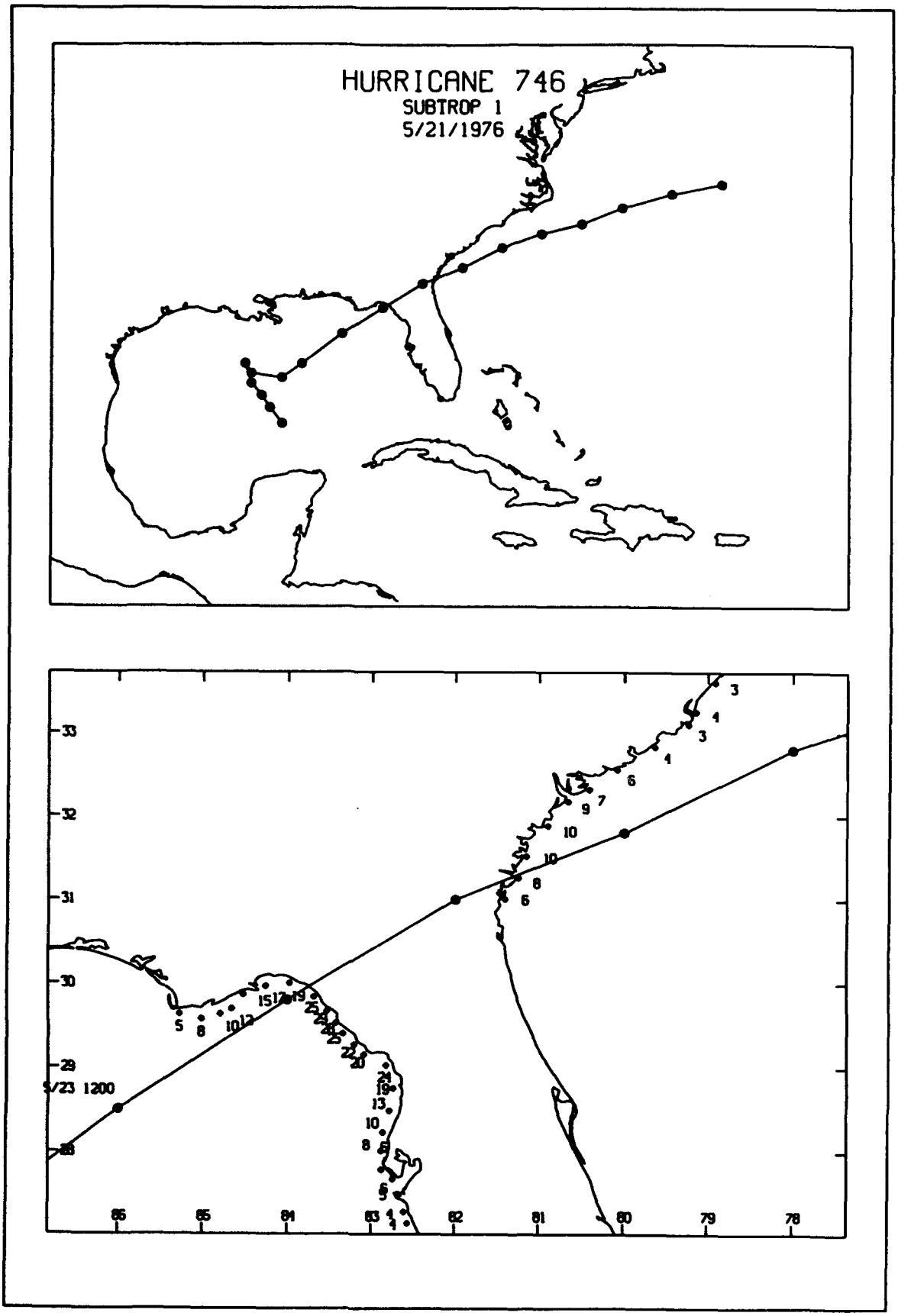
HURRICANE 746
SUBTROP 1
5/21/1976
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5/23 1200
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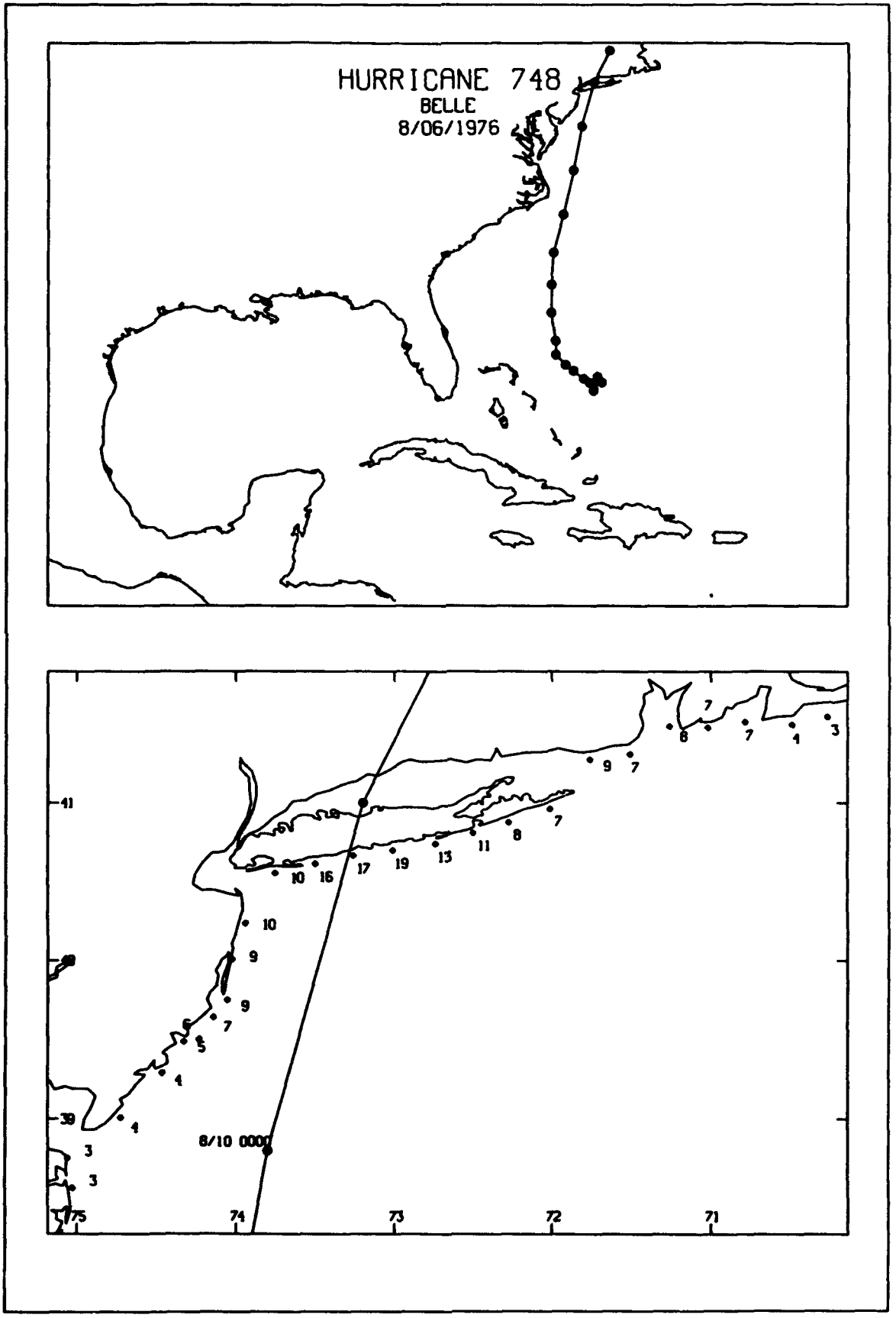
HURRICANE 748
BELLE
8/06/1976
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39
8/10 0000
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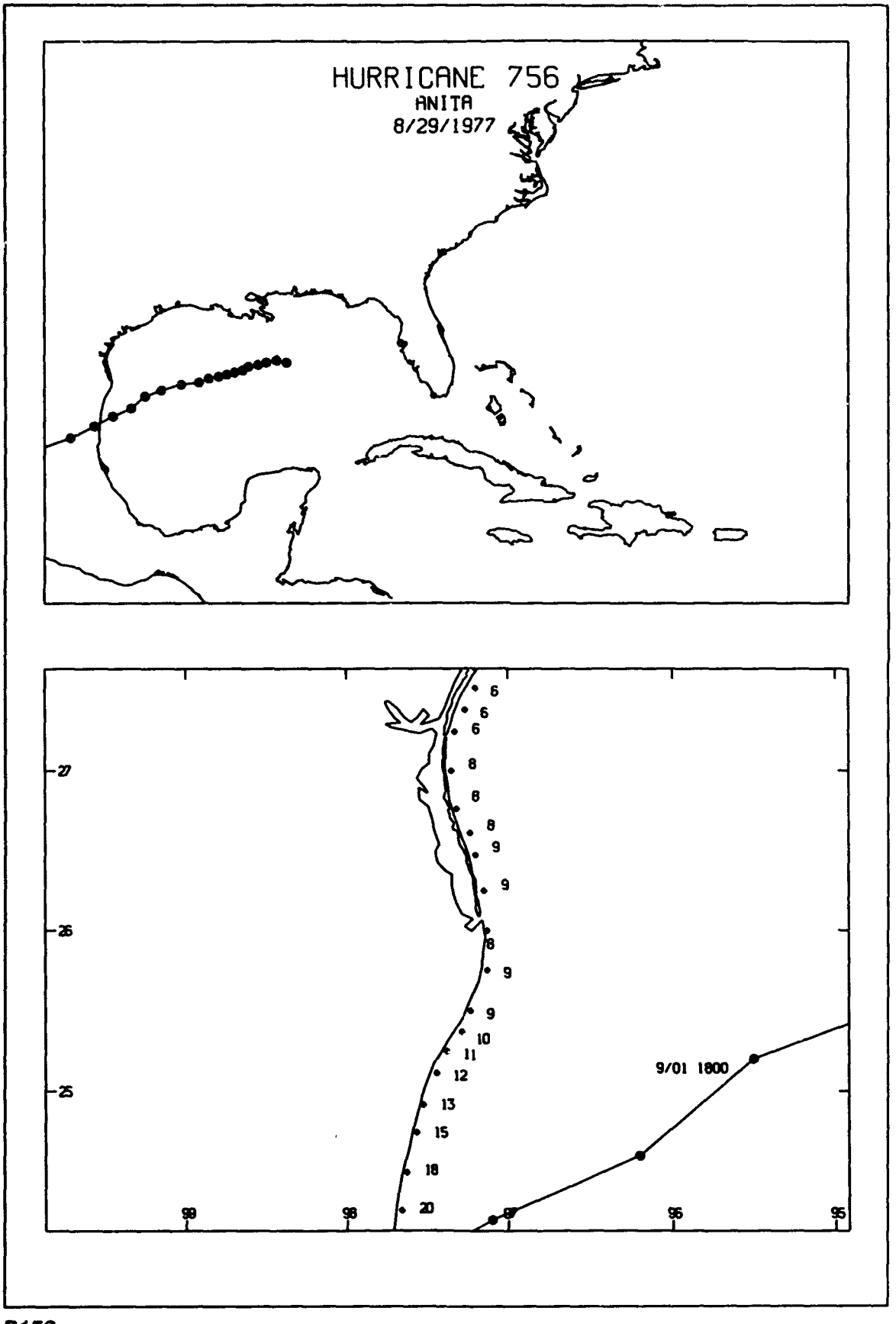
HURRICANE 756
ANITA
8/29/1977
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9/01 1800
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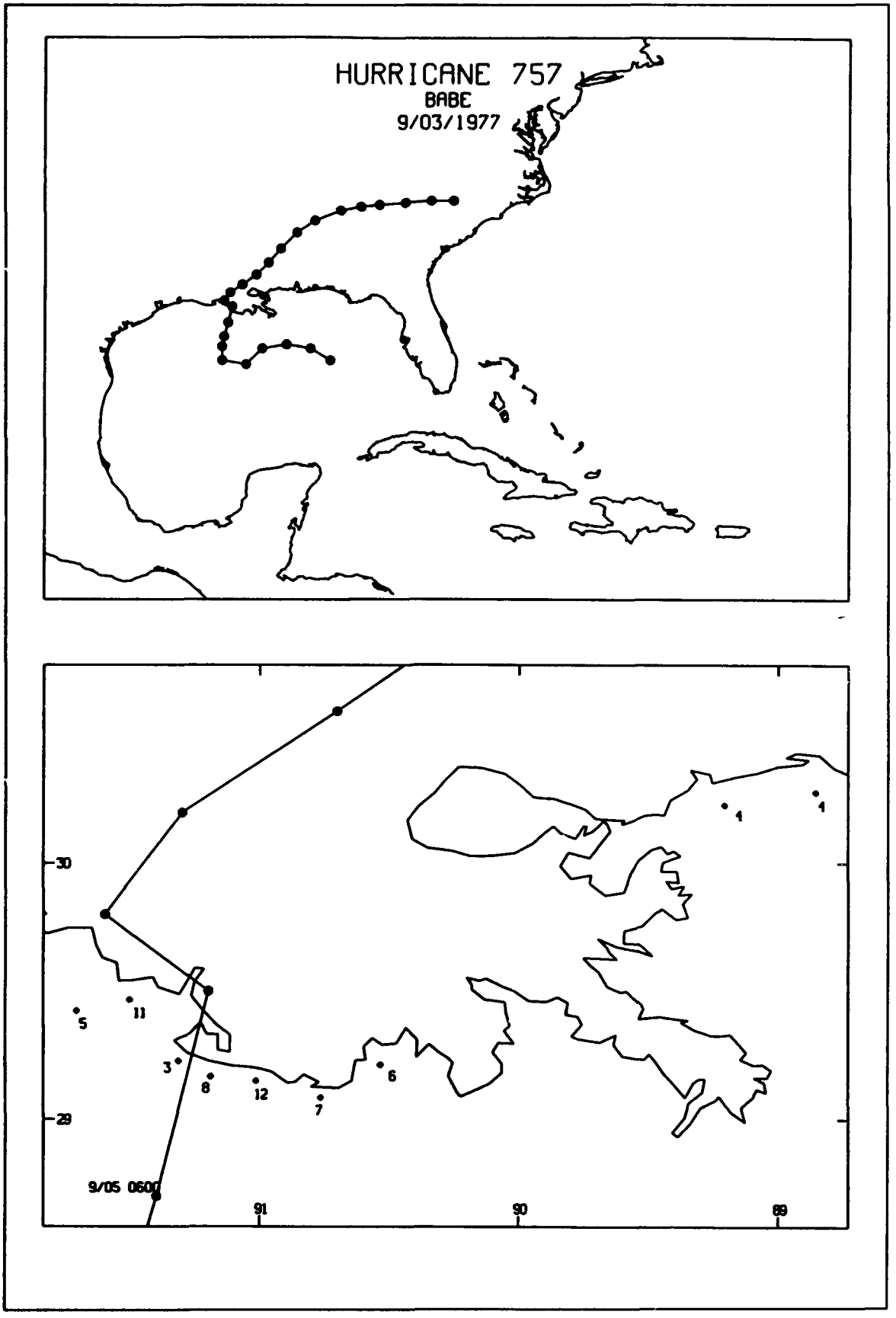
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BABE
9/03/1977
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91
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89
9/05 0600
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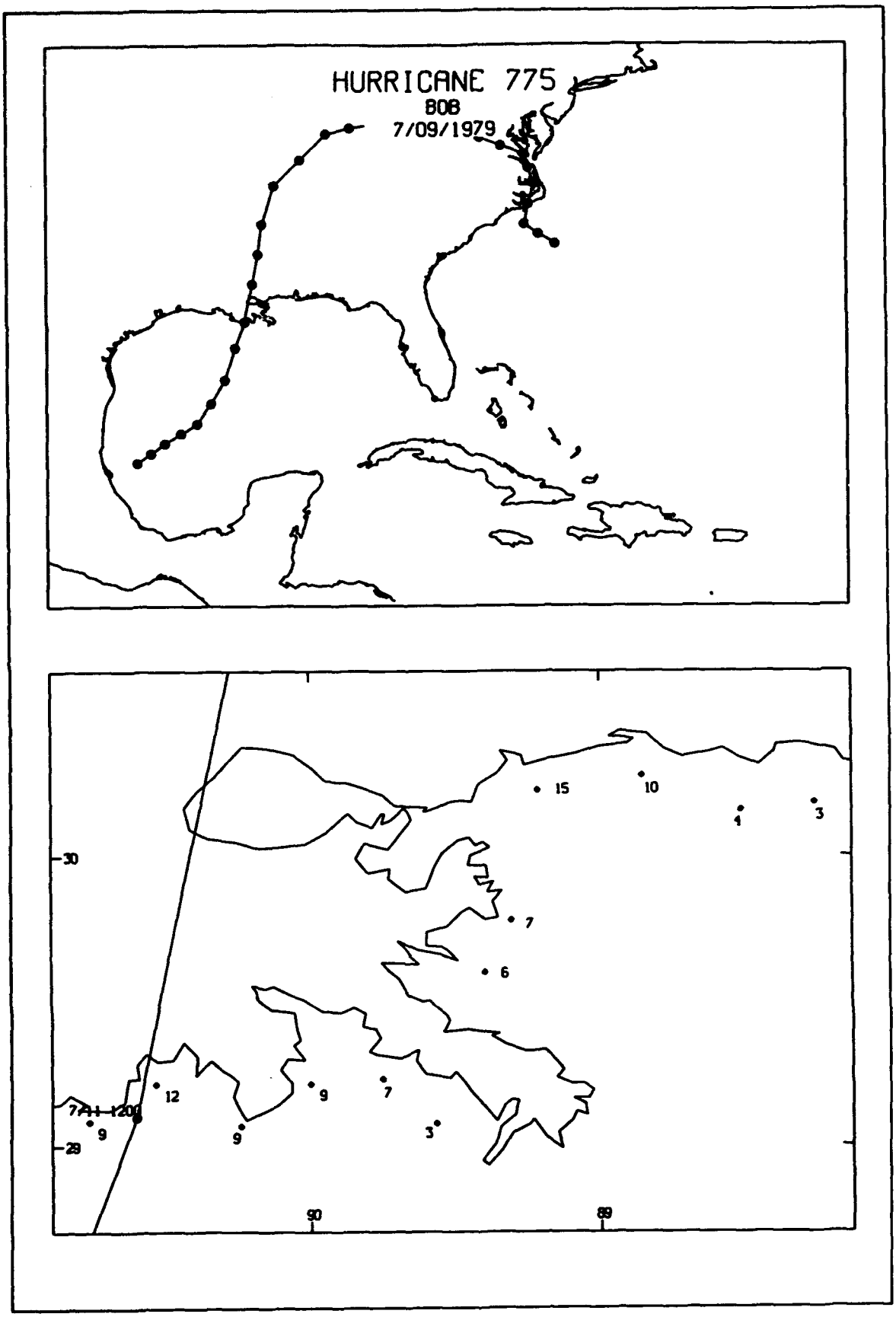
HURRICANE 775
BOB
7/09/1979
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29
90
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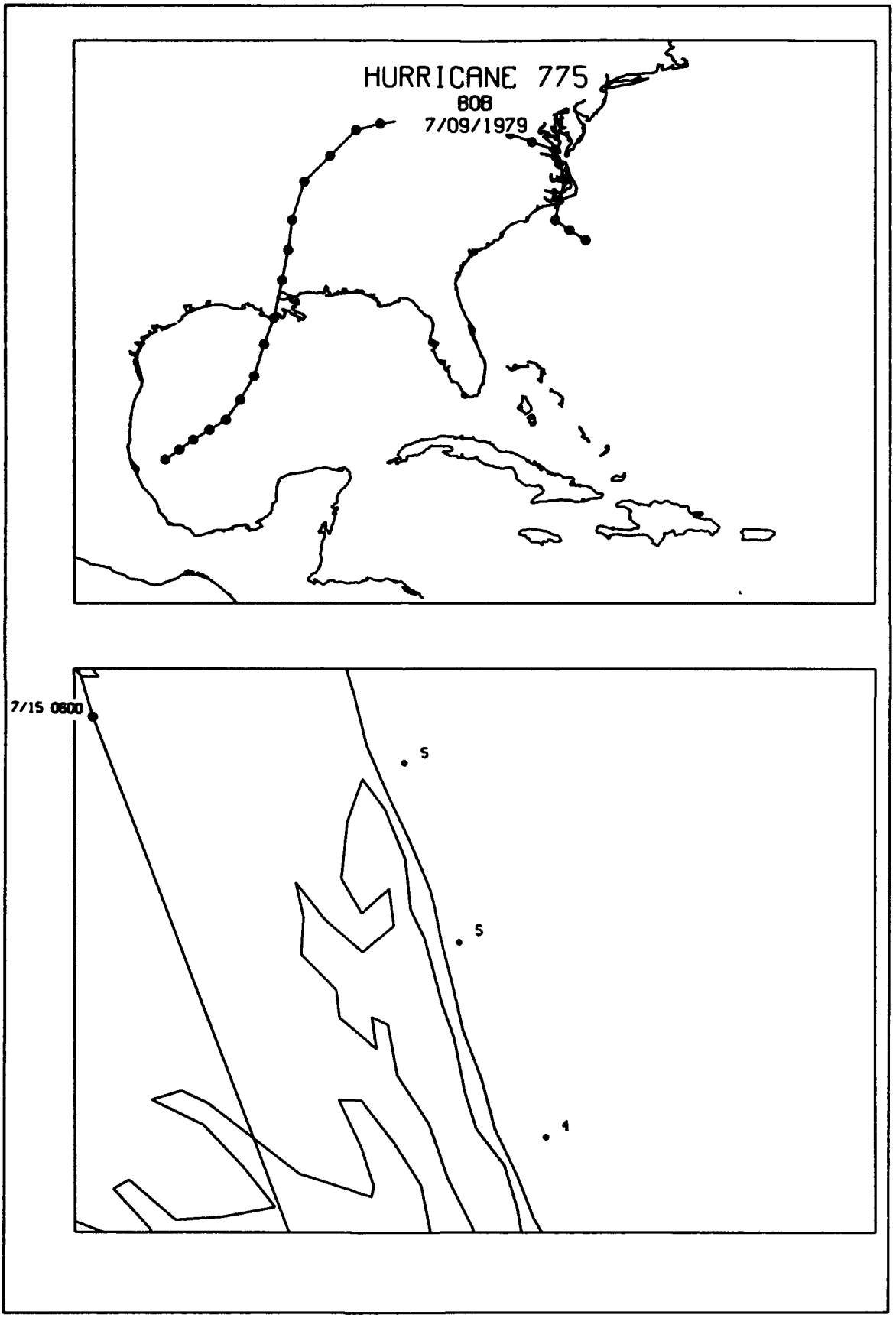
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7/09/1979
7/15 0600
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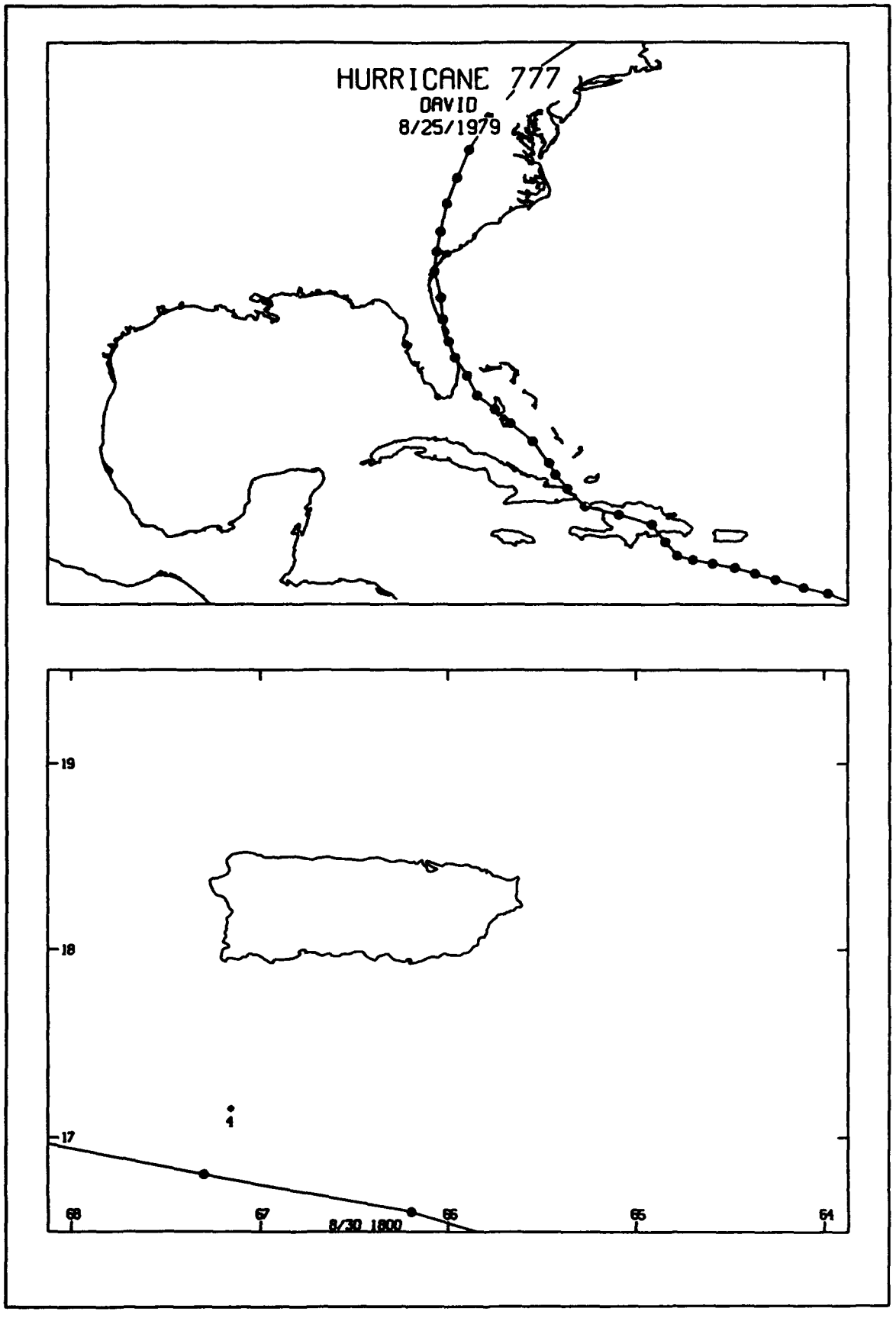
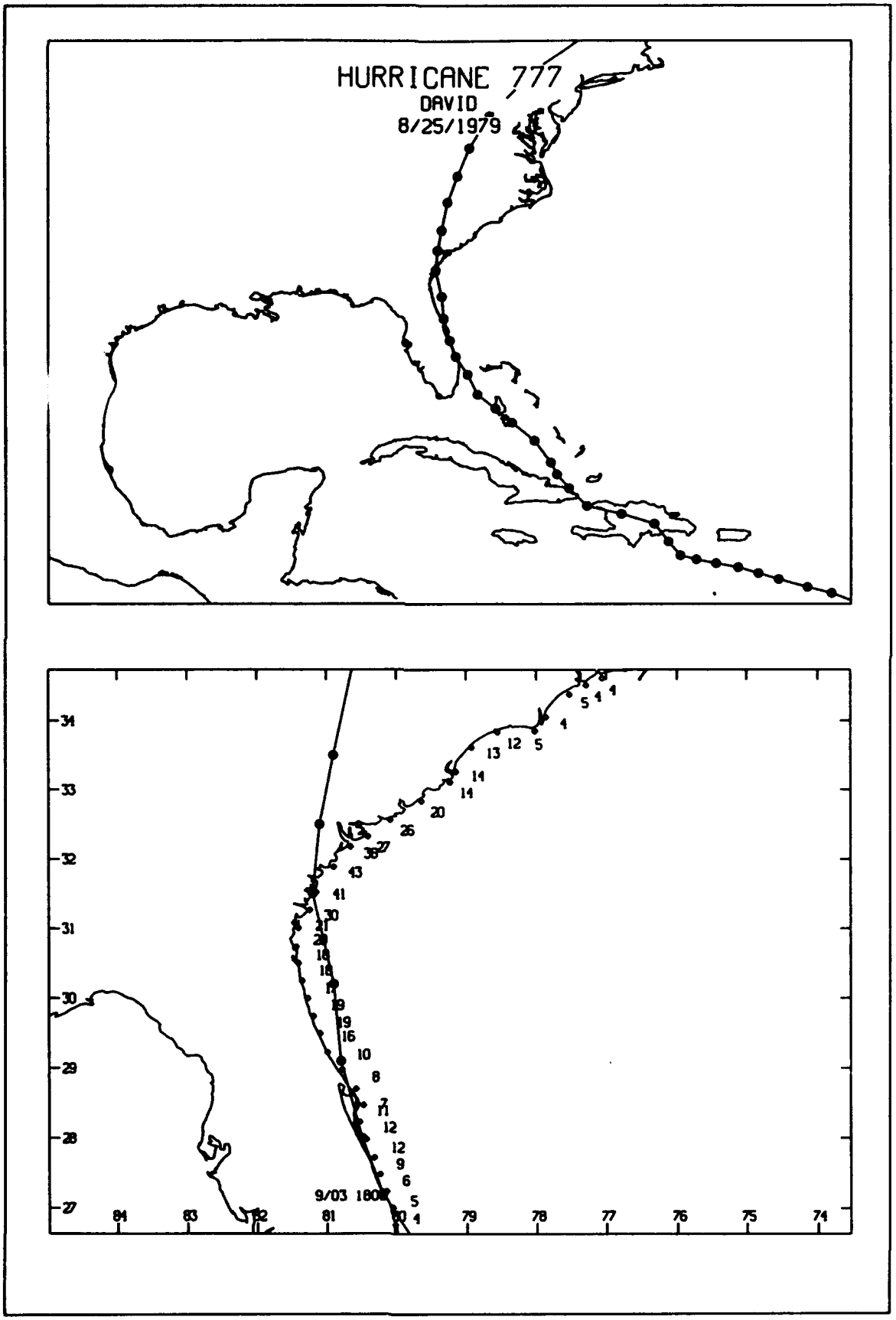

HURRICANE 777
DAVID
8/25/1979
19
18
17
68
67
66
65
64
8/30 1800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DAVID
8/25/1979
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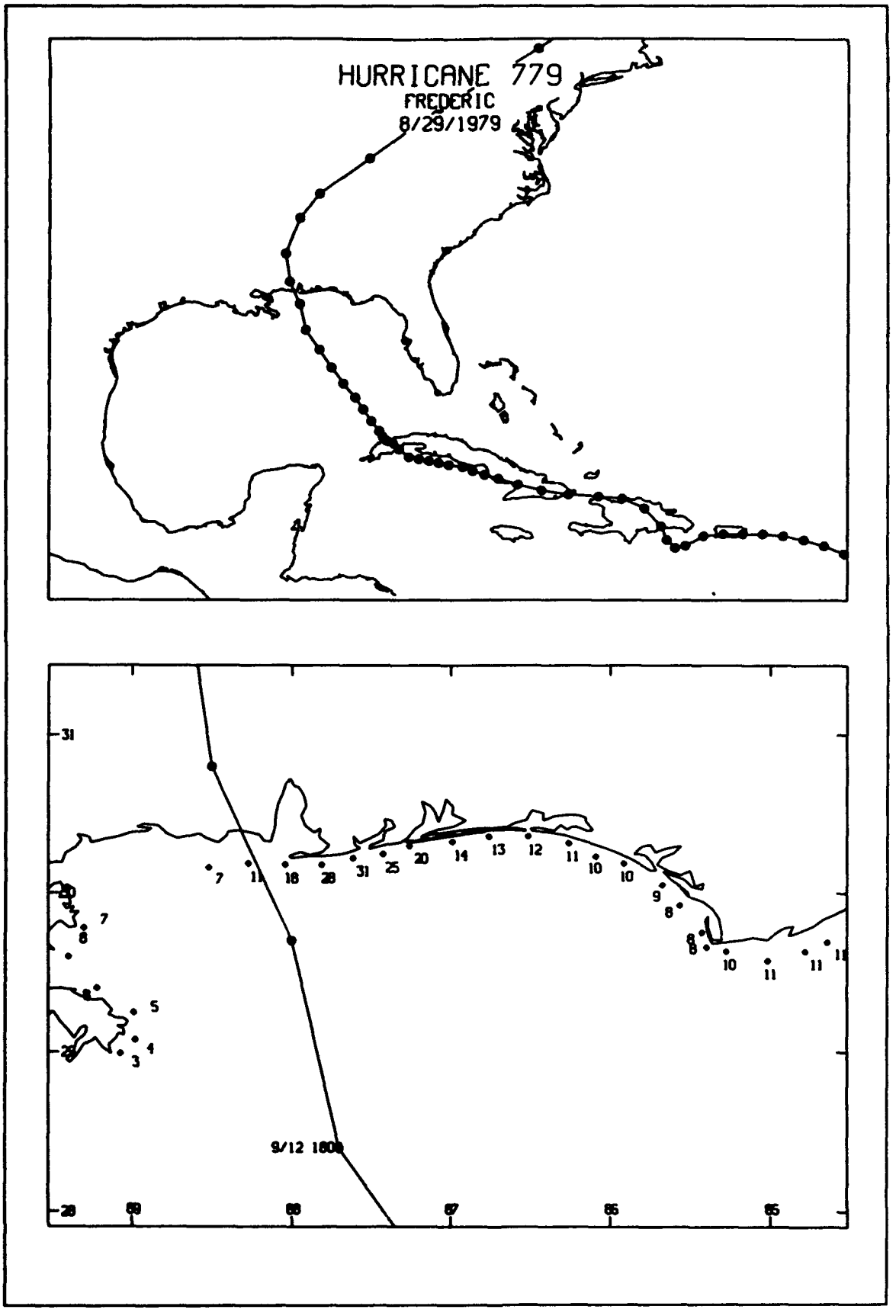
74
9/03 1800


HURRICANE 779
FREDERIC
8/29/1979
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7
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9/12 1800
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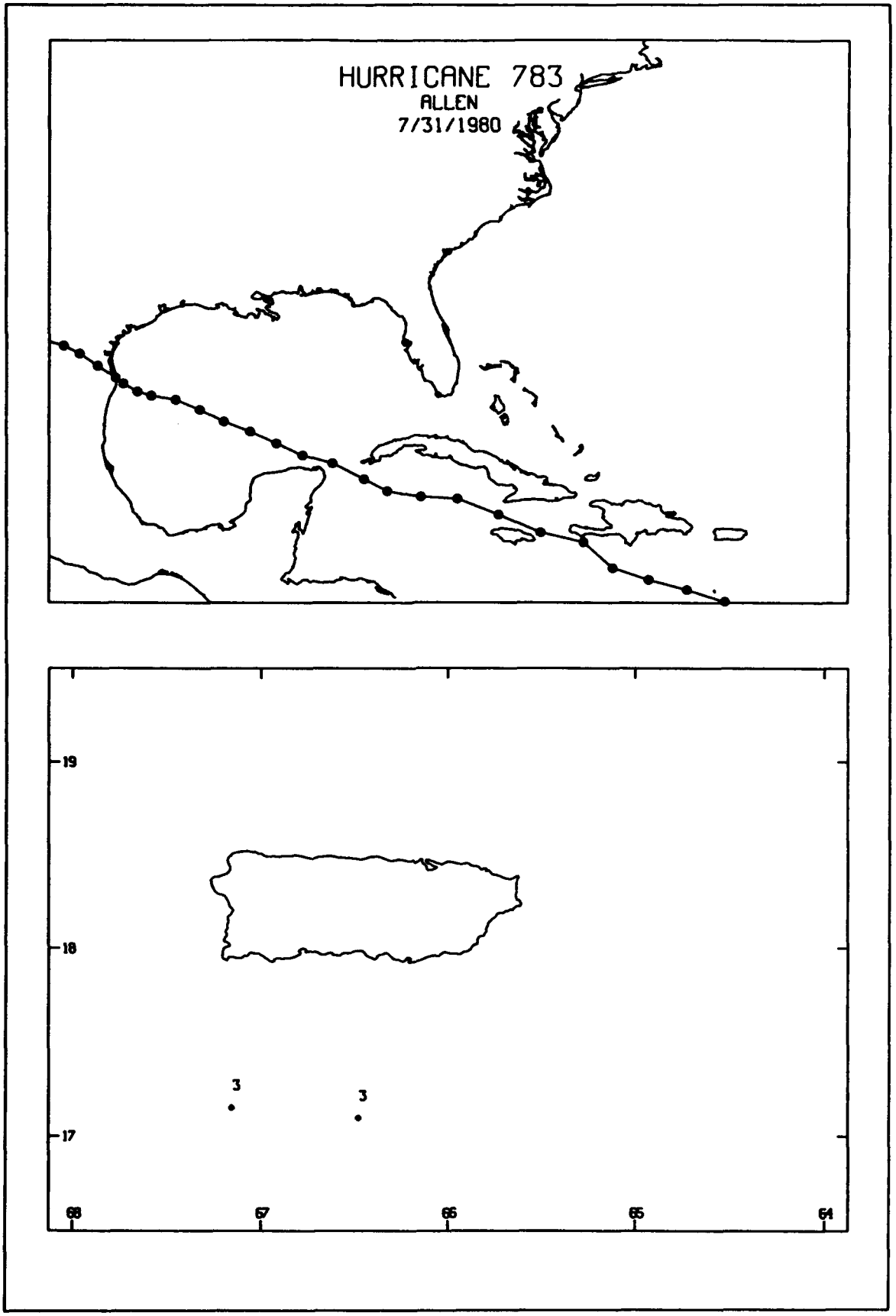
85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ALLEN
7/31/1980
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67
66
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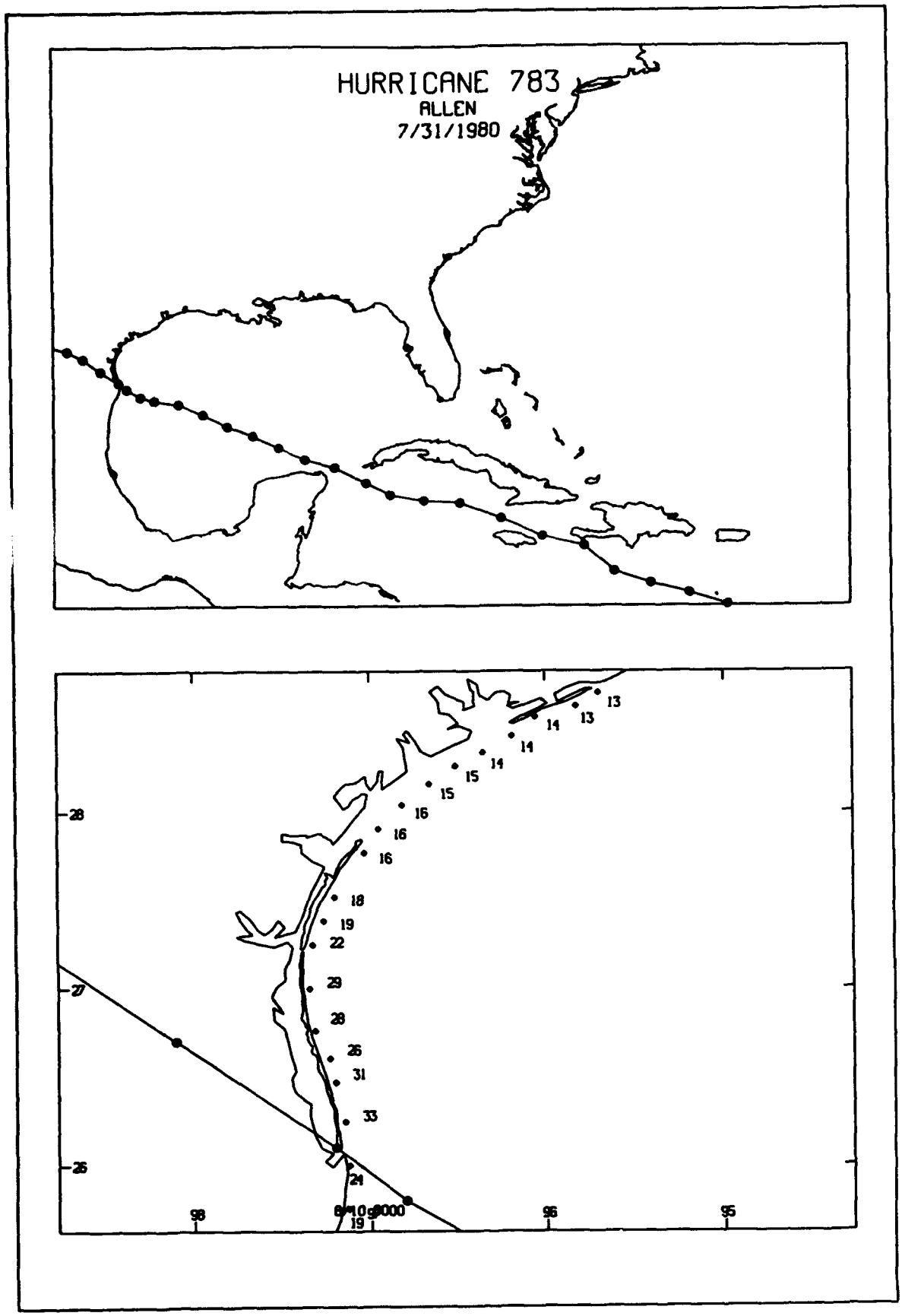
HURRICANE 783
ALLEN
7/31/1980
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13
14
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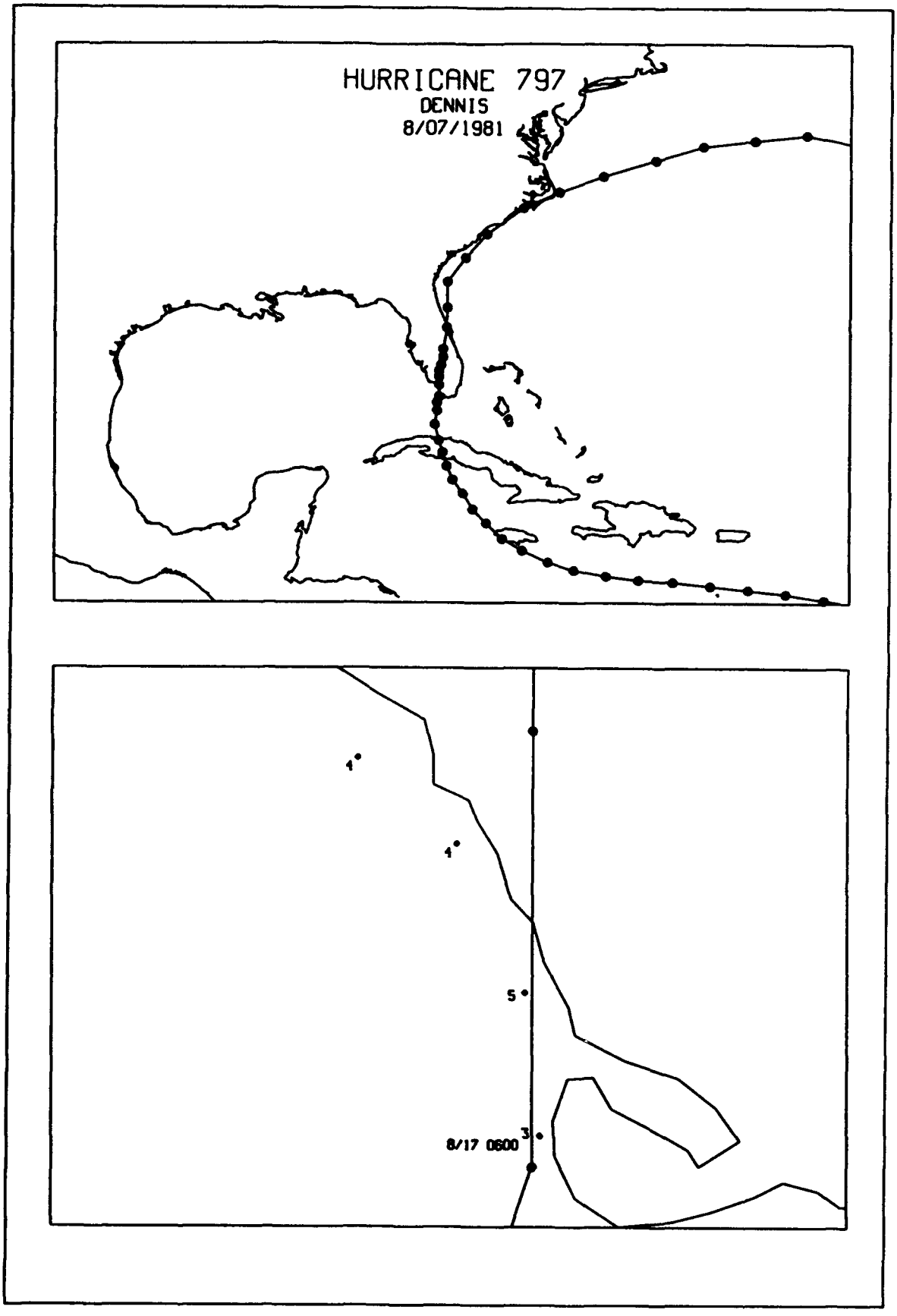
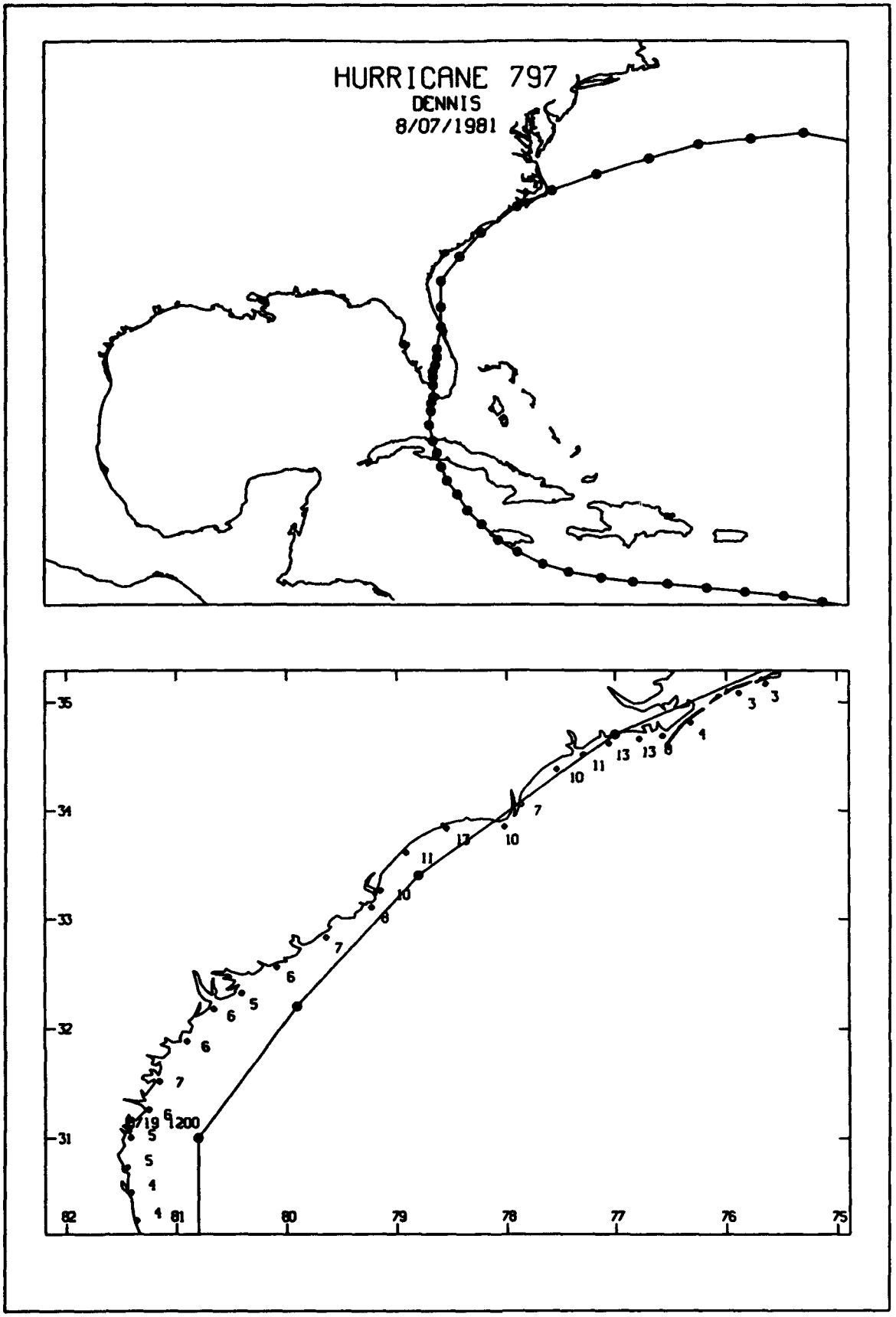

HURRICANE 797
DENNIS
8/07/1981
1
1
5
8/17 0600
3


HURRICANE 797
DENNIS
8/07/1981
35
34
33
32
31
82
81
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79
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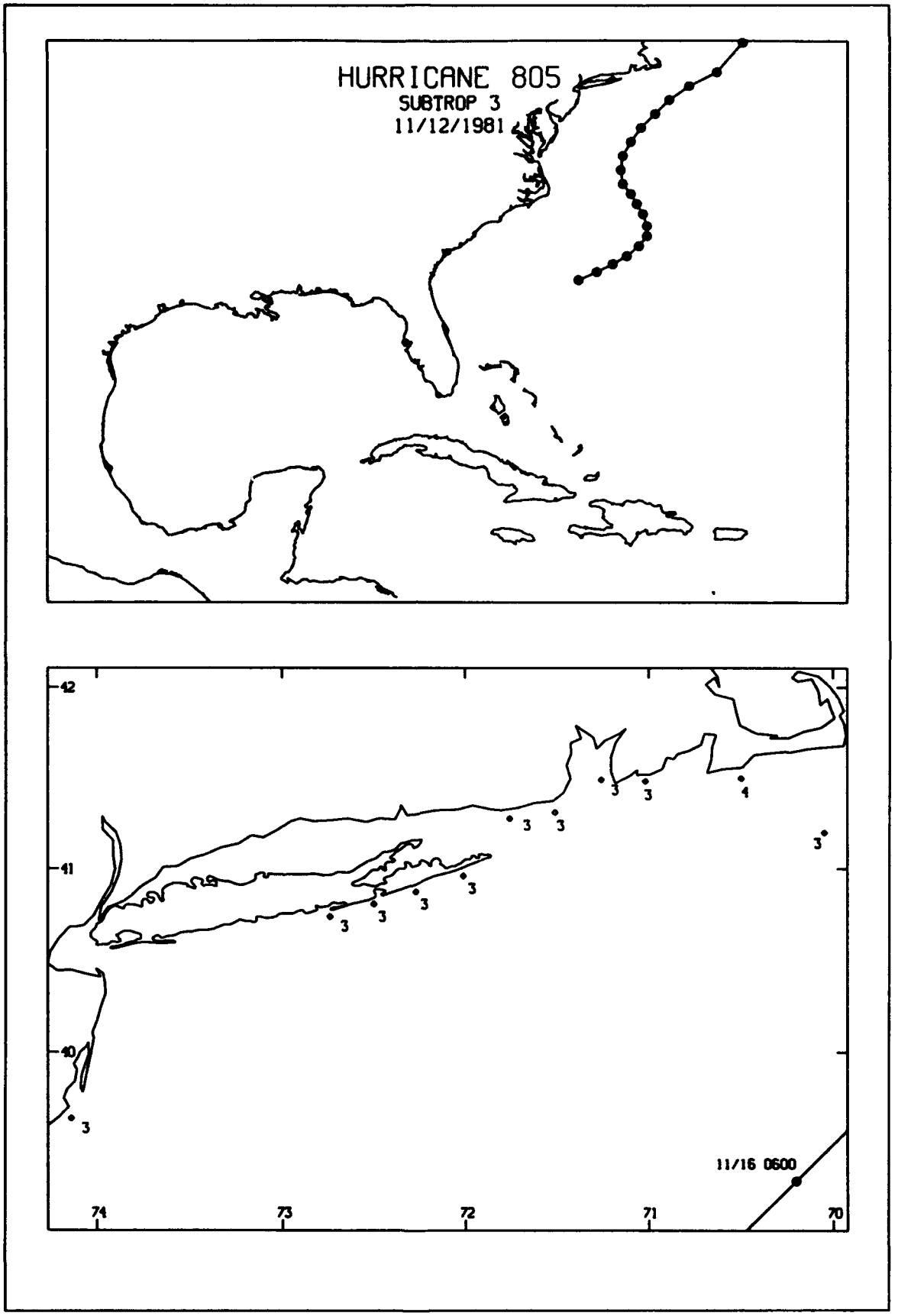
77
76
75
1200


HURRICANE 805
SUBTROP 3
11/12/1981
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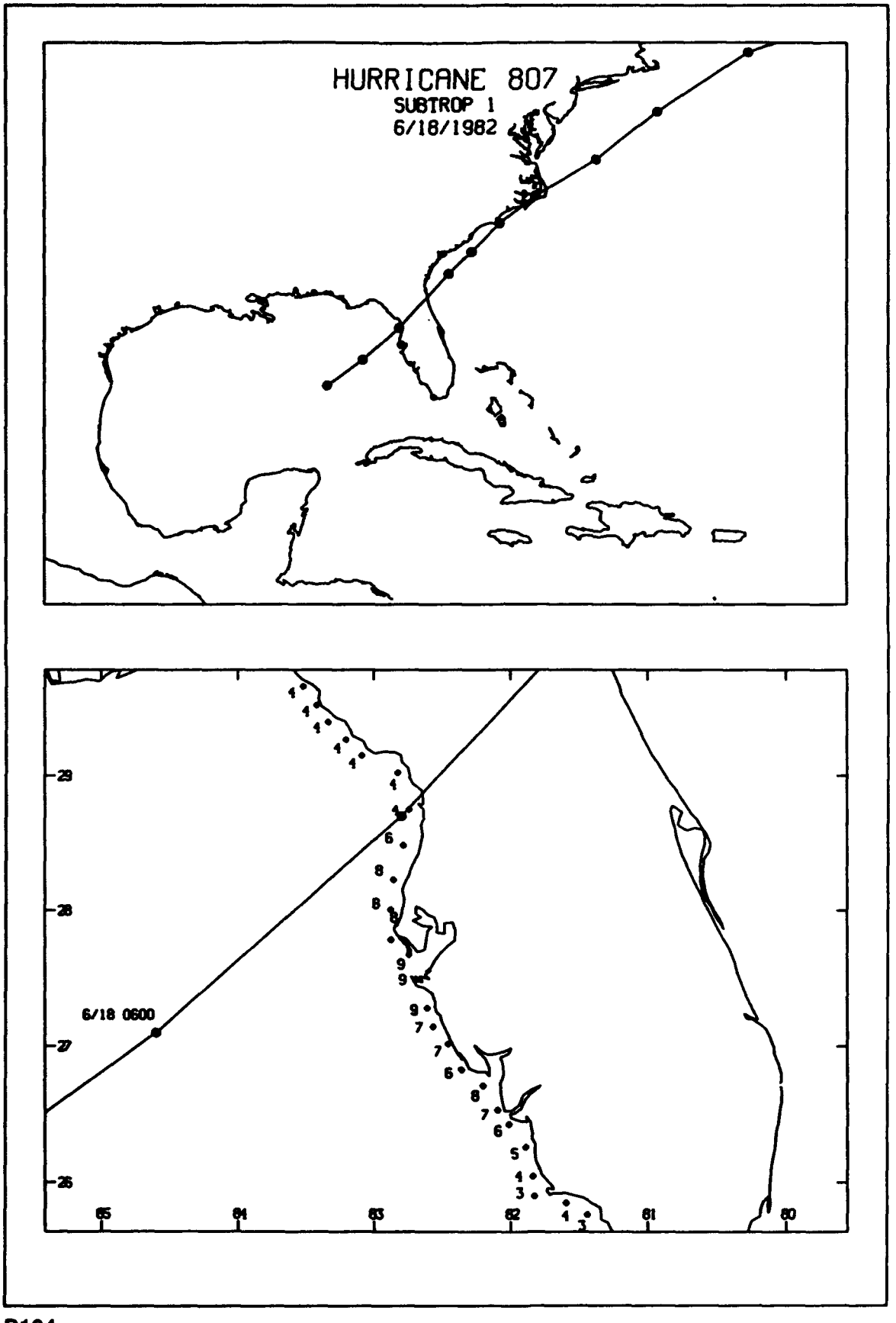
41
40
74
73
72
71
70
11/16 0600


HURRICANE 807
SUBTROP 1
6/18/1982
6/18 0600
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28
27
26
85
84
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82
81
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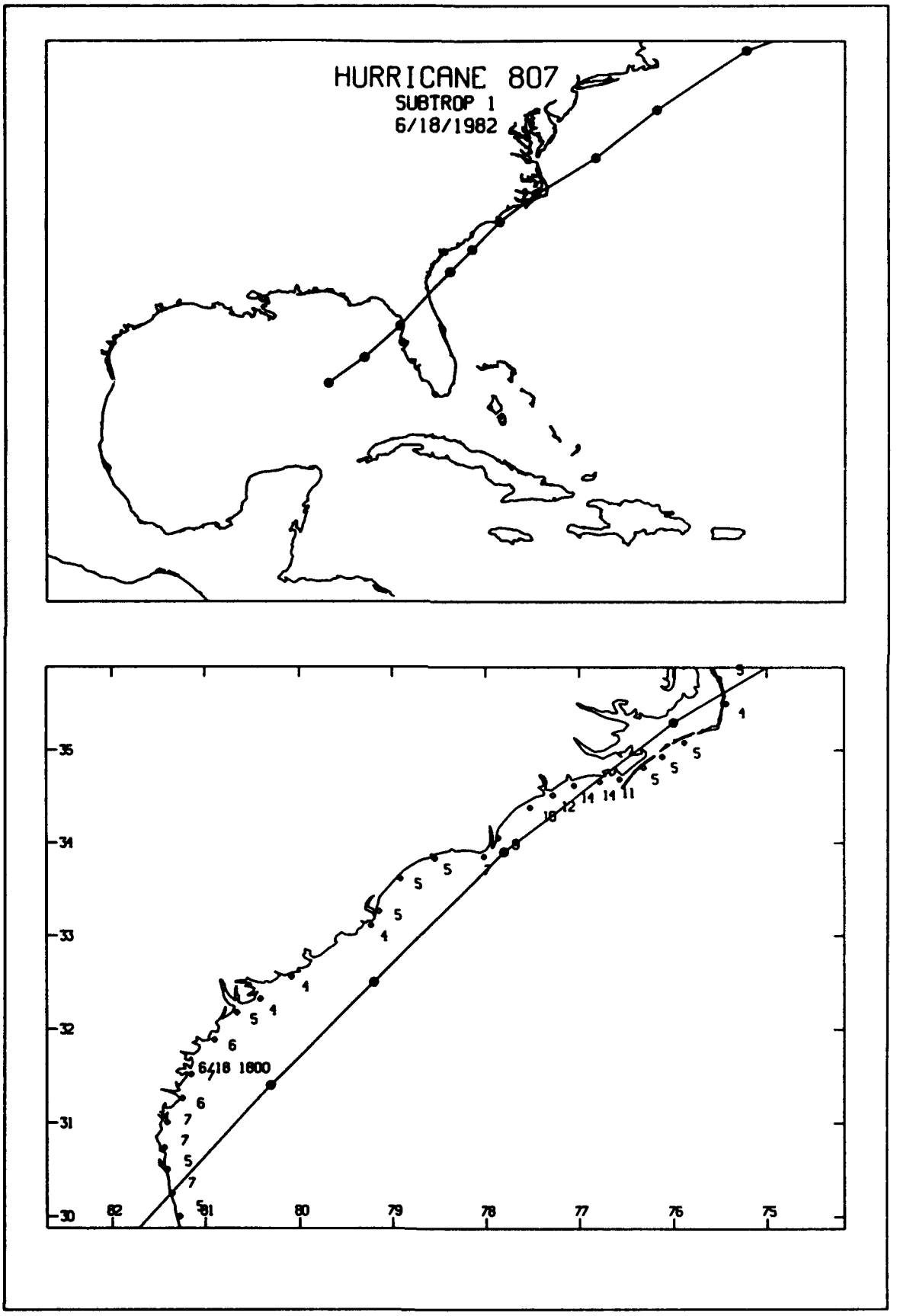
HURRICANE 807
SUBTROP 1
6/18/1982
6/18 1800
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82
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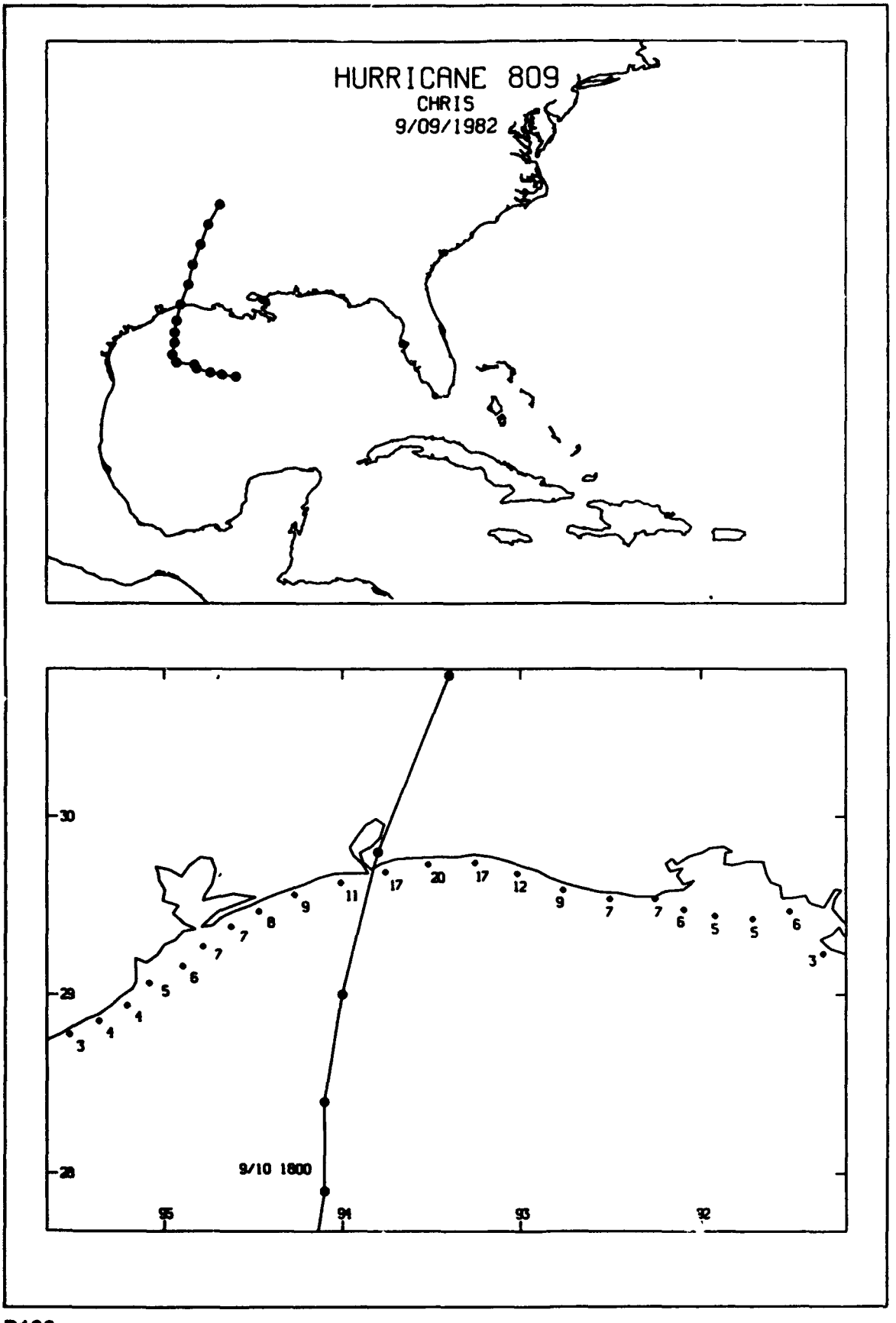
76
75


HURRICANE 809
CHRIS
9/09/1982
30
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94
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92
9/10 1800
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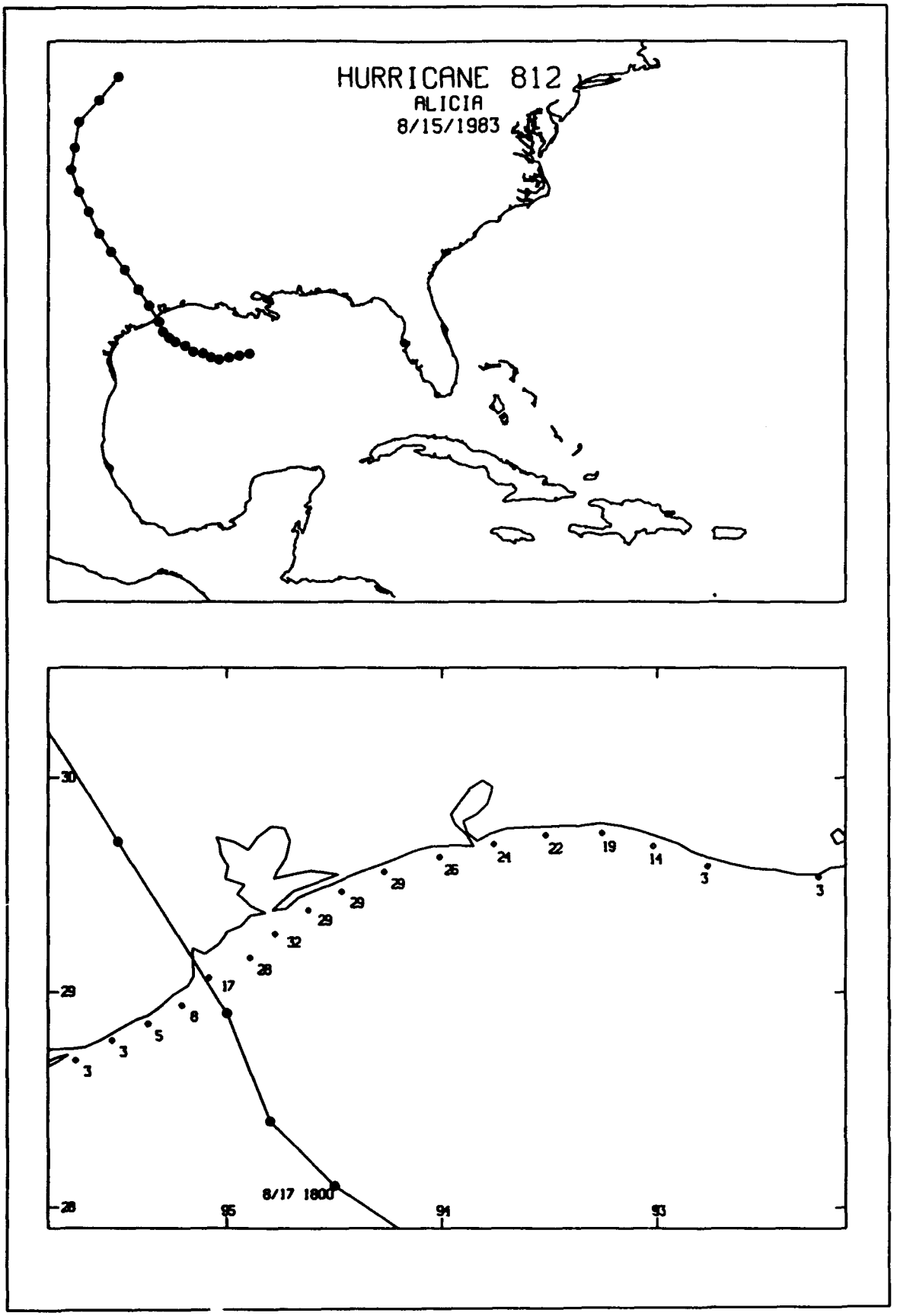
HURRICANE 812
ALICIA
8/15/1983
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29
28
95
91
87
8/17 1800
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32
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14
3
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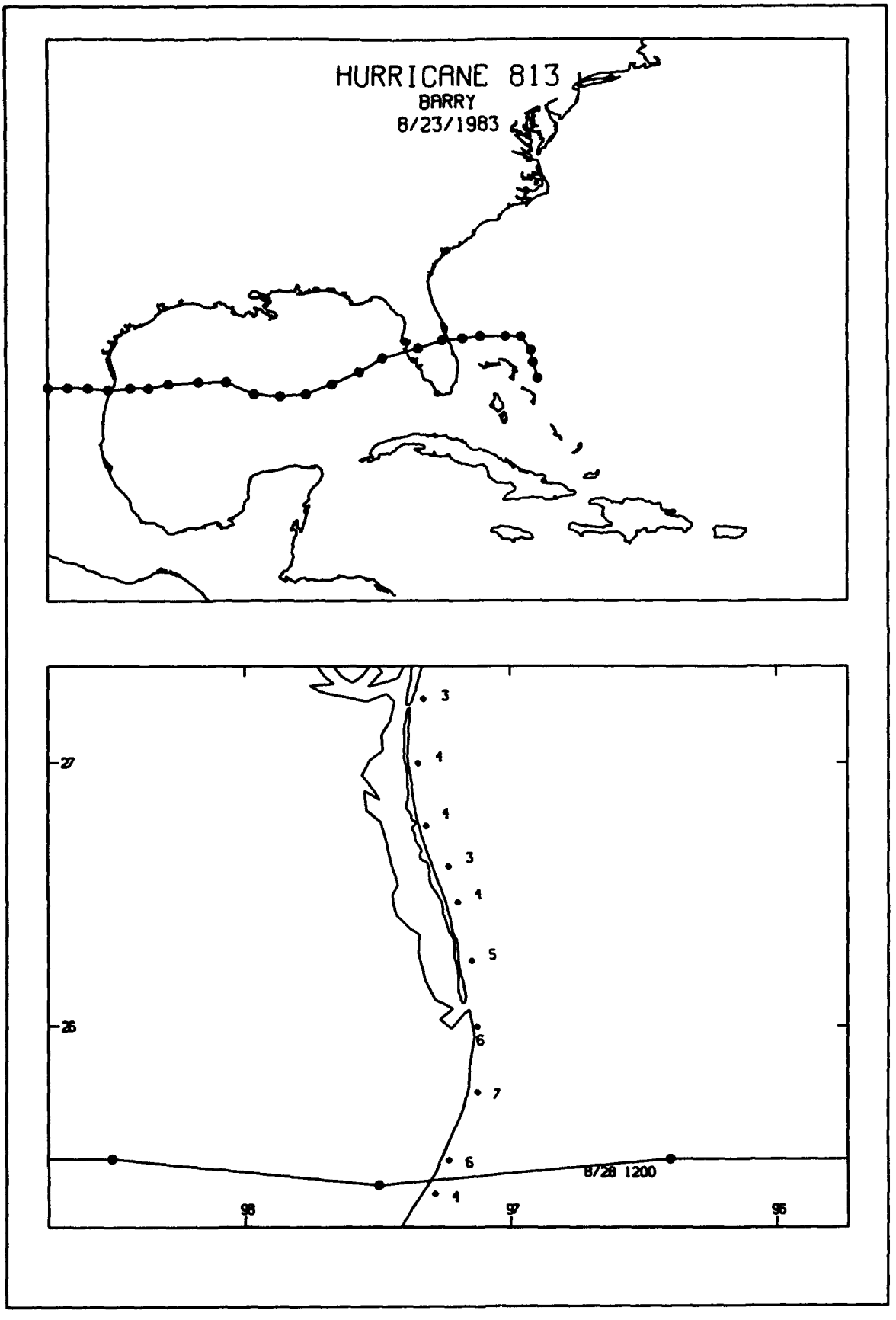
HURRICANE 813
BARRY
8/23/1983
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26
3
4
4
3
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5
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7
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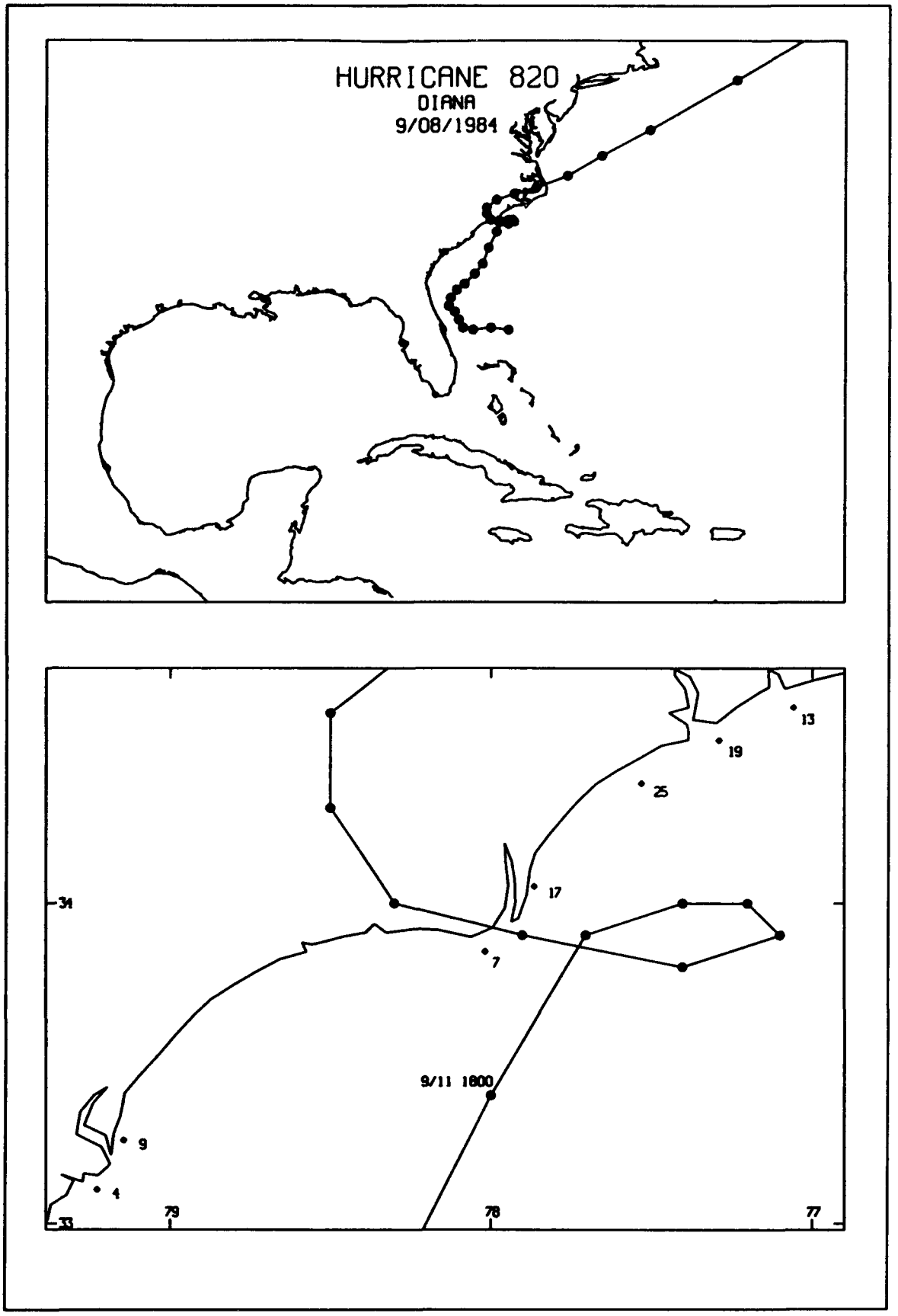
4
8/28 1200
98
97
96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DIANA
9/08/1984
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19
25
17
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7
9/11 1800
9
4
33
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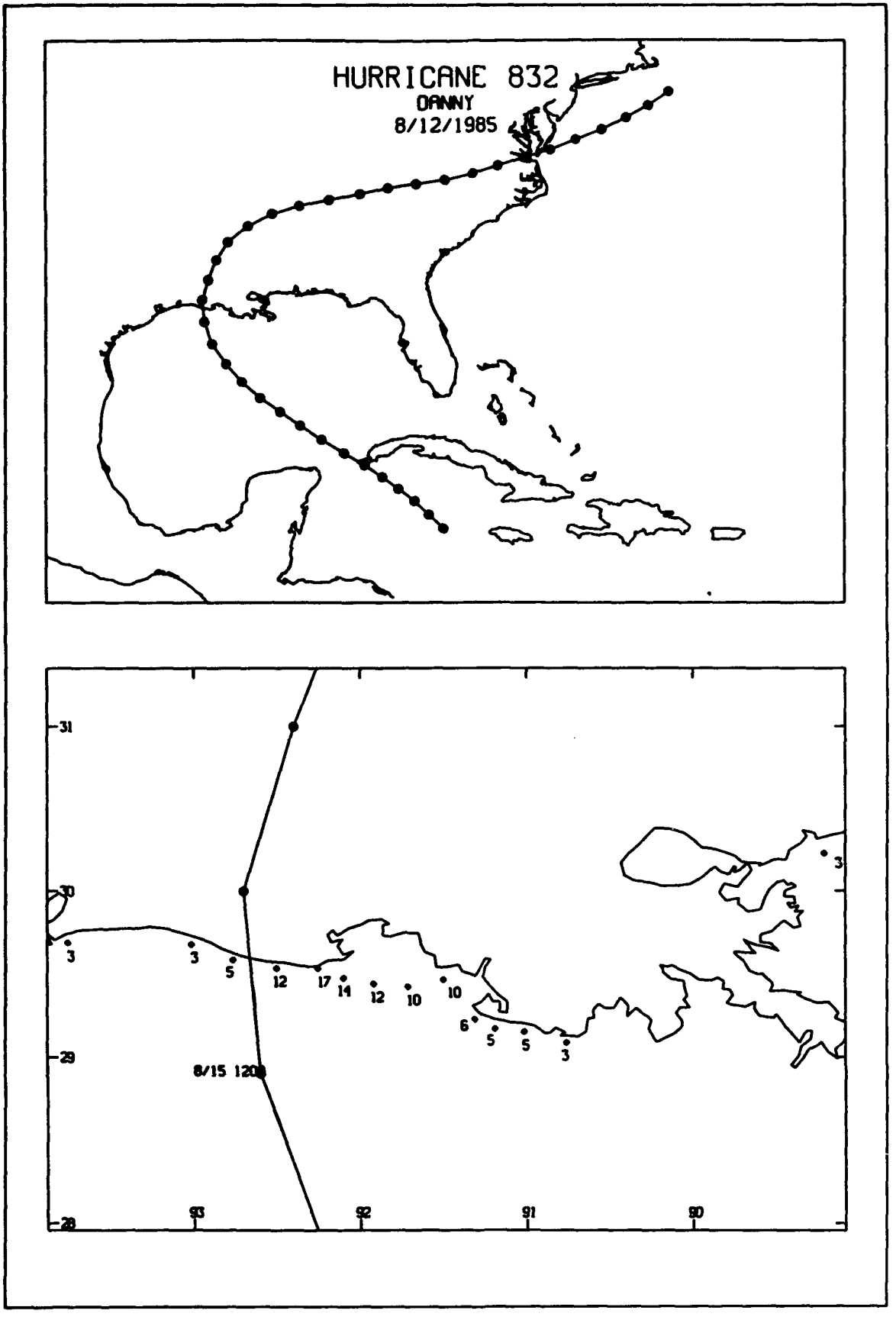
HURRICANE 832
DANNY
8/12/1985
31
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29
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93
92
91
90
3
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5
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12
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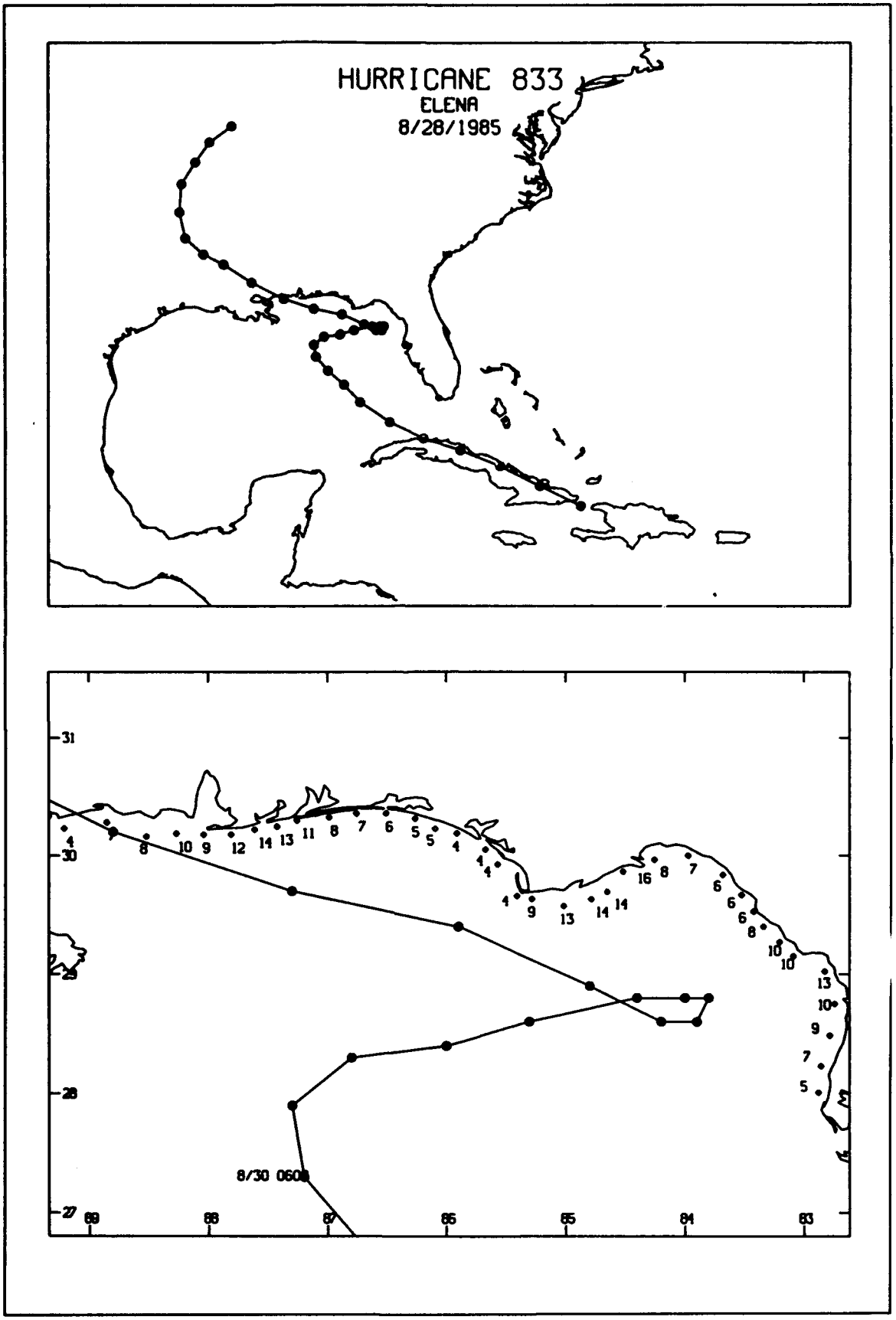
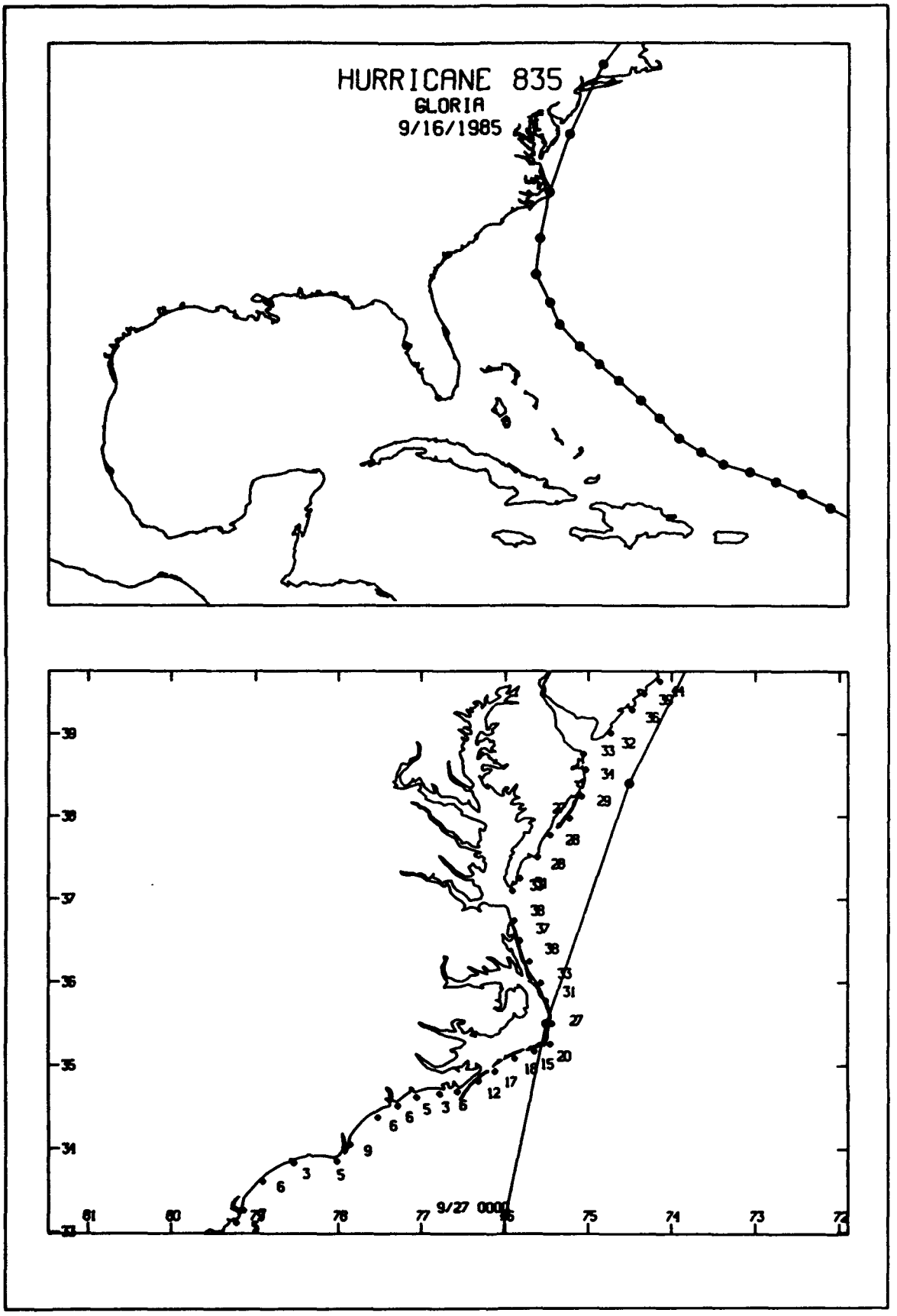
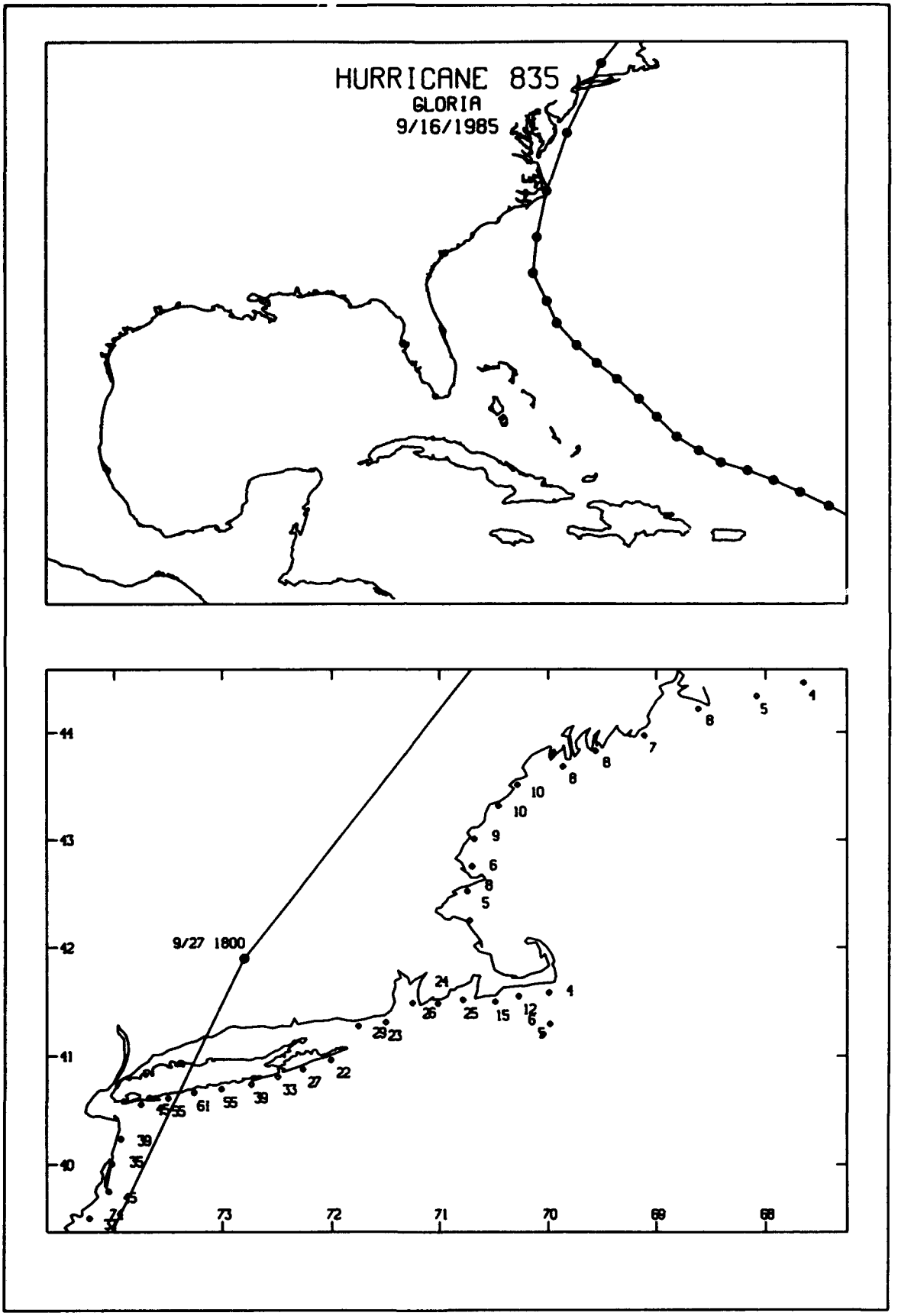
3
8/15 12


HURRICANE 833
ELENA
8/28/1985
31
30
29
28
27
8/30 0600
89
88
87
86
85
84
83


HURRICANE 835
GLORIA
9/16/1985
9/27 0000


HURRICANE 835
GLORIA
9/16/1985
9/27 1800
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43
42
41
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73
72
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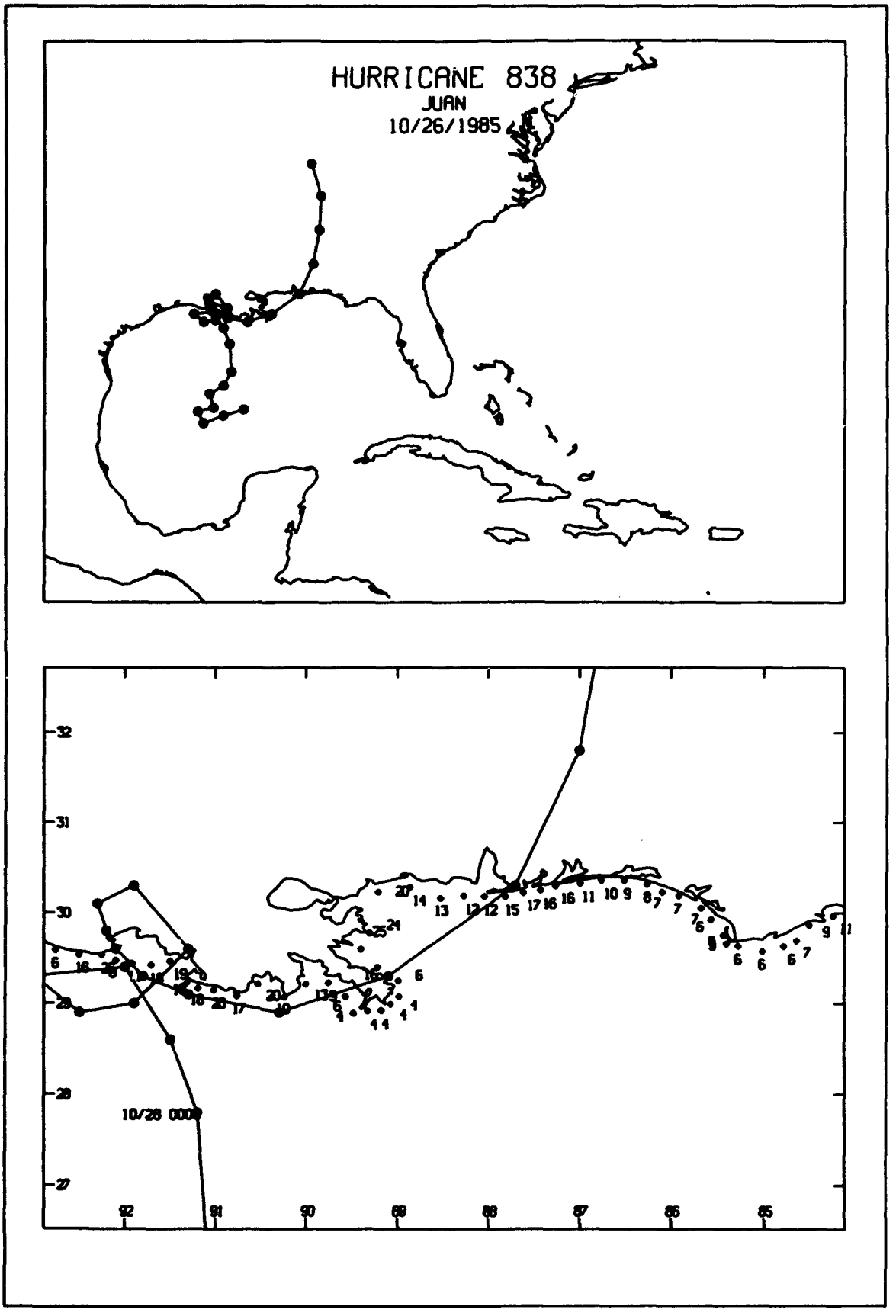
70
69
68


HURRICANE 838
JUAN
10/26/1985
32
31
30
29
28
27
92
91
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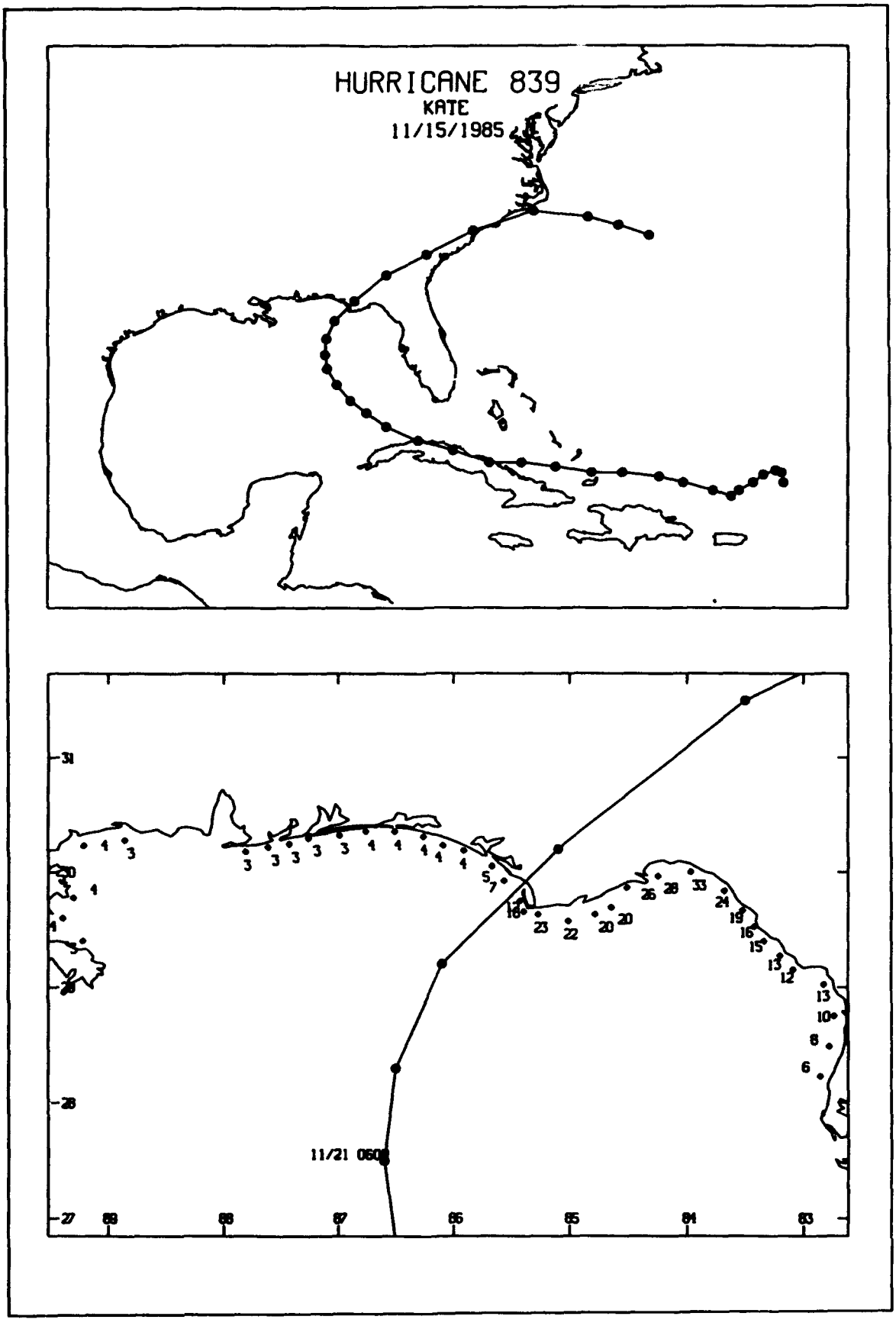
87
86
85
10/28 0000


HURRICANE 839
KATE
11/15/1985
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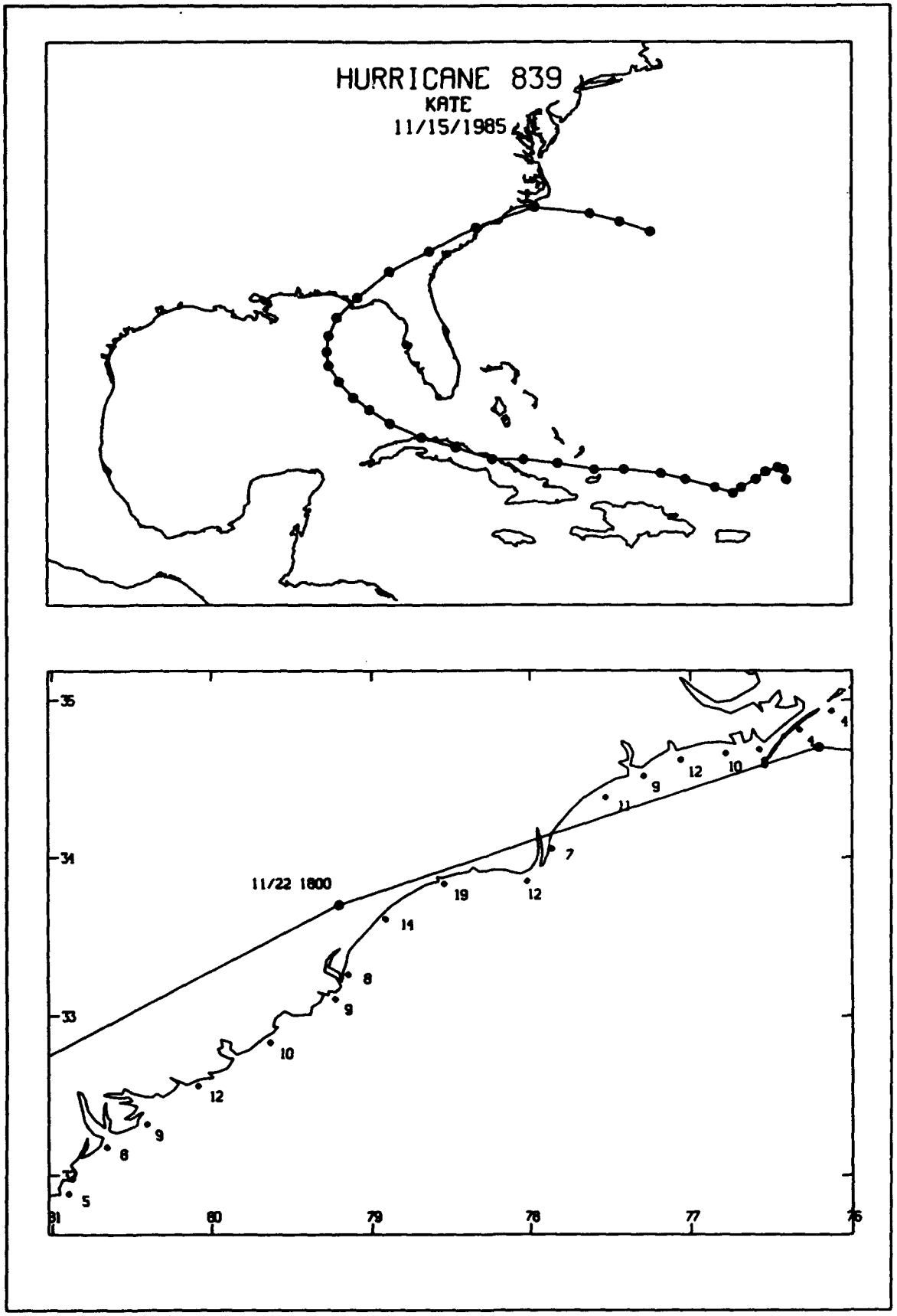
28
27
11/21 0600
89
88
87
86
85
84
83


HURRICANE 839
KATE
11/15/1985
11/22 1800
35
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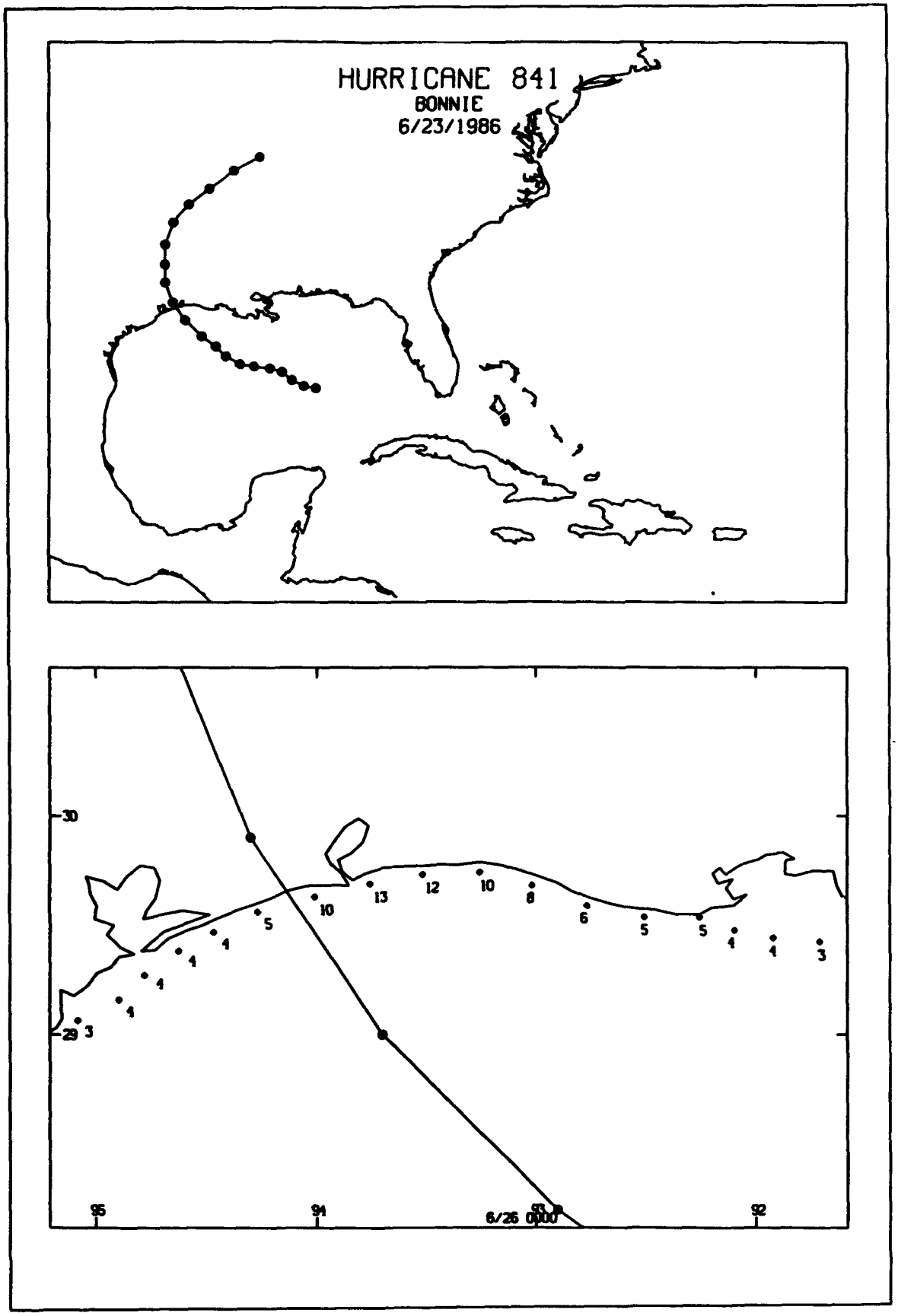
76


HURRICANE 841
BONNIE
6/23/1986
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6/26 0000
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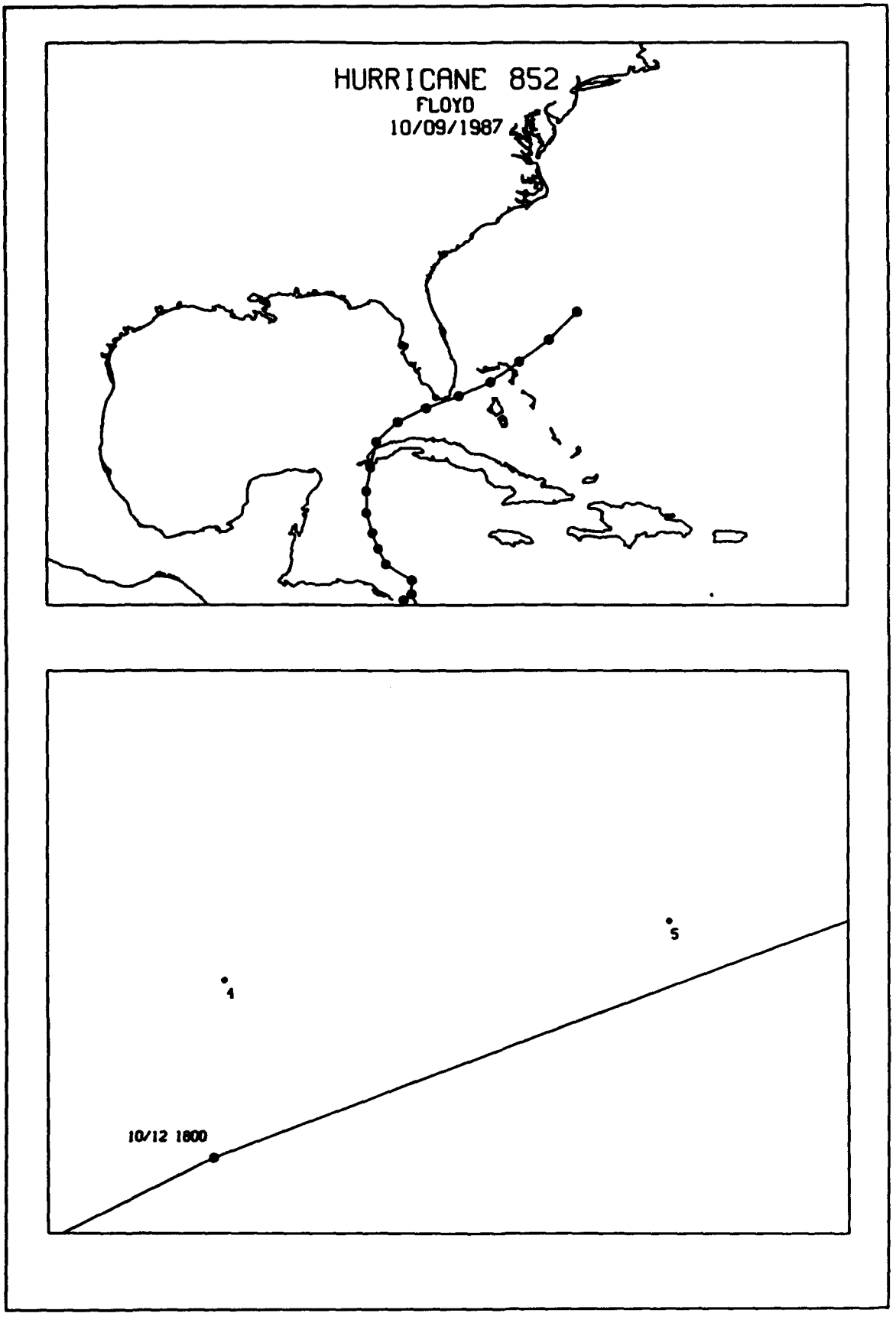
HURRICANE 852
FLOYD
10/09/1987
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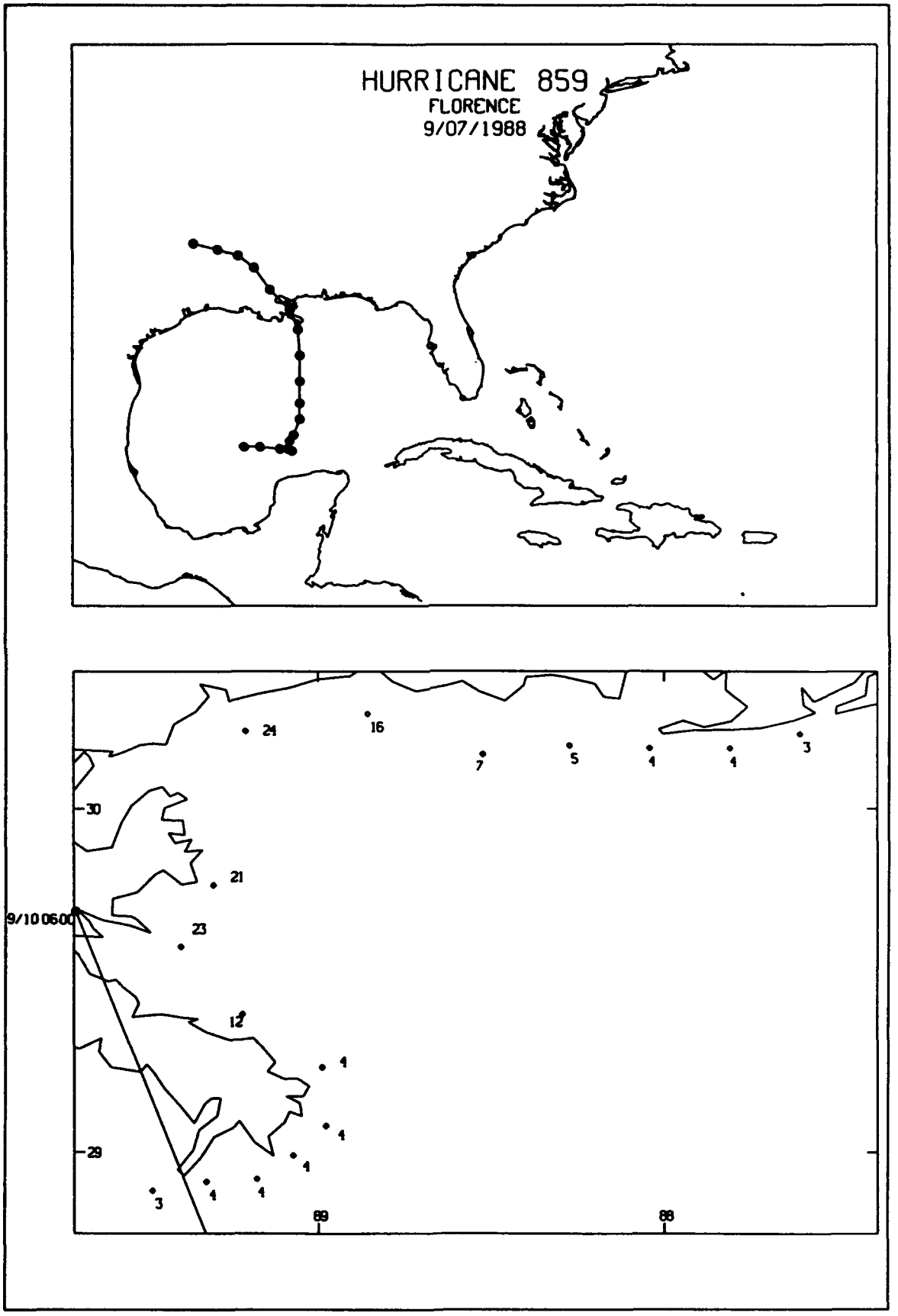
5
10/12 1800


HURRICANE 859
FLORENCE
9/07/1988
24
16
7
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9/10 0600
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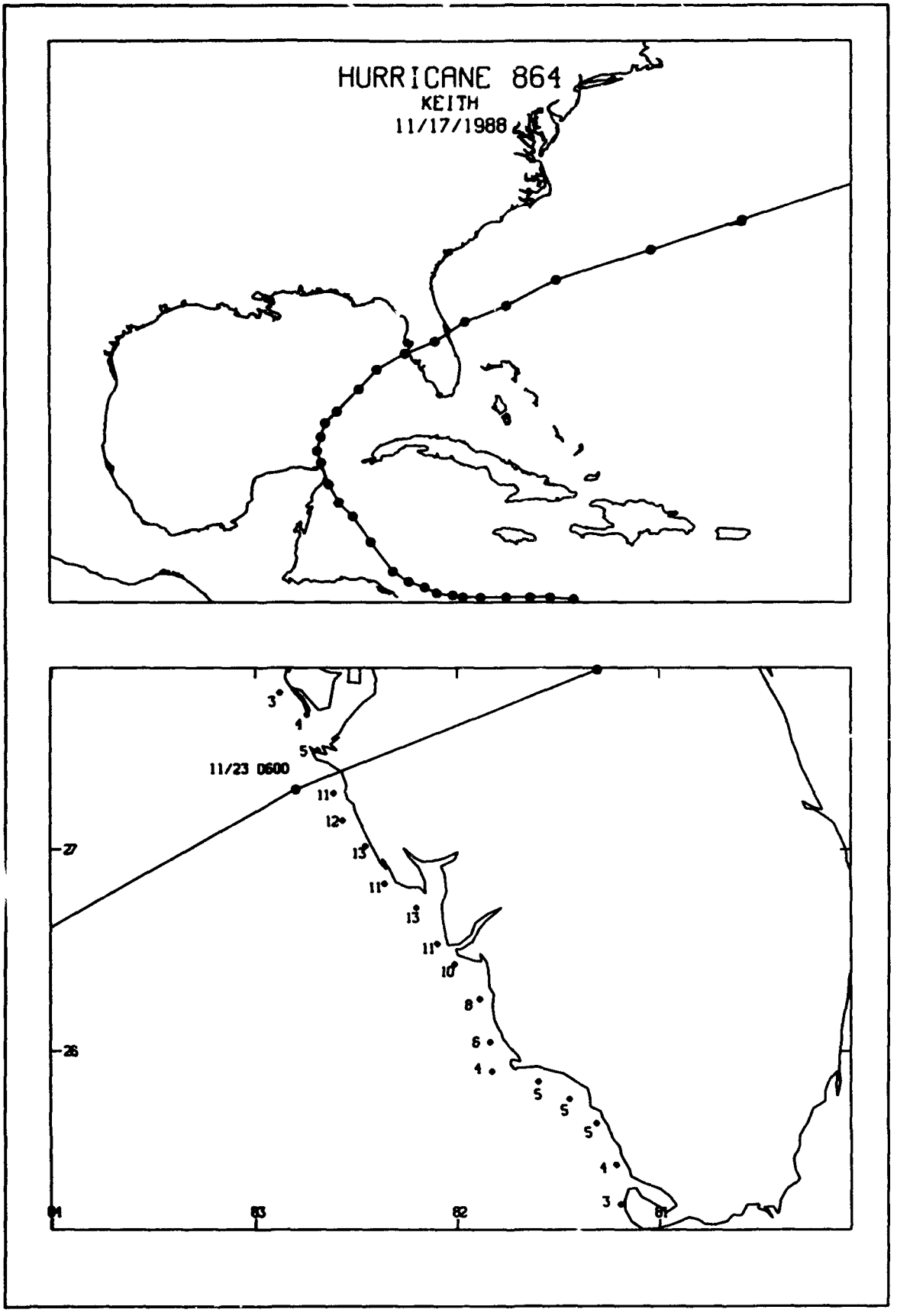
88


HURRICANE 864
KEITH
11/17/1988
11/23 0600
3°
4
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11°
12°
13°
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4°
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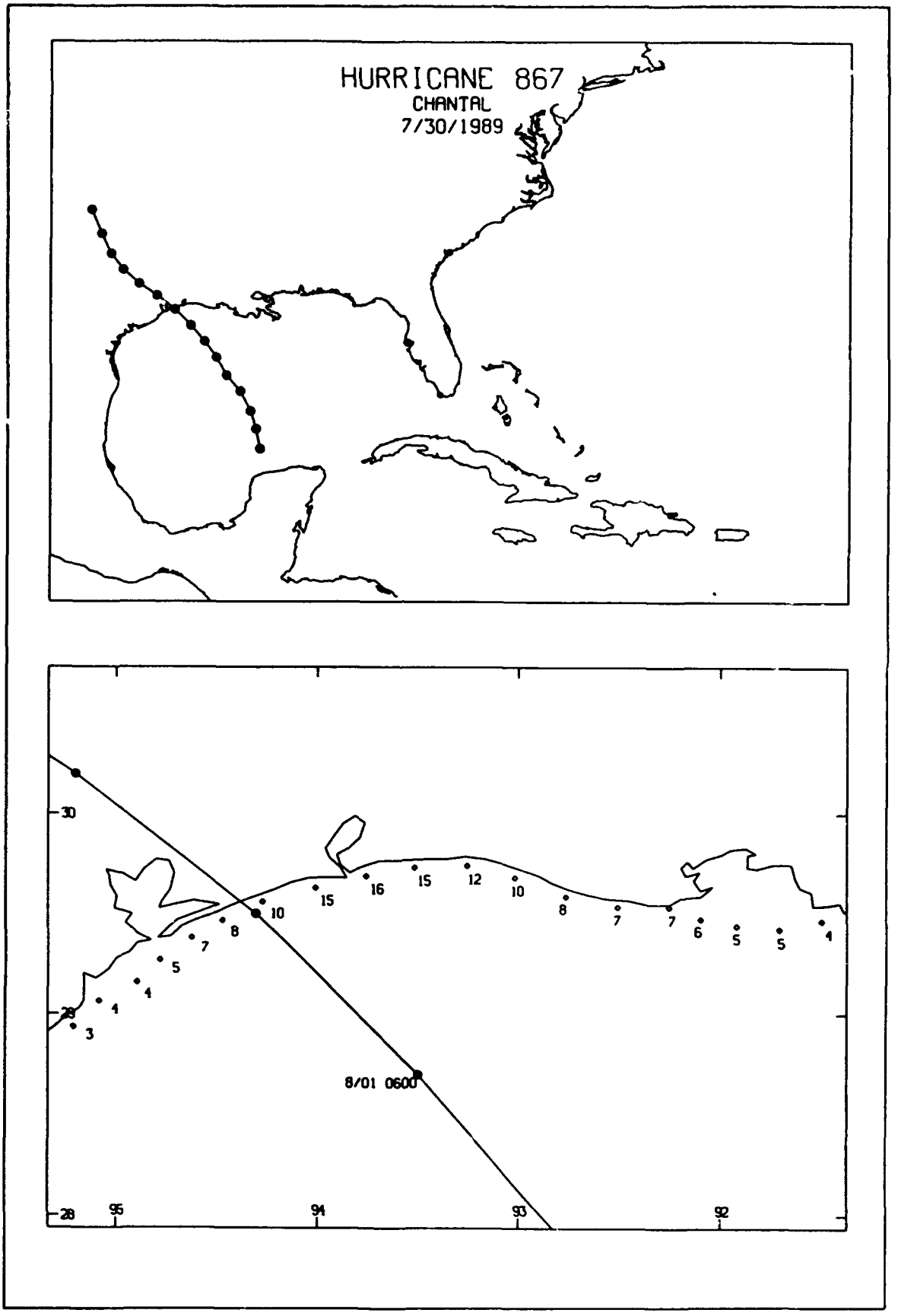
HURRICANE 867
CHANTAL
7/30/1989
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94
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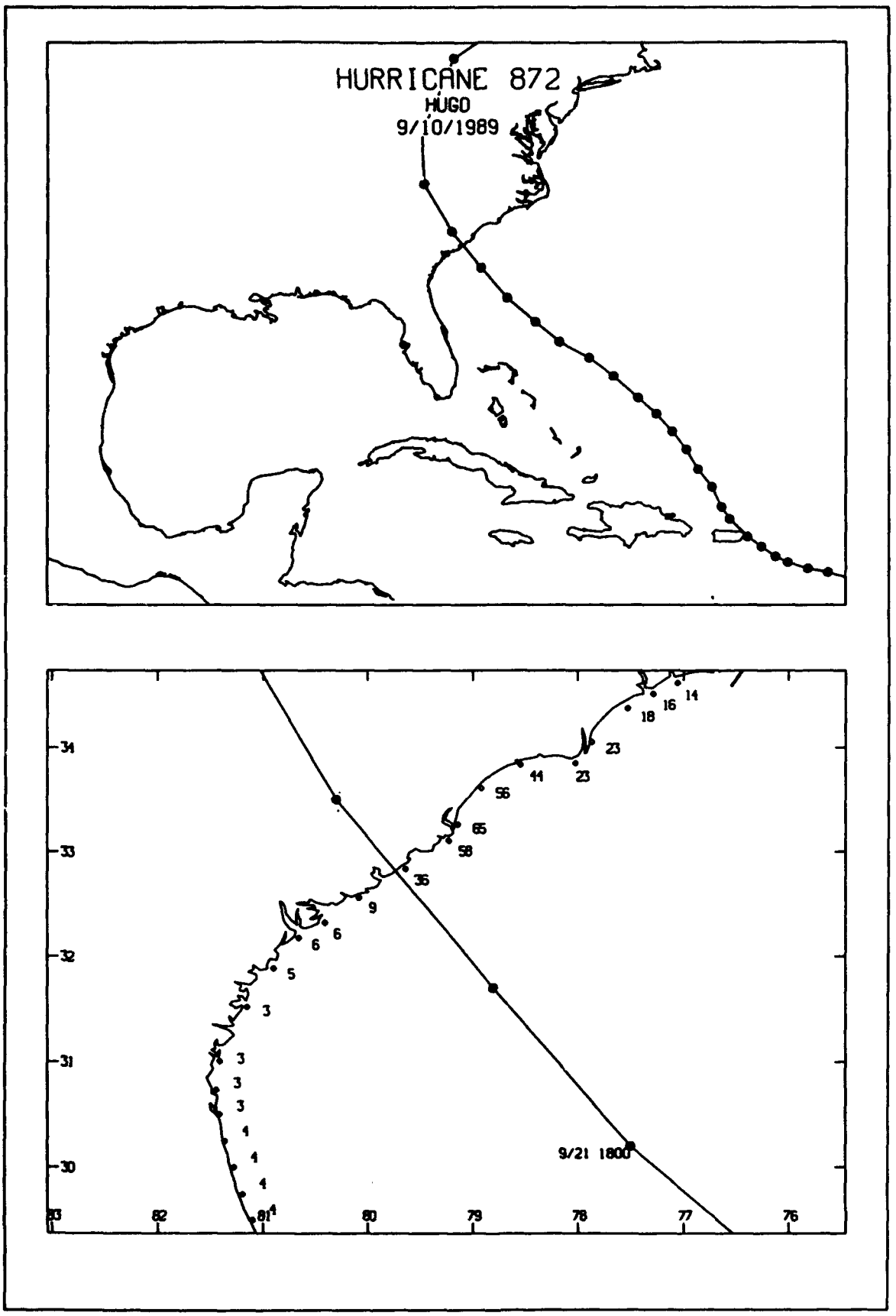
8/01 0600


HURRICANE 872
HUGO
9/10/1989
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32
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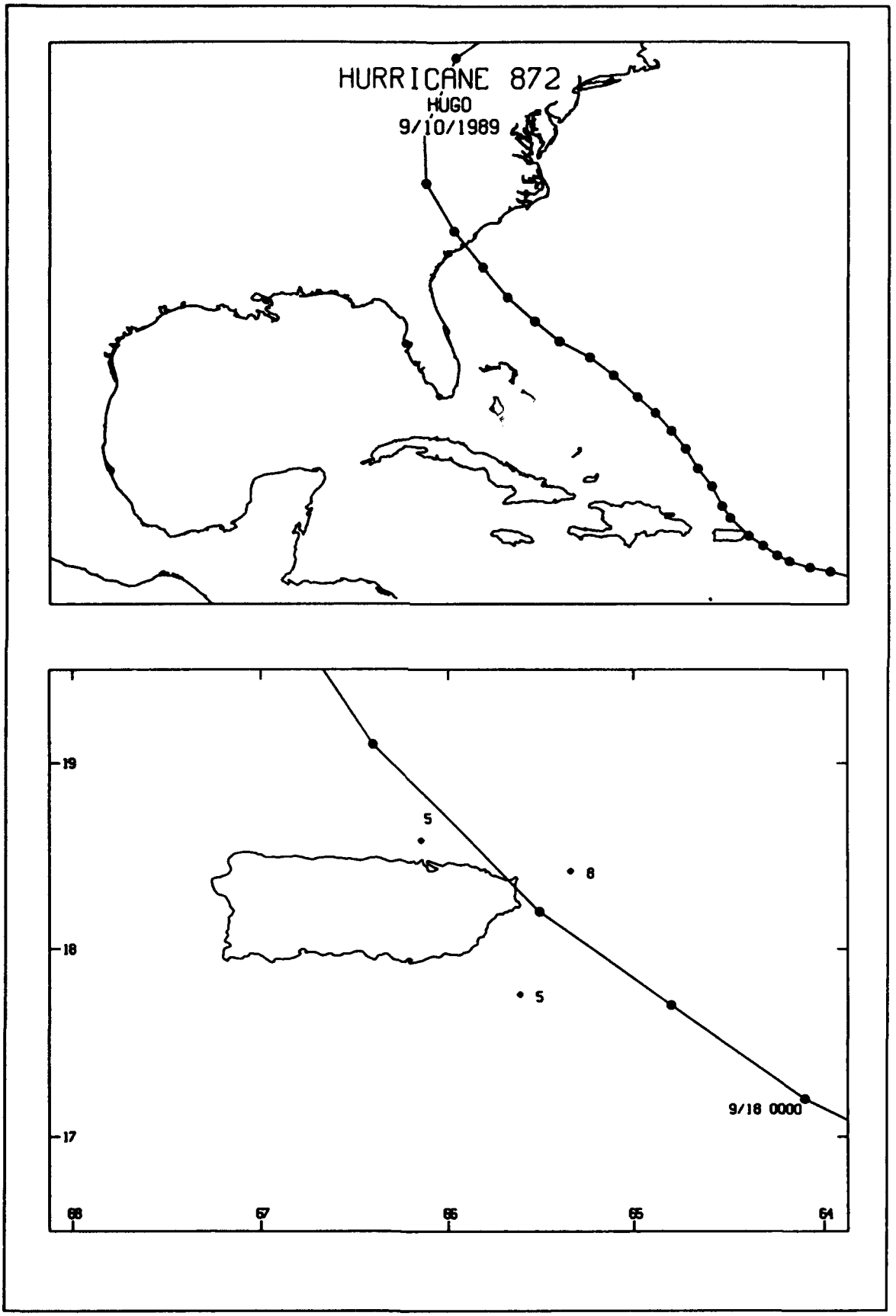
4
9/21 1800


HURRICANE 872
HUGO
9/10/1989
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9/18 0000
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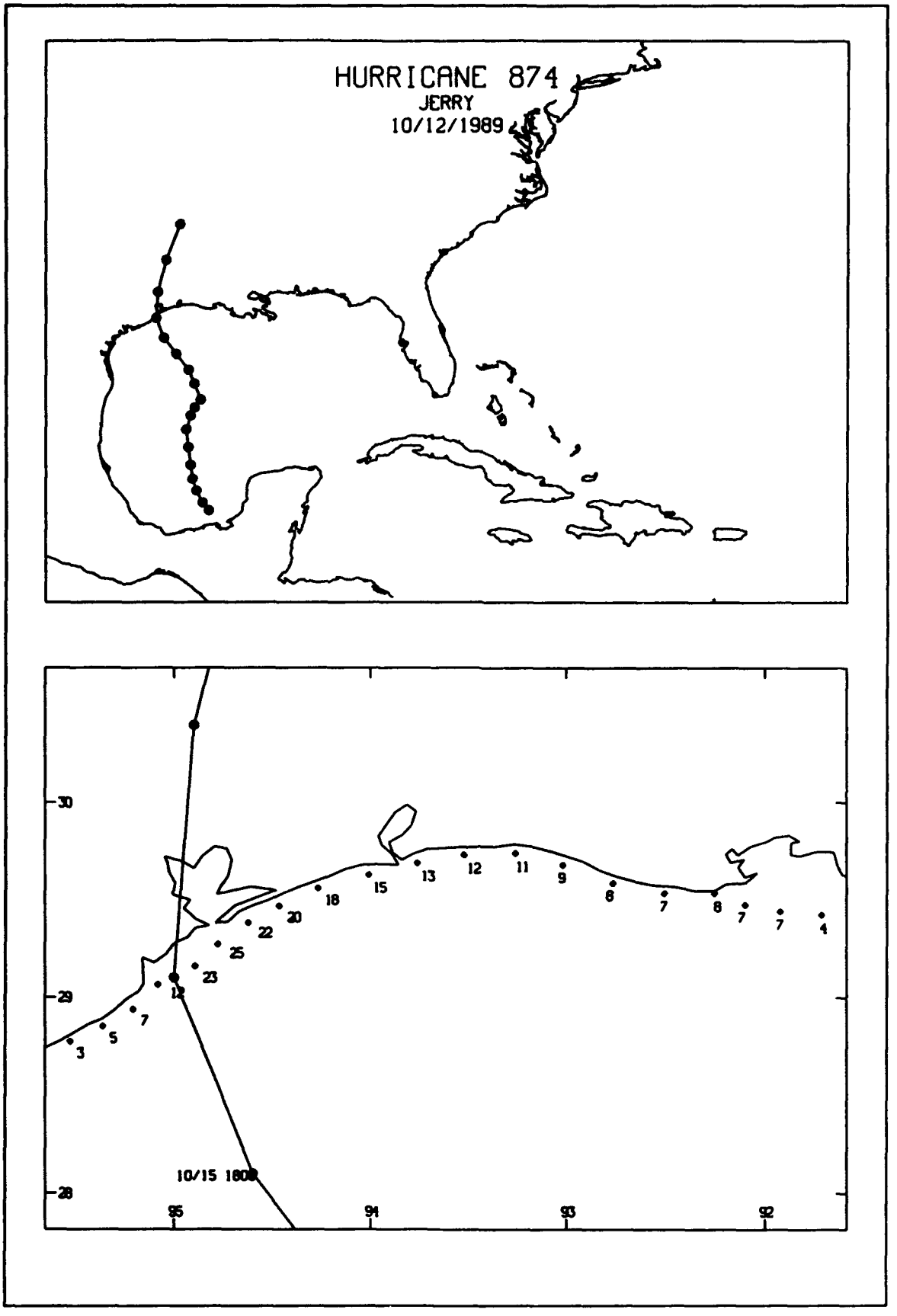
64


HURRICANE 874
JERRY
10/12/1989
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92
10/15 1800
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Appendix C
Storm Event and Maximum Surge Elevation Cross-Reference

TOTAL EVENTS: 134

HURDAT STORM 5, # STATIONS-MAX SURGE 41
120- 3 121- 5 122- 6 123-12 124- 9 125- 6 126- 9 127- 7 128- 5 129- 7 130- 6 131- 5 132- 6 133- 5 134- 6
135- 5 136- 4 137- 5 138- 4 139- 4 140- 3 539- 4 540- 4 541- 5 542- 5 543- 5 544- 6 545- 6 546- 6 547- 6
548- 7 549- 7 550- 8 551- 8 552-11 553-11 554-12 555-13 556-11 557- 5 558- 3

HURDAT STORM 72, # STATIONS-MAX SURGE 29
254- 3 255- 6 256- 6 257- 6 258- 7 259- 7 260- 8 261- 9 262- 9 263-13 264- 8 265- 6 266- 4 267- 3 416- 5
417- 7 418-11 419-16 420-20 421-15 422- 9 423- 8 424- 7 425- 7 426- 6 427- 6 428- 6 429- 4 430- 3

HURDAT STORM 76, # STATIONS-MAX SURGE 90
134- 9 135-13 136-16 137-14 138-11 139- 6 160- 5 161- 4 162- 3 164- 4 165- 6 166-11 167-20 168-32 169-41
170-30 171-22 172-17 173-14 174-11 175- 8 176- 7 177-12 178- 9 179- 8 180- 9 181- 9 182- 6 183- 7 184- 8
185- 6 186- 7 187- 5 188- 7 189- 7 272- 6 275- 4 276- 3 278- 4 282- 3 397- 3 400- 5 401- 5 404- 6 405-10
406-10 407- 8 408- 6 410- 5 411-10 412- 5 486-14 487-12 489- 9 490- 9 491- 8 492- 7 493- 7 494- 8 495- 9
496-10 497- 9 498-10 499-11 500-11 501-11 502-15 503-16 504-18 505-19 506-21 507-24 508-29 509-51 510-58
511-45 512-22 513-43 514- 8 515- 6 516- 5 517- 5 518- 7 519- 7 520-13 521-19 522-25 523-16 524-10 525- 6

HURDAT STORM 94, # STATIONS-MAX SURGE 40
193- 3 194- 4 195- 4 196- 3 197- 3 198- 4 199- 7 200- 5 201- 7 202- 6 203- 5 204- 5 205- 4 206- 4 207- 3
208- 4 209- 3 416- 4 417- 3 418- 4 419- 3 469- 3 470- 4 471- 4 472- 5 473- 5 474- 5 475- 5 476- 6 477- 9
478-11 479- 7 480- 8 481- 4 482- 3 483- 3 484- 4 485- 5 486- 4 487- 3

HURDAT STORM 103, # STATIONS-MAX SURGE 11
263- 4 264- 5 265- 6 266- 5 267- 4 415- 3 416- 6 417-10 418-11 419- 6 420- 4

HURDAT STORM 112, # STATIONS-MAX SURGE 109
230- 5 231- 4 232- 3 237- 3 238- 4 239- 4 240- 4 241- 4 242- 4 243- 4 244- 5 245- 5 246- 5 247- 6 248- 6
249- 8 250- 8 251- 7 252- 6 253- 5 254- 4 255- 7 256- 6 257- 5 258- 5 259- 4 260- 4 261- 4 262- 3 263- 4
264- 4 265- 3 267- 3 268- 3 282- 4 283- 5 285- 4 288- 6 289-10 290-10 291- 8 292- 6 293- 5 294- 4 295- 3
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397- 5 398- 7 399- 7 400- 7 401- 3 413- 4 414- 3 415- 4 416- 3 417- 3 418- 3 419- 4 420- 4 421- 4 422- 5
423- 5 424- 5 425- 6 426- 6 427- 7 428- 7 429- 7 430- 6 431- 7 432- 7 433- 9 434-10 435- 9 436- 7 437- 6
438- 5 439- 5 440- 4 441- 4 442- 4 443- 4 444- 4 445- 4 446- 4 447- 3 678- 7 679- 6 680- 7 681- 7 682- 6
683- 5 684- 3 685- 4 686- 5

HURDAT STORM 117, # STATIONS-MAX SURGE 59
128- 4 129- 4 130- 6 131- 7 132-10 133-11 134-19 135-18 136-16 137-24 138-21 139-18 140-14 141-11 142- 9
143- 9 144- 9 145- 9 146- 7 147- 6 148- 6 149- 5 150- 5 151- 5 152- 4 153- 5 154- 4 155- 3 229- 3 449- 3
450- 4 451- 3 513- 4 524- 4 525- 5 526- 5 527- 5 528- 4 529- 5 530- 6 531- 7 532- 8 533- 9 534- 9 535- 9
536-11 537-15 538-19 539-23 540-25 541-26 542-25 543-23 544-19 545-15 546-11 547- 8 548- 6 549- 4

HURDAT STORM 127, # STATIONS-MAX SURGE 110
154- 3 155- 3 156- 5 157- 6 158- 7 159- 5 160- 4 166- 6 167-11 168-18 169-26 170-18 171-12 172- 9 173- 7
174- 6 175- 5 176- 4 177- 7 178- 5 179- 5 180- 5 181- 5 209- 5 210- 5 211- 8 212- 7 213- 6 214- 9 215- 7
216-10 217- 7 218- 5 219- 7 220- 5 221- 6 222- 6 223- 8 224- 6 225- 5 226- 3 240- 3 241- 3 242- 4 243- 4
244- 4 245- 3 249- 3 250- 3 255- 5 256- 4 427- 8 428- 5 429- 5 430- 3 431- 3 432- 4 433- 5 434- 6 435- 6
436- 5 437- 5 438- 4 439- 4 440- 4 441- 4 442- 4 443- 3 453- 6 457- 8 458- 8 459- 8 460- 9 461- 8 462- 9
463-12 464-14 465-14 466-14 467-11 468- 9 469- 8 470- 5 497- 6 498- 6 499- 6 500- 6 501- 6 502- 8 503- 8
504- 9 505-10 506-11 507-13 508-17 509-40 510-46 511-29 512-13 513-28 514- 4 515- 3 516- 3 517- 3 518- 5
519- 5 520- 8 521- 7 522- 9 523- 4

HURDAT STORM 141, # STATIONS-MAX SURGE 30
189- 5 190- 5 191- 4 192- 7 193- 6 194- 6 208- 5 209- 4 210- 3 211- 5 212- 3 214- 3 425- 3 464- 4 465- 5
466- 6 467- 5 468- 5 469- 5 470- 6 471- 6 472- 8 473- 4 485- 8 486- 8 487- 9 488- 7 489- 7 490- 7 491- 5

HURDAT STORM 183, # STATIONS-MAX SURGE 52
126- 4 127- 4 128- 4 129- 5 130- 5 131- 5 132- 8 133- 8 134-15 135-11 136- 9 137-12 138-10 139- 8 140- 7
141- 6 142- 6 143- 6 144- 5 145- 5 146- 4 147- 4 148- 4 149- 3 526- 3 527- 3 529- 4 530- 4 531- 5 532- 5

533- 6 534- 5 535- 6 536- 7 537- 8 538- 9 539-10 540-11 541-13 542-14 543-15 544-16 545-14 546-10 547- 7
548- 6 549- 5 550- 4 551- 4 552- 4 553- 3 554- 3

HURDAT STORM 187, 0 STATIONS-MAX SURGE 16
156- 4 157- 5 158- 3 168- 4 169- 5 170- 3 509- 5 510- 8 511- 6 512- 4 513- 6 520- 4 521- 7 522- 9 523- 4
524- 3

HURDAT STORM 189, 0 STATIONS-MAX SURGE 26
229- 5 233- 7 234- 7 235- 6 236- 7 237- 7 238- 6 239- 6 240- 5 241- 4 242- 3 441- 3 442- 4 443- 6 444- 8
445- 7 446- 9 447- 8 448- 8 449- 8 450- [illegible] 451- 6 452- 9 454-10 455-10 456-11

HURDAT STORM 194, 0 STATIONS-MAX SURGE 171
199- 7 200- 7 201-14 202-13 203-11 204-10 205- 9 206- 7 207- 5 208-11 209- 8 210- 8 211-16 212-15 213-13
214-23 215-20 216-33 217-27 218-24 219-37 220-29 221-37 222-37 223-43 224-25 225-20 226-15 227-16 228-11
229-10 233- 6 234- 5 235- 4 236- 4 237- 4 238- 3 239- 3 240- 3 241- 3 249- 4 250- 4 251- 3 252- 3 253- 4
254- 8 255-15 256-14 257-14 258-22 259-24 260-28 261-37 262-28 263-38 264-33 265-29 266-27 267-31 268-23
269-18 270-30 271-28 272-33 273-22 274-24 275-26 276-20 277-16 278-17 279-13 280-16 281-10 282- 9 283- 5
284- 5 285- 7 286- 7 287- 6 288- 7 289- 7 290- 6 291- 5 391- 4 392- 5 393- 7 394- 7 395- 8 396- 9 397-10
398-10 399- 9 400-11 401-15 402-17 403-18 404-24 405-27 406-32 407-33 408-34 409-31 410-29 411-41 412-43
413-42 414-37 415-40 416-41 417-41 418-45 419-49 420-54 421-47 422-51 423-43 424-34 425-29 426-24 427-21
428-18 429-15 430- 8 431- 6 432- 6 433- 7 434- 8 435- 7 436- 5 437- 4 442- 3 443- 4 444- 4 445- 4 446- 5
447- 5 448- 6 449- 8 450-10 451-11 452- 9 453-25 454-17 455-18 456-12 457-40 458-50 459-52 460-51 461-37
462-40 463-43 464-40 465-36 466-34 467-22 468-18 469-13 470-13 471-14 472-13 473-10 474-14 475-17 476-23
477-28 478-24 479-12 480- 8 481- 6 482- 6

HURDAT STORM 196, 0 STATIONS-MAX SURGE 18
264- 4 265- 6 266-11 267-13 268- 9 269- 5 270- 7 271- 5 272- 4 411- 5 412- 7 413-10 414- 9 415-12 416-16
417-18 418-13 419- 4

HURDAT STORM 211, 0 STATIONS-MAX SURGE 56
127- 4 128- 6 129- 9 130-12 131-13 132-24 133-24 134-42 135-36 136-31 137-42 138-35 139-30 140-25 141-21
142-17 143-15 144-14 145-13 146- 9 147- 8 148- 7 149- 5 150- 5 151- 5 152- 4 153- 4 154- 4 524- 4 525- 4
526- 5 527- 5 528- 5 529- 5 530- 8 531-10 532-11 533-14 534-14 535-17 536-21 537-26 538-32 539-36 540-40
541-45 542-47 543-47 544-44 545-37 546-28 547-18 548-13 549- 9 550- 6 551- 4

HURDAT STORM 214, 0 STATIONS-MAX SURGE 49
155- 3 156-14 157-18 158-16 159-11 160-10 161- 8 162- 6 163- 4 164- 5 165- 7 166-11 167-18 168-29 169-38
170-25 171-17 172-14 173-11 174-10 175- 8 176- 7 177-10 178- 8 179- 7 500- 9 501- 9 502-11 503-11 504-13
505-13 506-15 507-17 508-21 509-51 510-76 511-48 512-27 513-48 514-12 515- 9 516- 9 517- 9 518-11 519-12
520-18 521-26 522-29 523-12

HURDAT STORM 215, 0 STATIONS-MAX SURGE 24
166- 3 167- 3 168- 5 169- 5 170- 9 171- 9 172- 7 173- 6 174- 5 175- 3 177- 4 501- 3 502- 4 503- 5 504- 6
505- 7 506- 8 507-10 508-11 509- 8 510- 4 511- 5 512- 4 513- 5

HURDAT STORM 217, 0 STATIONS-MAX SURGE 19
268- 6 269-10 270-16 271-12 272-11 273- 5 274- 5 275- 4 276- 3 406- 4 407- 5 408- 5 409- 6 410- 7 411-14
412-19 413-26 414-21 415- 6

HURDAT STORM 218, 0 STATIONS-MAX SURGE 43
110- 4 111-10 112-15 113-14 114-20 115-22 116-[illegible] 117-[illegible] 118-14 119-16 120-10 121-12 122- 9 123-12 124- 9
125- 7 126-10 127- 8 128- 7 129- 9 130- 8 131-[illegible] 547-[illegible] 548-10 549-10 550-10 551-10 552-11 553-11 554-12
555-12 556-13 557-14 558-16 559-17 560-20 561-[illegible] [illegible] 563-28 564-20 565-22 566-19 567- 9

HURDAT STORM 227, 0 STATIONS-MAX SURGE 40
174- 4 175- 6 176- 6 177-13 178-10 179- 8 180- 7 181- 7 182- 4 183- 5 184- 6 185- 4 186- 5 187- 3 188- 4
189- 4 190- 4 191- 4 192- 5 193- 5 485- 9 486- 7 487- 6 488- 5 489- 4 490- 4 491- 5 492- 5 493- 5 494- 6
495- 6 496- 7 497- 7 498- 8 499- 9 500-10 501-12 502-14 503- 8 504- 4

HURDAT STORM 231, 0 STATIONS-MAX SURGE 78

162- 3 163- 4 164- 4 165- 4 166- 4 167- 5 168- 6 169- 5 170- 6 171- 5 172- 5 173- 6 174- 7 175- 8 176- 8
177-12 178-12 179-12 180-14 181-15 182- 9 183-10 184-12 185- 8 186- 9 187- 6 188- 8 189- 9 190- 9 191- 9
192-13 193-13 194-13 195-14 196-10 197-12 198- 9 199-10 200- 8 201- 9 478-11 479-10 480-11 481-12 482-13
483-15 484-16 485-22 486-19 487-16 488-12 489-11 490-10 491-11 492-10 493-10 494-12 495-14 496-15 497-15
498-17 499-17 500- 1 501-13 502-12 503-11 504- 9 505- 7 506- 5 507- 5 508- 5 509- 4 510- 5 511- 7 512- 8
513- 8 514- 4 515- 3

HURDAT STORM 232, 0 STATIONS-MAX SURGE 58
130- 3 131- 4 132- 5 133- 6 134- 9 135- 9 136- 9 137-11 138-11 139-12 140-13 141-15 142-17 143-20 144-24
145-29 146-17 147-17 148-16 149-15 150-14 151-14 152-15 153-17 154-16 155-12 156- 8 157- 5 158- 3 513-10
520- 3 521- 6 522- 9 523- 9 524-18 525-19 526-21 527-18 528-15 529-19 530-20 531-24 532-28 533-31 534-26
535-22 536-21 537-20 538-17 539-14 540-12 541-11 542-11 543-10 544- 9 545- 8 546- 6 547- 4

HURDAT STORM 241, 0 STATIONS-MAX SURGE 17
153- 4 154- 8 155- 8 156- 6 157- 4 169- 4 509- 5 510- 7 511- 4 513- 4 521- 4 522- 7 523- 7 524-15 525-10
526- 5 527- 3

HURDAT STORM 249, 0 STATIONS-MAX SURGE 71
202- 3 203-10 204-16 205-20 206-23 207-24 208-39 209-34 210-27 211-36 212-27 213-20 214-26 215-19 216-24
217-18 218-13 219-17 220-10 221-14 222-14 223-16 225- 7 226- 5 227- 5 252- 4 253- 6 254-13 255-19 256-15
257-11 258-12 259-10 260- 8 261- 8 262- 6 263- 6 264- 4 419- 5 420- 8 421- 8 422-10 423-11 424-12 425-14
426-16 427-20 428-22 429-19 430- 8 457-16 458-19 459-20 460-21 461-19 462-22 463-27 464-32 465-34 466-38
467-35 468-39 469-40 470-45 471-44 472-44 473-30 474-27 475-23 476-19 477- 9

HURDAT STORM 271, 0 STATIONS-MAX SURGE 64
194- 4 195- 6 196- 4 197- 6 198- 4 199- 7 200- 5 201- 8 202- 6 203- 4 204- 3 246- 4 247- 3 249- 5 250- 5
251- 4 252- 3 253- 5 254-10 255-19 256-16 257-13 258-18 259-16 260-15 261-16 262-11 263-13 264- 9 265- 7
266- 6 417- 9 418-10 419-13 420-18 421-18 422-22 423-23 424-21 425-23 426-22 427-23 428-22 429-18 430-10
431- 7 432- 7 433- 9 434- 9 435- 8 436- 6 437- 4 474- 3 475- 5 476- 8 477-11 478-13 479- 8 480- 7 481- 8
482- 9 483- 9 484- 9 485- 7

HURDAT STORM 276, 0 STATIONS-MAX SURGE 134
162- 3 163- 4 164- 3 169- 3 170- 4 171- 5 172- 6 173- 7 174- 8 175- 9 176- 8 177-17 178-13 179-10 180- 9
181- 8 182- 5 183- 4 184- 5 185- 4 186- 5 187- 8 188-12 189-14 190-15 191-13 192-17 193-16 194-11 210- 5
211-10 212-14 213-14 214-21 215-18 216-28 217-21 218-16 219-25 220-20 221-25 222-25 223-30 224-23 225-18
226-13 227- 9 228- 5 233- 4 234- 4 235- 5 236- 6 237- 8 238- 9 239-10 240-10 241-10 242- 9 243- 8 244- 7
245- 6 246- 5 247- 5 248- 4 249- 6 250- 5 251- 4 252- 4 253- 3 429- 6 430- 4 431- 5 432- 6 433- 8 434-10
435-10 436- 8 437- 7 438- 6 439- 7 440- 8 441- 9 442-10 443-13 444-12 445-10 446- 6 447- 5 448- 4 449- 4
452- 5 453-24 454- 5 455- 5 456- 5 457-31 458-33 459-34 460-34 461-25 462-29 463-32 464-33 465-27 466-23
467-18 468-11 469- 7 485-18 486-20 487-19 488-17 489-17 490-16 491-12 492- 7 493- 4 494- 5 495- 5 496- 6
497- 7 498- 9 499-11 500-13 501-15 502-20 503-19 504-17 505-13 506-10 507- 9 508- 8 509-12 510- 9

HURDAT STORM 289, 0 STATIONS-MAX SURGE 68
193- 5 194- 7 195-11 196- 7 197-11 198- 6 199-11 200- 7 201-12 202- 8 203- 6 204- 5 205- 4 208- 3 245- 4
246- 3 249- 5 250- 4 251- 3 253- 4 254- 6 255-10 256- 8 257- 7 258- 9 259- 8 260- 8 261- 9 262- 6 263- 7
385- 3 420- 9 421- 9 422-11 423-11 424-10 425-11 426-11 427-11 428-11 429-11 430- 7 431- 5 432- 6 433- 9
434-10 435- 9 436- 7 437- 5 438- 4 466- 4 470- 3 471- 4 472- 4 473- 4 474- 5 475- 7 476-11 477-16 478-19
479-13 480-12 481-13 482-15 483-16 484-17 485-13 486- 6

HURDAT STORM 292, 0 STATIONS-MAX SURGE 141
208- 3 217- 3 218- 4 219- 5 220- 6 221- 8 222- 8 223-10 224- 9 225- 7 226- 5 227- 4 228- 3 230- 4 233- 3
234- 3 235- 4 236- 4 237- 5 238- 6 239- 6 240- 7 241- 7 242- 8 243-10 244-11 245-11 246-11 247- 9 248- 7
249-11 250- 8 251- 6 252- 5 254- 5 255- 8 256- 7 257- 7 258- 9 259- 8 260-12 261-20 262-16 263-22 264-17
265-15 266-14 267-17 268-10 269- 6 270-12 271-15 272-25 273-13 274-11 275-13 276-10 277- 8 278- 7 279- 4
280- 4 291- 3 390- 4 391- 5 392- 5 393- 4 401- 4 402- 4 403- 4 404- 8 405-13 406-17 407-18 408-19 409-15
410-20 411-33 412-24 413-17 414-17 415-19 416-26 417-25 418-27 419-28 420-34 421-28 422-30 423-19 424-12
425-11 426-11 427-10 428- 9 429- 8 430- 4 431- 8 432- 9 433-14 434-19 435-21 436-18 437-14 438-11 439-11
440- 9 441- 8 442- 7 443- 6 444- 6 445- 5 446- 5 447- 4 448- 4 449- 3 450- 3 452- 3 453- 9 455- 3 456- 4
457-11 458-10 459- 8 460- 5 461- 4 462- 4 463- 4 465- 3 466- 3 470- 3 471- 4 472- 4 474- 4 475- 5 476- 7
477- 6 478- 5 678- 8 679- 3 680- 3 681- 7

HURDAT STORM 295, # STATIONS-MAX SURGE 36
123- 6 124- 6 125- 5 126-10 127- 7 128- 6 129- 8 130- 6 131- 5 132- 6 133- 5 134- 6 135- 4 136- 4 137- 4
138- 4 139- 3 538- 3 539- 4 540- 4 541- 5 542- 5 543- 5 544- 6 545- 6 546- 7 547- 7 548- 7 549- 8 550- 9
551-10 552-12 553-12 554-10 555- 6 556- 4

HURDAT STORM 296, # STATIONS-MAX SURGE 156
184- 3 185- 3 186- 7 187- 6 188-11 189-19 190-23 191-23 192-35 193-31 194-28 195-25 196-18 197-13 198- 8
199- 3 206- 8 207- 9 208- 8 209-11 210-10 211-10 212-11 213-11 214-14 215-16 216-21 217-19 218-18 219-28
220-19 221-21 222-21 223-23 224-15 225-14 226-15 227-15 228- 9 233- 5 234- 5 235- 5 236- 7 237- 9 238- 7
239- 7 240- 6 241- 5 242- 5 243- 5 244- 4 245- 4 246- 3 249- 4 250- 4 265- 4 266- 5 267- 8 268- 5 269- 3
270- 5 271- 7 272- 9 273- 4 274- 3 275- 4 276- 3 304- 3 305- 6 306- 4 373- 5 374- 6 375- 8 376- 8 377- 4
380- 3 382- 5 383- 4 384- 4 385- 3 389- 4 390- 4 391- 3 404- 3 405- 5 406- 7 407- 6 408- 6 409- 4 410- 6
411-14 412-12 413- 8 414- 8 415-10 416-12 417-10 418- 9 419- 6 420- 5 432- 4 433- 6 434- 6 435- 6 436- 5
437- 4 438- 4 439- 4 440- 5 441- 5 442- 6 443- 8 444-11 445-11 446-10 447- 8 448- 6 449- 5 450- 3 452- 8
453-17 454-10 455- 9 456-11 457-19 458-28 459-35 460-39 461-25 462-23 463-21 464-20 465-13 466- 9 467-10
468-10 469-13 470-11 471- 7 472-10 473- 8 481- 5 482-11 483-15 484-25 485-45 486-46 487-45 488-33 489-30
490-21 491-13 492- 9 493- 9 494- 6 495- 4

HURDAT STORM 299, # STATIONS-MAX SURGE 125
186- 3 187- 4 188- 4 189- 4 203- 6 204-12 205-16 206-18 207-22 208-33 209-30 210-24 211-30 212-23 213-19
214-22 215-17 216-20 217-16 218-13 219-15 220-11 221-12 222-12 223-13 225- 8 226- 8 227- 8 229- 3 233- 4
234- 4 235- 3 236- 3 254- 8 255-12 256-13 257-12 258-16 259-13 260-12 261-12 262- 9 263-10 264- 8 265- 7
266- 6 267- 6 268- 5 269- 6 270- 8 271- 6 272- 5 273- 6 274- 7 275- 6 276- 5 277- 4 278- 4 279- 4 280- 5
281- 4 401- 4 402- 5 403- 5 404- 5 405- 4 406- 5 407- 6 408- 6 409- 9 410- 6 411- 6 412- 8 413- 9 414- 7
415- 6 416- 6 417- 7 418- 7 419- 9 420-11 421-12 422-13 423-16 424-16 425-19 426-19 427-19 428-15 429- 9
447- 4 448- 4 449- 4 450- 4 451- 4 452- 3 457-12 458-15 459-17 460-19 461-16 462-18 463-21 464-26 465-27
466-30 467-29 468-32 469-34 470-38 471-37 472-36 473-25 474-23 475-17 476-13 490- 4 491- 4 492- 4 493- 3
682- 5 683- 6 684- 4 685- 4 686- 5

HURDAT STORM 310, # STATIONS-MAX SURGE 52
128- 4 129- 5 130- 9 131-13 132-19 133-27 134-47 135-48 136-45 137-62 138-53 139-46 140-38 141-32 142-28
143-24 144-22 145-22 146-16 147-15 148-13 149-10 150- 9 151- 9 152- 9 153-10 154-10 525-11 526-12 527-11
528- 9 529-11 530-14 531-17 532-20 533-24 534-23 535-26 536-32 537-39 538-47 539-54 540-60 541-67 542-66
543-60 544-48 545-33 546-19 547-12 548- 7 549- 5

HURDAT STORM 324, # STATIONS-MAX SURGE 133
106- 3 107- 4 108- 5 109- 8 110-10 111-12 112-10 113- 8 114-10 115- 9 116- 7 117- 6 118- 6 119- 6 120- 5
121- 6 122- 5 123- 5 124- 5 125- 4 126- 5 127- 5 128- 5 129- 6 130- 6 131- 5 132- 6 133- 6 134- 8 135- 6
136- 6 137- 6 138- 5 139- 5 140- 5 141- 3 153- 4 154- 5 155- 5 156- 5 157- 4 166- 3 167- 5 168- 6 169- 6
170- 5 171- 4 172- 3 173- 3 174- 3 177- 3 209- 3 210- 3 211- 6 212- 4 213- 4 214- 5 215- 4 216- 5 217- 3
255- 3 258- 3 425- 4 426- 4 427- 4 428- 4 429- 3 434- 4 435- 6 436- 5 460- 3 461- 3 462- 4 463- 6 464- 7
465- 8 466- 9 467- 7 468- 6 469- 6 470- 4 502- 3 503- 4 504- 4 505- 4 506- 4 507- 4 508- 4 509- 5 510- 7
511- 8 512- 8 513-10 514- 4 522- 5 523- 5 524- 5 525- 5 538- 3 539- 5 540- 5 541- 6 542- 7 543- 7 544- 8
545- 7 546- 6 547- 6 548- 6 549- 6 550- 6 551- 6 552- 5 553- 5 554- 5 555- 5 556- 5 557- 6 558- 6 559- 6
560- 7 561- 7 562- 8 563-10 564-12 565-11 566-14 567-16 568-12 569- 9 570- 6 571- 5 572- 3

HURDAT STORM 327, # STATIONS-MAX SURGE 51
283- 3 284- 5 285- 9 286-11 287-12 288-18 289-23 290-23 291-24 292-16 293-17 294-11 295- 7 296- 8 297- 9
298- 9 299- 5 300- 4 301- 4 302- 4 303- 4 304- 4 305- 5 306- 4 374- 4 375- 5 376- 5 377- 5 378- 5 379- 5
380- 6 381- 5 382- 7 383- 6 384- 7 385-10 386- 9 387-12 388-10 389-18 390-21 391-29 392-30 393-30 394-25
395-23 396-21 397-15 398-13 399- 7 400- 3

HURDAT STORM 331, # STATIONS-MAX SURGE 111
191- 3 193- 5 194-10 195-20 196-15 197-26 198-18 199-31 200-22 201-32 202-21 203-18 204-15 205-13 206-10
207- 8 208-15 209-10 210- 8 211-13 212-10 213- 8 214-12 215- 9 216-12 217- 9 218- 8 219-10 220- 9 221-10
222-10 223-12 224- 8 225- 8 226- 6 227- 5 241- 3 242- 4 243- 6 244- 8 245- 8 246- 7 247- 6 248- 5 249- 9
250- 7 251- 5 252- 4 253- 5 254- 9 255-15 256-10 257- 8 258-11 259-10 260- 4 261- 5 262- 4 263- 5 420- 8
421- 6 422- 8 423- 7 424-13 425-13 426-13 427-13 428-17 429-16 430-10 431- 8 432-10 433-14 434-17 435-17
436-14 437-10 438- 8 439- 8 440- 5 441- 4 453- 8 457-11 458-13 459-13 460-13 461-11 462-12 463-15 464-16

465-18 466-19 467-13 468-15 469-13 470-15 471-18 472-19 473-15 474-19 475-22 476-25 477-30 478-44 479-36
480-36 481-35 482-35 483-33 484-27 485-11

HURDAT STORM 332, 0 STATIONS-MAX SURGE 127
279- 9 280-16 281-13 282-12 283- 6 284- 6 285-10 286-10 287-11 288-18 289-20 290-18 291-15 292-11 293-10
294- 9 295- 8 296- 8 297-11 298-10 299- 7 300- 7 301- 7 302- 8 303- 8 304- 6 305- 6 306- 5 307- 5 308- 5
309- 5 310- 5 311- 5 312- 5 313- 6 314- 5 315- 5 316- 5 317- 5 318- 6 319- 6 320- 8 321- 8 322- 6 323- 6
324- 5 325- 6 326- 5 327- 5 328- 5 329- 5 330- 5 331- 5 332- 5 333- 4 334- 4 335- 4 336- 4 337- 4 338- 4
339- 4 340- 4 341- 4 342- 4 343- 4 344- 4 345- 4 346- 5 347- 4 348- 4 349- 4 350- 5 351- 5 352- 5 353- 5
354- 5 355- 5 356- 6 357- 5 358- 6 359- 7 360- 8 361- 8 362- 6 363- 6 364- 5 365- 3 366- 5 367- 6 368- 5
369- 5 370- 5 371- 5 372- 5 373- 5 374- 5 375- 6 376- 6 377- 7 378- 8 379- 9 380- 8 381- 9 382- 8 383- 8
384- 8 385-10 386- 9 387- 9 388-11 389-10 390-11 391-15 392-16 393-21 394-21 395-21 396-18 397-17 398-14
399-12 400-16 401-19 402-19 403-19 404-10 409- 3

HURDAT STORM 353, 0 STATIONS-MAX SURGE 220
192- 4 193-11 194-20 195-38 196-33 197-58 198-43 199-71 200-44 201-43 202-27 203-29 204-32 205-35 206-38
207-32 208-38 209-36 210-33 211-45 212-40 213-35 214-45 215-42 216-52 217-45 218-39 219-52 220-38 221-41
222-41 223-37 224-25 225-26 226-30 227-37 228-21 229- 4 233- 9 234-11 235-13 236-16 237-16 238-12 239-11
240-10 241- 9 242- 8 243- 8 244- 7 245- 6 246- 6 247- 5 248- 5 249- 7 250- 7 251- 6 252- 4 253- 4 254- 6
255- 7 256- 8 257- 8 258-12 259-14 260-18 261-24 262-19 263-25 264-21 265-19 266-18 267-22 268-14 269- 9
270-15 271-16 272-24 273-11 274-11 275-13 276-10 277- 9 278-11 279- 6 280- 6 281- 4 282- 4 288- 6 289-16
290-25 291-32 292-29 293-29 294-20 295-13 296-12 297-13 298-11 299- 6 300- 5 301- 4 302- 5 303- 5 304- 3
305- 4 306- 4 307- 3 308- 3 370- 3 371- 3 372- 3 373- 4 374- 4 375- 4 376- 4 377- 4 378- 5 379- 5 380- 5
381- 6 382- 6 383- 6 384- 8 385-12 386-13 387-17 388-13 389-25 390-31 391-41 392-39 393-31 394-18 395- 7
400- 6 401- 7 402- 6 403- 8 404-13 405-20 406-23 407-20 408-19 409-14 410-17 411-35 412-28 413-22 414-21
415-26 416-32 417-32 418-35 419-33 420-38 421-31 422-35 423-26 424-19 425-15 426-13 427-10 428- 8 429- 8
430- 6 431- 5 432- 8 433-11 434-12 435-11 436- 9 437- 8 438- 7 439- 7 440- 8 441- 9 442-10 443-13 444-18
445-18 446-22 447-17 448-15 449-12 450- 8 451- 5 452-16 453-28 454-21 455-21 456-26 457-33 458-50 459-60
460-67 461-52 462-53 463-56 464-59 465-53 466-54 467-51 468-48 469-45 470-42 471-34 472-50 473-45 474-35
475-28 476- 8 478-43 479-72 480-79 481-78 482-77 483-71 484-55 485-15

HURDAT STORM 357, 0 STATIONS-MAX SURGE 135
168- 3 169- 3 170- 3 177- 4 178- 3 179- 4 180- 4 181- 4 182- 4 183- 4 184- 5 185- 4 186- 5 187- 5 188- 6
189- 6 190- 6 191- 6 192- 6 193- 6 194- 6 195- 5 196- 4 197- 5 198- 5 199- 5 200- 5 201- 5 202- 4 203- 4
204- 3 205- 4 206- 6 207- 5 208- 7 209- 6 210- 4 211- 6 212- 4 214- 4 220- 8 221- 8 222- 8 223-12 224-16
225-14 226-12 227- 9 228-10 236- 3 237- 4 238- 4 239- 5 240- 6 241- 6 242- 6 243- 6 244- 6 245- 5 246- 4
247- 4 248- 3 249- 5 250- 4 251- 3 274- 3 409- 3 431- 4 432- 5 433- 6 434- 7 435- 7 436- 7 437- 6 438- 5
439- 6 440- 6 441- 6 442- 6 443- 6 444- 5 445- 4 446- 3 447- 3 452- 8 453-16 454- 5 455- 8 456-11 457-15
458- 6 466- 6 467- 6 468- 6 469- 7 470- 7 471- 7 472- 8 473- 7 474- 4 475- 3 478- 5 479- 5 480- 5 481- 5
482- 5 483- 5 484- 5 485- 7 486- 7 487- 7 488- 7 489- 7 490- 7 491- 6 492- 5 493- 5 494- 5 495- 5 496- 5
497- 4 498- 4 499- 4 500- 4 501- 4 502- 4 503- 4 504- 4 505- 3 506- 3 508- 3 509- 3 511- 4 512- 3 513- 4

HURDAT STORM 362, 0 STATIONS-MAX SURGE 177
179- 4 180- 6 181- 8 182- 4 183- 6 184- 8 185- 5 186- 6 187- 6 188- 9 189-12 190-12 191-11 192-14 193-12
194-11 195-11 196- 8 197- 7 198- 5 211- 3 212- 4 213- 4 214- 7 215- 6 216- 9 217- 7 218- 6 219-10 220- 6
221- 7 222- 7 223- 6 224- 4 225- 3 226- 4 227- 3 443- 3 444- 4 445- 4 446- 4 453- 4 456- 3 457- 6 458- 9
459-13 460-14 461- 9 462- 9 463-10 464-11 465- 8 466- 6 467- 5 468- 3 469- 3 481- 4 482- 6 483- 8 484-11
485-14 486-16 487-16 488-14 489-15 490-14 491-11 492- 7 493- 7 494- 8 495- 9 496-10 497- 9 498-10 499- 8
500- 6 501- 3

HURDAT STORM 370, 0 STATIONS-MAX SURGE 110
284- 5 285- 7 286- 8 287- 9 288-13 289-14 290-13 291-13 292-11 293-10 294-10 295- 8 296- 8 297-10 298- 9
299- 6 300- 5 301- 6 302- 6 303- 7 304- 5 305- 5 306- 5 307- 5 308- 5 309- 6 310- 6 311- 7 312- 7 313- 7
314- 7 315- 8 316- 9 317-10 318-11 319-11 320- 8 321- 8 322- 8 323- 6 324- 5 325- 5 326- 4 327- 4 328- 4
329- 4 330- 4 331- 4 332- 4 333- 4 334- 3 339- 3 340- 4 341- 4 342- 3 345- 3 346- 4 347- 3 348- 4 349- 4
350- 4 351- 4 352- 4 353- 4 354- 4 355- 4 356- 5 357- 5 358- 7 359-10 360-13 361-13 362-13 363-12 364- 9
365- 6 366- 9 367- 9 368- 8 369- 7 370- 7 371- 7 372- 6 373- 5 374- 5 375- 6 376- 5 377- 6 378- 7 379- 7
380- 6 381- 7 382- 6 383- 6 384- 7 385- 9 386- 9 387-10 388-10 389-11 390-11 391-12 392-13 393-15 394-15
395-15 396-14 397-11 398-10 399- 5

HURDAT STORM 396, # STATIONS-MAX SURGE 110
280- 3 281- 3 284- 3 285- 4 286- 4 287- 4 288- 5 289- 6 290- 6 291- 6 292- 5 293- 5 294- 5 295- 5 296- 6
297- 8 298- 7 299- 8 300- 9 301-12 302-17 303-20 304-19 305-18 306-24 307-27 308-29 309-28 310-36 311-28
312-23 313-23 314-20 315-24 316-22 317-21 318-17 319-15 320- 8 321- 5 322- 4 323- 4 324- 5 325- 5 326- 6
327- 6 328- 7 329- 7 330- 8 331- 7 332- 5 333- 5 347- 6 348- 6 349- 6 350- 8 351- 8 352- 8 353- 7 354- 9
355- 7 356- 5 357- 4 358- 4 359- 6 360-10 361- 8 362-14 363-19 364-31 365-31 366-33 367-30 368-36 369-29
370-34 371-39 372-43 373-43 374-36 375-29 376-19 377-18 378-20 379-16 380-12 381-14 382-12 383-11 384- 8
385- 8 386- 6 387- 5 388- 8 389- 5 390- 5 391- 5 392- 6 393- 6 394- 6 395- 6 396- 6 397- 5 398- 5 399- 4
400- 3 401- 3 402- 4 403- 4 404- 3

HURDAT STORM 397, # STATIONS-MAX SURGE 103
138- 5 139-11 140-16 141-18 142-20 143-22 144-25 145-21 146-14 147-13 148-10 149- 6 150-10 151-10 152-10
153-12 154-13 155- 9 156- 7 157- 6 158- 5 159- 4 160- 3 166- 4 167- 6 168- 7 169- 7 170- 6 171- 4 172- 4
173- 3 174- 3 177- 3 203- 4 204- 5 205- 5 206- 3 208- 3 255- 6 256- 7 257- 7 258-10 259- 8 260- 8 261- 7
262- 5 263- 5 419- 3 420- 6 421- 7 422- 8 423-10 424-10 425-12 426-12 427-10 428- 6 429- 3 471- 4 472- 4
473- 4 474- 6 475- 7 476- 8 477- 4 502- 3 503- 3 504- 4 505- 3 506- 4 507- 4 508- 5 509- 6 510- 9 511-10
512- 9 513-11 514- 5 515- 4 516- 3 517- 3 518- 4 519- 4 520- 4 521- 5 522- 8 523- 7 524-13 525-14 526-14
527-10 528- 4 530- 3 531-10 532-13 533-23 534-26 535-26 536-29 537-34 538-26 539-15 540- 5

HURDAT STORM 398, # STATIONS-MAX SURGE 16
264- 5 265- 9 266-13 267-20 268-17 269-11 270-14 271-10 412-15 413-21 414-18 415-26 416-26 417-21 418-16
419- 6

HURDAT STORM 405, # STATIONS-MAX SURGE 45
124- 4 125- 6 126- 7 127-11 128-13 129-19 130-19 131-16 132-26 133-21 134-33 135-25 136-20 137-27 138-22
139-19 140-16 141-13 142-12 143-10 144-10 145-10 146- 6 532-10 533-11 534-10 535-12 536-15 537-18 538-21
539-23 540-25 541-29 542-31 543-33 544-36 545-34 546-32 547-27 548-25 549-20 550-15 551-11 552- 5 553- 4

HURDAT STORM 432, # STATIONS-MAX SURGE 30
270- 3 271- 4 272- 5 273- 8 274- 8 275- 8 276- 5 277- 4 278- 3 300- 3 302- 3 303- 4 376- 3 377- 3 378- 4
379- 4 380- 5 381- 4 382- 6 383- 4 384- 4 405- 5 406- 7 407- 8 408-10 409-11 410-12 411- 5 412- 4 413- 3

HURDAT STORM 436, # STATIONS-MAX SURGE 137
270- 3 271- 3 273- 4 274- 5 275- 4 276- 4 277- 3 278- 3 279- 5 280- 7 281- 9 282-10 283- 8 284- 8 285-13
286-13 287-14 288-20 289-20 290-19 291-17 292-15 293-14 294-13 295-13 296-13 297-16 298-16 299-15 300-16
301-18 302-21 303-23 304-19 305-19 306-21 307-20 308-20 309-19 310-22 311-20 312-16 313-17 314-14 315-18
316-15 317-13 318-11 319- 9 320- 5 324- 4 325- 4 326- 6 327- 8 328-10 329-10 330-12 331-12 332- 8 333- 9
334- 7 335- 8 336-11 337- 8 338- 6 339- 8 340-10 341-12 342-11 343-10 344-11 345-15 346-14 347-11 348-11
349-10 350-12 351-12 352-12 353-12 354-14 355- 8 356- 5 357- 3 359- 5 360- 6 361- 5 362-14 363-18 364-26
365-28 366-29 367-27 368-33 369-22 370-25 371-25 372-24 373-25 374-22 375-21 376-18 377-21 378-23 379-22
380-19 381-21 382-17 383-16 384-15 385-16 386-13 387-13 388-17 389-13 390-15 391-16 392-17 393-20 394-20
395-21 396-22 397-18 398-19 399-12 400-11 401-12 402-10 403- 7 404- 5 406- 4 407- 4 408- 4 409- 6 410- 3
412- 3 413- 4

HURDAT STORM 440, # STATIONS-MAX SURGE 135
201- 5 202- 4 203- 4 204- 6 205- 8 206- 7 207- 7 208-12 209-11 210-10 211-17 212-15 213-12 214-20 215-16
216-23 217-17 218-13 219-17 220- 9 221-14 222-14 223-16 224- 7 225- 6 226- 3 227- 5 254- 5 255- 8 256- 8
257- 9 258-15 259-16 260-18 261-22 262-17 263-22 264-19 265-15 266-12 267-13 268- 7 269- 4 270- 6 271- 6
272- 9 273- 4 275- 4 276- 3 292- 4 293- 5 294- 4 296- 3 297- 4 298- 4 313- 3 314- 3 315- 4 316- 4 317- 5
318- 5 319- 6 322- 3 359- 5 360- 5 361- 5 362- 8 363- 7 364- 5 365- 5 366- 5 367- 4 368- 4 382- 3 384- 3
385- 5 386- 4 387- 5 388- 4 389- 7 390- 6 391- 5 392- 4 405- 5 406- 7 407- 6 408- 6 409- 4 410- 6 411-14
412-11 413- 9 414-10 415-15 416-20 417-21 418-25 419-28 420-30 421-27 422-29 423-26 424-21 425-19 426-16
427-13 428-10 429- 9 430- 4 433- 3 434- 3 453- 8 457-15 458-19 459-21 460-22 461-19 462-22 463-27 464-30
465-29 466-30 467-22 468-19 469-16 470-16 471-14 472-14 473-10 474-11 475-10 476-10 477-10 478- 8 479- 3

HURDAT STORM 445, # STATIONS-MAX SURGE 71
108- 3 109- 4 110- 4 111- 5 112- 5 113- 4 114- 5 115- 6 116- 6 117- 5 118- 6 119- 7 120- 6 121- 8 122- 8
123-10 124-11 125- 9 126-17 127-10 128- 6 129-11 130- 6 131- 4 132- 9 133- 7 134-12 135-10 136- 8 137-12
138-10 139- 9 140- 8 141- 7 142- 6 143- 5 535- 6 536- 8 537- 9 538-10 539-11 540-12 541-13 542-13 543-13
544-13 545-12 546-12 547- 9 548-10 549-13 550-15 551-17 552-21 553-17 554-13 555-11 556- 9 557- 8 558- 8

359- 7 360- 7 361- 6 362- 6 363- 6 364- 5 365- 5 366- 6 367- 6 368- 5 369- 5

HURDAT STORM 449, # STATIONS-MAX SURGE 62
216- 3 219- 4 220- 4 221- 5 222- 5 223- 6 224- 4 225- 4 238- 5 239- 4 255- 4 256- 4 257- 5 258- 8 259- 9
260-11 261-14 262-12 263-15 264-12 265-11 266-10 267-11 268- 6 270- 4 271- 4 272- 4 411- 6 412- 6 413- 7
414- 7 415-11 416-17 417-18 418-19 419-19 420-21 421-18 422-18 423-16 424-13 425-11 426- 9 427- 7 428- 5
429- 4 443- 5 444- 8 445- 5 453- 4 457- 6 458- 7 459- 6 460- 5 461- 4 462- 4 463- 5 464- 4 465- 4 466- 4
476- 3 477- 3

HURDAT STORM 456, # STATIONS-MAX SURGE 108
194- 3 195- 4 196- 4 197- 5 198- 4 199- 7 200- 6 201-11 202- 8 203- 6 204- 7 205- 8 206- 8 207- 7 208-12
209-10 210- 8 211-13 212-11 213- 9 214-14 215-10 216-14 217-10 218- 7 219- 9 220- 5 221- 7 222- 7 223- 8
224- 4 225- 3 226- 3 255- 3 256- 3 257- 4 258- 6 259- 8 260-10 261-13 262-10 263-13 264-10 265- 8 266- 7
267- 7 268- 4 272- 3 289- 4 290- 5 291- 5 292- 3 390- 3 391- 5 392- 6 393- 7 394- 4 405- 4 406- 5 407- 3
411- 6 412- 4 413- 5 414- 5 415- 8 416-11 417-12 418-15 419-16 420-20 421-17 422-20 423-15 424-11 425- 8
426- 7 427- 5 428- 4 429- 4 453- 4 457- 8 458-10 459-11 460-12 461-11 462-12 463-15 464-18 465-19 466-20
467-16 468-14 469-13 470-14 471-14 472-15 473-11 474-11 475-11 476-12 477-15 478-17 479-10 480- 8 481- 6
482- 6 483- 6 484- 5

HURDAT STORM 461, # STATIONS-MAX SURGE 115
163- 3 164- 4 165- 5 166- 6 167- 7 168-10 169-15 170-16 171-16 172-14 173-12 174-10 175- 8 176- 6 177- 9
178- 6 179- 5 180- 5 181- 5 182- 4 183- 4 184- 4 185- 4 186- 4 187- 5 188- 7 189- 9 190- 9 191- 7 192-11
193- 7 211- 4 212- 6 213- 8 214-12 215-14 216-18 217-18 218-20 219-33 220-27 221-32 222-32 223-34 224-23
225-22 226-20 227-17 228- 7 242- 5 243- 7 244- 4 245- 3 433- 3 434- 4 435- 4 436- 4 437- 4 438- 3 439- 4
440- 7 441- 5 452- 4 453-23 454- 6 455- 7 456- 7 457-32 458-38 459-43 460-46 461-27 462-23 463-18 464-18
465-11 466- 4 467- 7 468- 4 485- 4 486- 8 487-13 488-11 489-11 490-10 491- 8 492- 6 493- 4 494- 4 495- 5
496- 5 497- 5 498- 5 499- 6 500- 6 501- 7 502-10 503-12 504-14 505-14 506-15 507-18 508-20 509-25 510-33
511-12 512-11 513- 9 514- 5 515- 4 516- 3 520- 3 521- 3 524- 3 528- 3

HURDAT STORM 463, # STATIONS-MAX SURGE 116
194- 3 195- 5 196- 4 197- 8 198- 7 199-13 200-11 201-21 202-17 203-16 204-17 205-18 206-18 207-15 208-23
209-19 210-16 211-22 212-18 213-15 214-18 215-15 216-18 217-14 218-10 219-12 220- 7 221- 7 222- 7 223- 7
224- 3 226- 3 227- 5 256- 3 257- 4 258- 8 259-10 260-13 261-20 262-16 263-21 264-17 265-15 266-13 267-13
268- 7 269- 4 270- 6 271- 6 272- 8 273- 3 275- 3 290- 4 291- 5 292- 5 293- 4 389- 3 390- 5 391- 6 392- 7
393- 5 404- 3 405- 6 406- 7 407- 5 408- 5 409- 3 410- 5 411-13 412-10 413- 9 414- 9 415-13 416-20 417-22
418-27 419-27 420-32 421-27 422-29 423-20 424-14 425-10 426- 8 427- 5 428- 3 453- 4 457- 7 458-11 459-13
460-16 461-14 462-16 463-19 464-22 465-22 466-24 467-22 468-23 469-23 470-24 471-25 472-30 473-24 474-23
475-23 476-25 477-30 478-32 479-18 480-14 481-11 482-10 483- 8 484- 7 485- 3

HURDAT STORM 465, # STATIONS-MAX SURGE 40
255- 3 256- 3 261- 4 262- 6 263-10 264-13 265-15 266-17 267-19 268-15 269-11 270-14 271-11 272- 9 273- 7
274- 7 275- 6 276- 4 277- 3 406- 4 407- 5 408- 6 409- 8 410- 7 411-10 412-14 413-19 414-16 415-21 416-22
417-25 418-25 419-20 420-11 421- 6 422- 3 428- 3 453- 3 454- 4 455- 4

HURDAT STORM 471, # STATIONS-MAX SURGE 20
154- 4 155- 6 156- 6 157- 4 168- 5 169- 9 170- 6 171- 4 506- 3 507- 4 508- 5 509-17 510-25 511- 8 513- 6
521- 7 522- 9 523- 8 524- 6 525- 4

HURDAT STORM 473, # STATIONS-MAX SURGE 40
219- 3 220- 3 221- 8 222- 8 223-17 224-11 225- 5 241- 3 242- 4 243- 4 244- 5 245- 5 246- 5 247- 5 248- 4
249- 5 250- 4 429- 3 432- 4 433- 5 434- 8 435-10 436- 8 437- 7 438- 5 439- 5 440- 4 441- 4 442- 3 450- 5
451- 3 452- 6 453-12 454- 9 455-11 456- 9 457-18 458-17 459-11 460- 5

HURDAT STORM 474, # STATIONS-MAX SURGE 9
233- 3 443- 3 444- 4 448- 3 449- 4 450- 4 454- 5 455- 4 456- 4

HURDAT STORM 477, # STATIONS-MAX SURGE 85
194- 4 195- 5 196- 4 197- 7 198- 6 199-10 200- 7 201-14 202-10 203- 7 204- 5 205- 6 206- 5 207- 4 208- 7
209- 5 210- 4 211- 6 212- 4 213- 3 214- 4 243- 4 244- 6 245- 5 246- 3 254- 5 255- 8 256- 7 257- 7 258- 7
259- 6 260- 6 261- 7 262- 5 263- 7 264- 4 346- 4 365- 4 375- 4 376- 4 416- 4 417- 4 418- 5 419- 6 420- 9

421- 9 422-10 423- 9 424- 7 425- 8 426- 9 427-10 428- 9 429- 8 430- 4 433- 4 434- 6 435- 7 436- 6 437- 6
438- 5 439- 6 440- 3 464- 4 465- 6 466- 8 467- 6 468- 7 469- 6 470- 8 471- 9 472- 9 473- 7 474- 9 475- 8
476-11 477-16 478-22 479-13 480-11 481- 9 482- 8 483- 7 484- 6 485- 4

HURDAT STORM 490, # STATIONS-MAX SURGE 24
170- 3 171- 3 172- 4 173- 5 174- 5 175- 4 176- 3 177- 7 178- 4 179- 3 494- 3 495- 3 496- 3 498- 3 499- 4
500- 4 501- 5 502- 8 503- 9 504-12 505-11 506- 6 507- 4 508- 3

HURDAT STORM 493, # STATIONS-MAX SURGE 70
200- 4 201-11 202-18 203- 3 204- 9 205-13 206-16 207- 5 208- 6 209- 5 210- 4 211- 7 212- 5 213- 3 214- 4
215- 3 216- 5 228- 4 229- 5 253- 3 254- 8 255-14 256-13 257-13 258-20 259-19 260-19 261-21 262-13 263-16
264-11 265- 8 266- 7 267- 6 416- 8 417-10 418-12 419-15 420-23 421-23 422-29 423-29 424-26 425-26 426-22
427-20 428-17 429-13 430- 5 450- 4 451- 5 454- 4 460- 3 462- 4 463- 5 464- 7 465- 5 466- 5 467- 6 468- 7
469- 7 470- 6 471- 6 472-25 473-21 474-18 475-16 476-12 477-26 478-16

HURDAT STORM 499, # STATIONS-MAX SURGE 44
195- 3 197- 3 201- 4 238- 3 239- 3 255- 5 256- 5 257- 5 258- 7 259- 8 260- 8 261-10 262- 7 263- 8 264- 6
265- 4 266- 3 417- 5 418- 6 419- 8 420-11 421-11 422-14 423-12 424-10 425-10 426- 9 427- 8 428- 7 429- 6
433- 3 434- 4 435- 3 443- 4 476- 3 477- 5 478- 6 479- 4 480- 3 481- 3 482- 4 483- 4 484- 4 485- 4

HURDAT STORM 520, # STATIONS-MAX SURGE 14
280- 4 281- 4 282- 3 288- 4 289- 3 394- 3 395- 4 396- 4 397- 4 400- 4 401- 6 402- 5 403- 5 404- 3

HURDAT STORM 521, # STATIONS-MAX SURGE 60
213- 5 214- 5 215- 8 216-11 217-13 218-13 219-19 220-18 221-25 222-25 223-32 224-25 225-20 226-15 227-11
228- 5 258- 3 259- 3 260- 3 261- 3 262- 4 263- 7 264- 9 265-10 266-12 267-12 268- 7 269- 4 270- 6 271- 5
272- 4 411- 5 412- 6 413- 9 414- 8 415-11 416-15 417-18 418-16 419-11 420- 5 421- 4 422- 3 423- 3 424- 3
425- 3 452- 3 453-25 454- 5 455- 6 456- 6 457-32 458-33 459-31 460-28 461-19 462-18 463-13 464- 9 465- 4

HURDAT STORM 522, # STATIONS-MAX SURGE 49
317- 3 318- 3 319- 3 320- 4 321- 5 322- 5 323- 4 324- 4 325- 5 326- 5 327- 5 328- 5 329- 5 330- 5 331- 5
332- 5 333- 5 334- 5 335- 5 336- 6 337- 5 338- 6 339- 6 340- 6 341- 6 342- 6 343- 6 344- 6 345- 6 346- 6
347- 5 348- 5 349- 5 350- 5 351- 5 352- 5 353- 5 354- 5 355- 5 356- 5 357- 4 358- 4 359- 5 360- 4 361- 5
362- 4 363- 4 367- 3 368- 3

HURDAT STORM 526, # STATIONS-MAX SURGE 91
178- 3 179- 4 180- 6 181- 8 182- 4 183- 6 184- 6 185- 4 186- 5 188- 3 189- 3 190- 3 191- 4 192- 5 193- 6
194- 8 195-11 196- 7 197- 9 198- 6 199- 8 200- 6 201- 8 202- 6 203- 4 263- 4 264- 7 265- 9 266-11 267-15
268-13 269- 9 270-12 271-12 272-12 273- 9 274-10 275-10 276- 9 277- 8 278- 8 279- 6 280- 6 281- 4 401- 4
402- 5 403- 6 404- 8 405-10 406-11 407-11 408-11 409-11 410-11 411-13 412-15 413-16 414-16 415-18 416-18
417-16 418-16 419-11 420- 7 421- 3 476- 6 477- 8 478-11 479- 9 480- 9 481-10 482-12 483-13 484-16 485-17
486-10 487- 6 488- 4 489- 4 490- 4 491- 4 492- 4 493- 5 494- 6 495- 7 496- 9 497- 9 498- 9 499- 7 500- 5
501- 3

HURDAT STORM 530, # STATIONS-MAX SURGE 28
212- 4 213- 4 214- 6 215- 4 216- 8 217- 5 218- 3 219- 5 220- 4 221- 5 222- 5 223- 5 224- 4 225- 4 249- 3
433- 3 434- 5 453- 4 457- 5 458- 6 459- 6 460- 6 461- 6 462- 7 463-10 464-11 465-10 466- 5

HURDAT STORM 535, # STATIONS-MAX SURGE 60
282- 3 283- 4 285- 4 286- 5 287- 3 303- 3 304- 3 305- 4 306- 4 307- 5 308- 5 309- 6 310-10 311- 7 312- 5
313- 5 314- 4 315- 6 316- 6 317- 5 318- 4 319- 4 328- 3 329- 4 330- 5 331- 5 332- 3 333- 3 346- 4 347- 3
348- 4 349- 4 350- 5 351- 5 352- 5 353- 3 354- 4 362- 6 363- 7 364-11 365-12 366-12 367-10 368-13 369- 8
370- 9 371-11 372-12 373- 6 374- 4 375- 4 376- 4 377- 3 378- 3 379- 3 396- 3 397- 4 398- 3 399- 5 400- 6

HURDAT STORM 541, # STATIONS-MAX SURGE 80
264- 3 265- 5 266- 6 267- 6 268- 6 269-20 270-25 271-33 272-44 273-39 274-40 275-39 276-30 277-24 278-22
279-12 280- 9 281- 5 282- 4 288- 3 289- 4 290- 5 291- 5 292- 4 293- 6 294- 4 295- 3 296- 4 297- 5 298- 5
299- 5 300- 4 301- 4 302- 5 303- 5 304- 5 305- 8 376- 9 377- 6 378- 6 379- 5 380- 6 381- 6 382- 7 383- 6
384- 7 385- 6 386- 5 387- 5 388- 5 389- 7 390- 7 391- 6 392- 5 393- 5 394- 5 395- 4 396- 3 397- 3 398- 3
399- 3 400- 5 401- 7 402- 8 403-11 404-19 405-30 406-40 407-44 408-49 409-49 410-49 411-53 412-36 413-22

414-12 415- 6 416- 7 417- 5 418- 4

HURDAT STORM 545, # STATIONS-MAX SURGE 70
273- 3 274- 8 275- 9 276- 9 277- 8 278- 9 279-10 280-13 281- 8 282- 9 283- 5 284- 4 285- 7 286- 7 287- 8
288-14 289-19 290-20 291-21 292-16 293-20 294-14 295- 9 296-11 297-13 298-13 299- 7 300- 5 301- 4 302- 5
303- 5 304- 4 305- 5 306- 4 374- 4 375- 5 376- 5 377- 5 378- 5 379- 6 380- 7 381- 6 382- 8 383- 8 384-10
385-14 386-13 387-16 388-14 389-24 390-24 391-27 392-26 393-27 394-22 395-18 396-14 397-12 398-10 399- 9
400-12 401-14 402-14 403-16 404-16 405- 9 406-10 407-10 408- 8 409- 8

HURDAT STORM 546, # STATIONS-MAX SURGE 20
273- 5 274-12 275-13 276- 9 277- 7 278- 6 279- 4 364- 4 365- 4 366- 4 368- 3 375- 3 403- 4 404- 6 405- 9
406-14 407-16 408-19 409-16 410- 4

HURDAT STORM 552, # STATIONS-MAX SURGE 57
268- 4 269- 4 270- 5 271- 3 273- 3 274- 6 275- 6 276- 8 277-10 278-13 279-18 280-23 281-14 282-10 283- 4
284- 3 285- 4 286- 4 287- 5 288- 9 289-15 290-16 291-16 292-11 293-10 294- 6 295- 4 296- 4 297- 4 298- 3
385- 4 386- 5 387- 6 388- 4 389- 9 390-11 391-16 392-18 393-21 394-16 395-11 396- 7 397- 8 398- 7 399- 7
400-12 401-18 402-22 403-27 404-28 405-15 406- 7 407- 5 409- 6 413- 4 414- 4 415- 3

HURDAT STORM 562, # STATIONS-MAX SURGE 118
156- 4 157- 4 158- 4 166- 3 167- 7 168- 7 169- 7 170- 5 171- 4 172- 4 173- 4 174- 5 175- 5 176- 4 177- 6
178- 6 179- 6 180- 7 181- 9 182- 5 183- 7 184- 9 185- 5 186- 7 187- 4 188- 6 189- 6 190- 7 191- 8 192-11
193-12 194-14 195-17 196-11 197-14 198- 9 199-13 200- 9 201-12 202- 9 266- 4 267- 6 268- 4 270- 5 271- 7
272-13 273- 5 274- 4 289- 5 290- 6 291- 6 292- 5 293- 4 389- 4 390- 5 391- 7 392- 8 393- 7 394- 5 404- 3
405- 6 406- 7 407- 5 408- 3 409- 6 410- 9 411-19 412-13 413- 8 414- 8 415- 9 416-11 417- 8 418- 7 419- 5
420- 3 477-12 478-16 479-14 480-14 481-15 482-17 483-20 484-24 485-28 486-20 487-15 488-10 489- 9 490- 8
491- 8 492- 7 493- 8 494- 9 495-11 496-12 497-11 498-10 499- 9 500- 7 501- 6 502- 7 503- 7 504- 7 505- 5
506- 4 507- 4 508- 4 509- 6 510- 7 511- 9 512-10 513-11 514- 4 520- 5 521- 4 522- 5 523- 4

HURDAT STORM 565, # STATIONS-MAX SURGE 60
126- 3 127- 4 128- 4 129- 4 130- 4 131- 4 132- 5 133- 6 134- 7 135- 6 136- 7 137- 7 138-11 139-18 140-23
141-27 142-28 143-26 144-24 145-26 146-13 147-13 148-13 149-14 150- 6 151- 6 152- 6 153- 6 154- 5 155- 5
524- 9 525- 8 526-12 527-12 528-14 529-24 530-22 531-24 532-25 533-29 534-27 535-32 536-41 537-45 538-41
539-26 540- 8 541- 7 542- 7 543- 7 544- 7 545- 6 546- 5 547- 5 548- 5 549- 4 550- 4 551- 4 552- 3 553- 3

HURDAT STORM 575, # STATIONS-MAX SURGE 4
275- 4 276- 3 402- 3 408- 3

HURDAT STORM 584, # STATIONS-MAX SURGE 24
206- 4 207- 5 208- 7 209- 8 210- 6 211-12 212- 8 213- 6 214- 9 215- 7 216-10 217- 7 218- 5 219- 6 220- 6
221- 6 222- 6 223- 7 224- 5 225- 5 226- 5 227- 4 463- 4 464- 3

HURDAT STORM 596, # STATIONS-MAX SURGE 42
126- 4 127- 4 128- 4 129- 5 130- 5 131- 5 132-12 133- 9 134-16 135-10 136- 7 137-10 138- 9 139- 8 140- 7
141- 6 142- 5 143- 3 144- 3 145- 3 532- 3 533- 3 534- 3 535- 5 536- 6 537- 8 538- 9 539-10 540-11 541-12
542-12 543-14 544-18 545-18 546-14 547- 9 548- 5 549- 5 550- 4 551- 4 552- 4 553- 3

HURDAT STORM 589, # STATIONS-MAX SURGE 34
261- 3 263- 4 264- 5 265- 9 266-17 267-32 268-19 269- 9 270-14 271-11 272-13 273- 7 274- 7 330- 4 331- 4
350- 4 351- 4 352- 3 365- 4 409- 9 410- 9 411-18 412-19 413-22 414-20 415-34 416-45 417-17 418- 4 419- 4
420- 4 421- 4 422- 3 423- 3

HURDAT STORM 597, # STATIONS-MAX SURGE 208
214- 5 215- 5 216-12 217- 9 218- 9 219-19 220-16 221-22 222-22 223-26 224-16 225-14 226-12 227-10 228- 8
233- 7 234- 8 235- 9 236-10 237-10 238- 7 239- 6 240- 6 241- 6 242- 5 243- 4 254- 3 255-10 256-11 257- 9
258- 7 259- 6 260- 6 261- 5 262- 4 263- 4 264- 3 265- 4 266- 4 267- 4 268- 5 269- 7 270-10 271-10 272- 6
273-18 274-30 275-33 276-28 277-24 278-31 279-20 280-19 281-10 282- 7 285- 3 286- 4 287- 6 288-12 289-16
290-16 291-14 292-12 293-10 294- 7 295- 5 296- 5 297- 4 298- 3 300- 3 301- 5 302- 5 303- 6 304- 6 305- 6
306- 6 307- 7 308- 9 309- 9 310- 9 311- 9 312- 7 313- 6 314- 5 315- 8 316- 7 317- 6 318- 5 319- 5 328- 4
329- 6 330- 7 331- 9 332- 5 333- 5 334- 4 335- 3 336- 3 340- 3 341- 3 342- 3 343- 3 344- 4 345- 4 346- 7

347- 6 348- 7 349- 7 350- 9 351- 9 352- 8 353- 5 354- 6 362- 7 363- 9 364-14 365-14 366-14 367-13 368-17
369-10 370-14 371-11 372-10 373- 9 374- 6 375- 6 376- 6 377- 5 378- 6 379- 6 380- 4 381- 5 382- 4 383- 3
384- 4 385- 3 386- 5 387- 6 388- 4 389- 9 390-11 391-13 392-13 393-18 394-16 395-16 396- 9 397- 8 398- 5
399- 5 400- 8 401-13 402-17 403-23 404-39 405-55 406-49 407-46 408-37 409-34 410-16 411- 5 412- 9 413-10
414- 6 415- 5 416- 3 417- 3 419- 3 420- 4 421- 5 422- 6 423- 6 424- 7 425- 7 426-10 427-13 428-14 429- 6
440- 4 441- 5 442- 6 443- 8 444-11 445-11 446-15 447-12 448-11 449- 8 450- 6 451- 3 452- 9 453-17 454-11
455-12 456-14 457-25 458-31 459-33 460-31 461-16 462-16 463-17 464-14 465-10 466- 9 467- 5

HURDAT STORM 598, # STATIONS-MAX SURGE 34
166- 5 167- 7 168-10 169-12 170-12 171- 9 172- 7 173- 5 174- 4 177- 4 178- 3 179- 3 180- 3 181- 3 496- 3
497- 3 498- 4 499- 4 500- 4 501- 4 502- 5 503- 6 504- 6 505- 6 506- 8 507-10 508-13 509-17 510-14 511-12
512-10 513-13 514- 5 515- 3

HURDAT STORM 602, # STATIONS-MAX SURGE 63
109- 3 110- 3 111- 4 112- 4 113- 4 114- 5 115- 5 116- 4 117- 5 118- 5 119- 5 120- 8 121-10 122-16 123-24
124-29 125-28 126-44 127-33 128-24 129-33 130-25 131-19 132-26 133-21 134-30 135-23 136-19 137-24 138-21
139-10 140-10 539-22 540-23 541-26 542-27 543-29 544-32 545-31 546-32 547-31 548-33 549-36 550-39 551-42
552-53 553-48 554-37 555-25 556-16 557- 8 558- 4 559- 4 560- 5 561- 4 562- 4 563- 5 564- 5 565- 5 566- 5
567- 4 568- 4 569- 3

HURDAT STORM 604, # STATIONS-MAX SURGE 33
318- 4 319- 4 321- 4 322- 3 323- 3 324- 3 325- 5 326- 4 327- 4 328- 4 329- 4 330- 4 331- 4 346- 3 349- 3
350- 4 351- 4 352- 4 353- 4 354- 4 355- 5 356- 5 357- 3 358- 4 359- 5 360- 5 361- 5 362- 7 363- 7 364- 4
366- 3 367- 3 368- 3

HURDAT STORM 606, # STATIONS-MAX SURGE 34
319- 3 320- 3 321- 4 322- 4 323- 4 324- 4 325- 4 326- 4 327- 4 328- 4 329- 4 330- 4 331- 4 332- 4 333- 3
334- 3 345- 4 347- 4 348- 3 349- 3 350- 4 351- 4 352- 4 353- 4 354- 4 355- 4 356- 4 357- 4 358- 4 359- 4
360- 4 361- 4 362- 4 363- 4

HURDAT STORM 611, # STATIONS-MAX SURGE 22
275- 3 276- 3 277- 3 278- 4 279- 4 280- 5 281- 3 282- 4 284- 3 285- 3 398- 4 399- 4 400- 4 401- 4 402- 4
403- 5 404- 5 405- 4 406- 4 407- 4 408- 4 409- 3

HURDAT STORM 623, # STATIONS-MAX SURGE 50
263- 3 264- 4 265- 4 266- 4 267- 4 321- 4 322- 4 323- 4 324- 4 325- 4 326- 4 327- 4 328- 4 329- 4 331- 5
332- 5 333- 5 334- 5 335- 5 336- 5 337- 5 338- 5 339- 5 340- 6 341- 6 342- 5 343- 5 344- 5 345- 5 346- 6
347- 5 348- 5 349- 5 350- 5 356- 4 357- 4 358- 4 359- 4 360- 3 361- 4 362- 3 363- 3 403- 3 404- 4 415- 4
416- 4 417- 4 418- 4 419- 4 420- 3

HURDAT STORM 629, # STATIONS-MAX SURGE 63
238- 3 239- 4 240- 5 241- 5 242- 4 243- 3 249- 4 250- 3 254- 4 255- 8 256- 7 257- 6 258- 8 259- 6 260- 6
261- 8 262- 6 263- 7 264- 7 265- 6 266- 4 267- 4 288- 4 289- 4 290- 4 291- 4 391- 5 392- 6 393- 6 394- 5
395- 5 396- 5 413- 3 414- 3 415- 5 416- 7 417- 8 418-10 419-11 420-10 421-10 422-11 423-10 424- 8 425-10
426-10 427-11 428-10 429- 9 430- 5 431- 4 432- 4 433- 7 434- 8 435- 7 436- 5 437- 4 439- 3 440- 4 441- 5
442- 5 443- 5 444- 3

HURDAT STORM 630, # STATIONS-MAX SURGE 9
264- 3 266- 3 267- 3 409- 3 410- 9 411- 5 412- 4 413- 8 414- 7

HURDAT STORM 634, # STATIONS-MAX SURGE 100
134- 3 147- 3 148-10 149-21 150-13 151-13 152-20 153-24 154-20 155-15 156- 8 157- 4 168- 3 169-11 170- 8
171- 7 172- 6 173- 6 174- 5 175- 4 176- 4 177- 8 178- 7 179- 7 180- 8 181- 9 182- 5 183- 7 184- 9 185- 5
186- 7 187- 4 188- 5 189- 5 190- 6 191- 6 192- 9 193- 9 194-11 195-13 196- 8 197-10 198- 7 199- 9 200- 6
201- 8 202- 5 203- 4 204- 3 475- 4 476- 5 477- 8 478-11 479- 9 480-10 481-11 482-13 483-15 484-20 485-23
486-16 487-11 488- 7 489- 7 490- 7 491- 7 492- 7 493- 8 494- 9 495-11 496-11 497- 9 498-10 499-10 500-10
501- 9 502-10 503- 9 504-10 505- 9 506-10 507-10 508-10 509-28 510-27 511- 7 520- 3 521- 6 522- 9 523-10
524-25 525-26 526-38 527-35 528-31 529-31 530-15 531- 6 544- 3 545- 3

HURDAT STORM 635, # STATIONS-MAX SURGE 24

221- 4 222- 4 223-10 224- 8 225- 4 226- 6 227- 5 228- 4 229- 3 244- 3 280- 4 400- 3 401- 4 402- 5 403- 5
404- 5 439- 3 453- 9 454- 4 455- 4 457-11 458- 7 459- 4 460- 3

HURDAT STORM 639, # STATIONS-MAX SURGE 90
144- 3 145- 5 147- 3 148- 4 149- 7 150- 4 151- 4 152- 7 153-10 154-11 155-11 156- 9 157- 8 158- 8 159- 6
160- 4 161- 3 166- 6 167-11 168-18 169-24 170-16 171-10 172- 7 173- 6 174- 4 177- 4 220- 6 225- 7 226-11
227-15 228-15 229- 3 233- 3 234- 3 236- 4 237- 7 238- 6 239- 4 240- 3 434- 5 435- 4 436- 3 443- 5 444- 7
445- 8 446- 7 447- 5 448- 4 449- 4 450- 3 451- 3 452- 7 454- 8 455- 9 456-11 501- 3 502- 5 503- 5 504- 7
505- 7 506- 8 507-10 508-13 509-28 510-39 511-31 512-15 513-31 514- 5 515- 4 516- 4 517- 4 518- 5 519- 5
520-11 521-17 522-17 523-11 524-20 525-14 526-16 527-13 528-11 529- 9 530- 5 531- 7 532- 6 533- 5 534- 3

HURDAT STORM 643, # STATIONS-MAX SURGE 93
190- 4 191- 7 192-14 193-15 194-21 195-32 196-17 197-27 198- 7 199- 8 200- 5 206- 3 208- 5 209- 4 211- 5
212- 4 213- 3 214- 5 215- 4 216- 5 217- 4 219- 4 262- 3 263- 6 264- 5 265- 5 266- 6 267- 7 268- 4 270- 5
271- 5 272- 6 273- 4 274- 6 275- 5 276- 4 277- 4 278- 3 315- 3 317- 3 318- 3 362- 5 363- 7 364- 5 365- 5
366- 4 367- 4 368- 3 404- 4 405- 4 406- 5 407- 5 408- 6 409- 7 410- 5 411- 6 412- 7 413- 7 414- 6 415- 8
416-11 417-11 418-11 419-10 420- 9 421- 6 422- 5 459- 3 460- 4 461- 4 462- 5 463- 6 464- 6 465- 6 466- 8
467- 6 468- 6 469- 5 470- 5 471- 5 472- 7 473- 4 479- 4 480- 8 481-11 482-34 483-40 484-48 485-40 486-27
487-19 488- 9 489- 4

HURDAT STORM 651, # STATIONS-MAX SURGE 14
104- 3 446- 3 452- 5 455- 4 456- 7 574- 3 575- 3 576- 3 577- 4 682- 3 683- 4 684- 7 685- 6 686- 4

HURDAT STORM 657, # STATIONS-MAX SURGE 48
289- 5 290- 6 291- 7 292- 6 293- 7 294- 8 295- 9 296-10 297-11 298- 9 299- 6 300- 5 301- 5 302- 6 303- 6
304- 5 305- 5 306- 5 307- 5 308- 4 309- 4 310- 4 311- 4 312- 4 372- 5 373- 5 374- 5 375- 5 376- 5 377- 5
378- 6 379- 6 380- 6 381- 6 382- 6 383- 6 384- 8 385-10 386-11 387-10 388-11 389-11 390- 9 391-10 392-10
393- 9 394- 5 395- 3

HURDAT STORM 662, # STATIONS-MAX SURGE 69
211- 4 212- 4 213- 4 214- 7 215- 6 216-10 217- 7 218- 5 219- 7 220- 5 221- 6 222- 6 223- 6 224- 5 225- 4
247- 3 248- 4 249- 5 250- 3 254- 3 255- 5 256- 4 257- 4 258- 6 259- 6 260- 5 261- 8 262- 6 263- 7 264- 5
265- 3 404- 4 405- 6 406- 7 407- 6 408- 5 412- 3 417- 4 418- 5 419- 6 420-10 421-11 422-12 423- 9 424- 7
425- 8 426- 7 427- 6 428- 6 429- 6 430- 4 431- 3 433- 7 434- 8 435- 4 453- 4 457- 6 458- 8 459- 8 460- 9
461- 8 462- 9 463-13 464-14 465-12 466-10 467- 6 468- 4 469- 3

HURDAT STORM 669, # STATIONS-MAX SURGE 94
189- 4 190- 4 201- 5 202- 7 203- 8 204-12 205-15 206-16 207-13 208-17 209-12 210- 8 211-11 212- 8 213- 3
214- 4 215- 3 216- 3 255- 4 256-10 257-13 258-21 259-22 260-21 261-21 262-16 263-17 264-13 265-10 266- 8
267- 8 268- 9 269- 8 270-11 271- 9 272- 7 273- 8 274- 9 275- 8 276- 7 277- 7 278- 6 279- 5 280- 5 281- 5
282- 4 399- 3 400- 4 401- 4 402- 5 403- 5 404- 5 405- 6 406- 7 407- 8 408- 8 409-10 410- 7 411- 8 412-10
413-13 414-10 415-10 416- 8 417-10 418-12 419-15 420-20 421-21 422-23 423-26 424-26 425-25 426-18 427-12
428- 5 463- 3 464- 4 465- 4 466-11 467-10 468-12 469-12 470-15 471-18 472-24 473-21 474-20 475-18 476-17
477-15 478- 9 489- 3 490- 4

HURDAT STORM 672, # STATIONS-MAX SURGE 69
158- 5 159- 5 160- 7 161- 9 162-11 163-11 164-11 165-15 166-22 167-33 168-41 169-50 170-46 171-35 172-26
173-21 174-17 175-13 176-10 177-15 178-12 179-10 180-11 181-10 182- 8 183- 8 185- 7 291- 3 292-10 293-15
294-10 295- 6 296- 5 297- 6 298- 5 385- 6 386- 6 387-10 388- 6 389-17 390-17 391-12 392- 5 496-10 497-10
498-11 499-12 500-13 501-13 502-17 503-19 504-23 505-24 506-27 507-34 508-44 509-77 510-62 511-54 512-56
513-58 514-26 515-17 516-14 517-11 518- 9 519- 7 520- 8 521- 9

HURDAT STORM 676, # STATIONS-MAX SURGE 11
336- 4 337- 5 338- 3 339- 4 340- 4 341- 5 342- 7 343- 8 344- 4 345- 4 346- 4

HURDAT STORM 688, # STATIONS-MAX SURGE 34
197- 3 199- 4 200- 4 201- 7 202- 6 203- 5 204- 4 205- 4 206- 4 207- 3 208- 4 209- 3 211- 3 465- 3 466- 3
467- 4 468- 3 469- 4 470- 4 471- 4 472- 5 473- 5 474- 5 475- 5 476- 5 477- 7 478- 9 479-10 480- 6 481- 5
482- 4 483- 3 484- 3 485- 3

HURDAT STORM 690, # STATIONS-MAX SURGE 50
116- 6 117- 6 118-10 119-16 120-15 121-26 122-21 123-34 124-24 125-18 126-25 127-20 128-16 129-20 130-16
131-13 132-18 133-15 134-20 135-14 136-10 137-13 138- 9 139- 5 140- 4 539- 8 540-10 541-14 542-17 543-19
544-21 545-21 546-21 547-20 548-21 549-22 550-23 551-24 552-29 553-30 554-33 555-35 556-35 557-31 558-24
559-17 560- 9 561- 6 562- 5 563- 3

HURDAT STORM 693, # STATIONS-MAX SURGE 15
101- 6 102- 5 103- 5 104- 6 106- 3 565- 3 566- 3 570- 3 571- 4 572- 5 573- 5 574- 6 575- 6 576- 7 577-10

HURDAT STORM 702, # STATIONS-MAX SURGE 69
274- 5 275- 6 276- 6 277- 6 278- 9 279- 8 280-10 281- 5 282- 4 291- 5 292- 6 293-10 294- 8 295- 5 296- 7
297- 9 298- 9 299- 8 300- 8 301- 7 302- 9 303- 7 304- 8 305-14 306-12 307- 8 308- 5 309- 4 310- 4 311- 3
364- 3 365- 3 366- 4 367- 3 368- 4 370- 4 371- 5 372- 6 373-11 374-14 375-20 376-18 377- 9 378- 8 379-10
380-11 381-11 382-14 383-12 384-12 385- 9 386- 8 387- 9 388-10 389-13 390-12 391-10 392-10 393- 4 400- 4
401- 6 402- 9 403-12 404-18 405-15 406-10 407- 8 408- 6 409- 5

HURDAT STORM 703, # STATIONS-MAX SURGE 120
101- 4 102- 4 103- 5 104- 7 105- 3 106- 5 107- 3 108- 5 109- 6 110- 6 111- 5 112- 4 113- 4 114- 4 115- 4
116- 3 118- 3 119- 3 120- 3 121- 4 122- 3 123- 4 124- 4 125- 3 126- 4 127- 4 128- 5 129- 5 130- 6 131- 6
132- 7 133- 7 134- 8 135- 8 136- 8 137- 8 138- 8 139-10 140-12 141-12 142-15 143-18 144-21 145-24 146-10
147-11 148-11 149-13 150- 6 151- 6 152- 7 153- 8 154- 7 155- 6 169- 6 170- 4 171- 3 499- 3 506- 3 507- 4
508- 4 509-12 510-13 521- 4 522- 4 523- 4 524-10 525- 9 526-13 527-14 528-16 529-25 530-17 531-22 532-23
533-26 534-24 535-23 536-17 537-13 538-10 539- 9 540- 8 541- 8 542- 8 543- 8 544- 8 545- 8 546- 7 547- 7
548- 6 549- 5 550- 5 551- 5 552- 4 553- 4 554- 4 555- 4 556- 4 557- 4 558- 4 559- 4 560- 4 561- 4 562- 4
563- 5 564- 5 565- 5 566- 6 567- 7 568- 7 569- 7 570- 7 571- 7 572- 7 573- 6 574- 6 575- 6 576- 6 577- 6

HURDAT STORM 704, # STATIONS-MAX SURGE 67
116- 3 118- 4 119- 7 120- 4 121- 7 122- 4 123- 8 124- 7 125- 6 126-11 127- 9 128- 8 129-15 130-11 131- 8
132-13 133- 9 134-13 135- 9 136- 6 137- 8 139- 5 139- 4 140- 3 166- 3 167- 6 168- 8 169-10 170- 7 171- 5
172- 4 504- 3 505- 3 506- 4 507- 5 508- 6 509-14 510-20 511-13 512- 9 513-13 514- 4 538- 4 539- 5 540- 7
541- 9 542-10 543-12 544-14 545-15 546-16 547-15 548-16 549-16 550-15 551-13 552-14 553-12 554-10 555- 8
556- 9 557- 9 558- 9 559- 8 560- 6 561- 5 562- 4

HURDAT STORM 711, # STATIONS-MAX SURGE 24
256- 3 257- 3 258- 4 259- 4 260- 5 261- 8 262-10 263-15 264-12 265-10 266- 8 267- 7 416- 8 417-10 418-12
419-15 420-20 421-15 422- 8 423- 6 424- 5 425- 4 426- 4 427- 4

HURDAT STORM 712, # STATIONS-MAX SURGE 148
183- 4 184- 5 185- 5 186- 8 187- 8 188-13 189-16 190-15 191-14 192-20 193-18 194-17 195-18 196-14 197-14
198-12 199-13 200-10 201-11 202- 9 203- 7 204- 6 205- 6 206- 5 207- 4 208- 5 209- 4 210- 3 211- 4 212- 3
271- 3 272- 8 273- 3 275- 5 276- 4 277- 3 278- 4 286- 3 287- 4 288- 6 289- 8 290- 7 291- 6 292- 4 293- 4
294- 4 295- 4 296- 4 297- 5 298- 5 299- 5 300- 6 301- 8 302-12 303-16 304-14 305-14 306-17 307-16 308-14
309-12 310-12 311- 9 312- 7 313- 7 314- 6 315- 6 316- 5 317- 5 318- 4 319- 3 362- 4 363- 5 364- 8 365- 7
366- 8 367- 9 368-10 369- 9 370-11 371-14 372-16 373-22 374-23 375-20 376-14 377-16 378-16 379-12 380- 7
381- 9 382- 6 383- 5 384- 5 385- 5 386- 4 387- 4 388- 6 389- 4 390- 4 391- 6 392- 7 393- 9 394- 8 395- 7
396- 5 397- 4 400- 5 401- 5 404- 5 405- 9 406-10 407- 8 408- 8 409- 4 410- 6 411-13 412- 7 468- 4 469- 4
470- 5 471- 5 472- 6 473- 6 474- 6 475- 6 476- 7 477- 9 478-13 479-13 480-13 481-15 482-15 483-18 484-21
485-29 486-27 487-25 488-19 489-19 490-19 491-17 492-10 493- 9 494- 7 495- 6 496- 4 497- 3

HURDAT STORM 722, # STATIONS-MAX SURGE 52
126- 3 127- 4 128- 6 129-10 130-11 131- 6 132-11 133-12 134-21 135-17 136-15 137-20 138-17 139-15 140-13
141-11 142-10 143- 9 144- 8 145- 8 146- 6 147- 5 148- 5 149- 4 150- 3 151- 3 527- 4 528- 3 529- 5 530- 5
531- 7 532- 7 533- 9 534- 9 535- 9 536-11 537-13 538-16 539-18 540-19 541-22 542-23 543-23 544-22 545-17
546-13 547- 9 548-13 549-10 550- 6 551- 5 552- 4

HURDAT STORM 731, # STATIONS-MAX SURGE 68
138- 4 139- 4 140- 5 143- 5 144-10 145-19 146- 8 147-11 148-15 149-19 150-11 151-11 152-17 153-24 154-28
155-28 156-19 157-12 158- 8 159- 6 160- 5 161- 4 162- 3 164- 3 165- 4 166- 6 167- 9 168-15 169-19 170-13
171- 9 172- 7 173- 6 506- 7 507- 8 508-11 509-22 510-33 511-23 512-12 513-22 514- 6 515- 5 516- 5 517- 5
518- 5 519- 6 520- 8 521-14 522-21 523-23 524-46 525-35 526-39 527-32 528-25 529-25 530-20 531-26 532-24

533-21 534-11 535- 7 536- 5 537-10 538- 9 539- 6 540- 5

HURDAT STORM 739, # STATIONS-MAX SURGE 20
101- 9 102-11 103-13 104-13 105- 6 106- 7 107- 4 108- 4 109- 3 563- 3 568- 3 569- 4 570- 6 571- 6 572- 9
573-11 574-14 575-16 576-16 577-14

HURDAT STORM 741, # STATIONS-MAX SURGE 43
180- 6 181-11 182- 5 183- 8 184-11 185- 7 186-10 187- 6 188- 8 189- 8 190- 7 191- 7 192-10 193-10 194-10
195-11 196- 8 197- 9 198- 7 199- 8 200- 6 480- 9 481-10 482-11 483-12 484-14 485-17 486-15 487-13 488-10
489- 9 490-10 491-10 492- 9 493-10 494-12 495-13 496-12 497-11 498-10 499- 4 500- 3 504- 3

HURDAT STORM 746, # STATIONS-MAX SURGE 64
188- 5 189- 7 190- 9 191-10 192-13 193-14 194-14 195-19 196-15 197-22 198-15 199-20 200-14 201-18 202-13
203-10 204- 9 205- 7 206- 5 207- 4 208- 5 209- 4 261- 5 262- 6 263- 7 264- 7 265- 6 266- 5 267- 5 270- 3
412- 3 413- 4 414- 3 415- 4 416- 6 417- 7 418- 9 419-10 420-10 421- 8 422- 6 469- 4 470- 4 471- 5 472- 6
473- 6 474- 8 475-10 476-13 477-19 478-24 479-20 480-22 481-25 482-28 483-29 484-25 485-19 486-17 487-15
488-12 489-10 490- 8 491- 5

HURDAT STORM 748, # STATIONS-MAX SURGE 47
297- 3 298- 3 299- 4 300- 5 301- 6 302- 8 303- 9 304- 9 305-10 306-12 307-12 308-10 309- 8 310- 9 311- 7
312- 5 313- 5 314- 4 315- 5 316- 4 317- 4 318- 3 362- 3 363- 4 364- 7 365- 7 366- 8 367- 7 368- 9 369- 7
370- 8 371-11 372-13 373-19 374-17 375-16 376-10 377-10 378- 9 379- 9 380- 6 381- 7 382- 5 383- 4 384- 4
385- 3 388- 3

HURDAT STORM 756, # STATIONS-MAX SURGE 39
101-13 102-14 103-13 104-13 105- 9 106- 9 107- 7 108- 7 109- 8 110- 7 111- 7 112- 7 113- 6 114- 7 115- 7
116- 6 117- 5 118- 5 119- 5 120- 4 122- 4 560- 6 561- 6 562- 6 563- 8 564- 8 565- 8 566- 9 567- 9 568- 8
569- 9 570- 9 571-10 572-11 573-12 574-13 575-15 576-18 577-20

HURDAT STORM 757, # STATIONS-MAX SURGE 17
148- 3 149- 3 150- 3 151- 3 152- 5 153- 7 154- 6 155- 4 509- 4 510- 4 524- 6 525- 7 526-12 527- 8 528- 3
529-11 530- 5

HURDAT STORM 775, # STATIONS-MAX SURGE 27
153- 4 154- 8 155- 8 156- 8 157- 5 158- 3 168- 5 169- 7 170- 4 171- 3 289- 4 290- 3 393- 5 394- 5 395- 4
507- 3 508- 4 509-10 510-15 511- 7 513- 6 520- 3 521- 7 522- 9 523- 9 524-12 525- 9

HURDAT STORM 777, # STATIONS-MAX SURGE 68
244- 4 245- 5 246- 4 247- 3 249- 6 250- 5 251- 4 252- 3 253- 6 254-10 255-17 256-15 257-13 258-16 259-16
260-17 261-21 262-22 263-31 264-26 265-21 266-16 267-17 268-11 269- 6 270- 9 271- 8 272- 9 273- 4 274- 4
275- 3 341- 3 346- 4 406- 4 407- 4 408- 5 409- 4 410- 5 411-12 412-13 413-14 414-14 415-20 416-26 417-27
418-36 419-43 420-41 421-30 422-21 423-20 424-18 425-18 426-17 427-19 428-19 429-16 430-10 431- 8 432- 7
433-11 434-12 435-12 436- 9 437- 6 438- 5 439- 4 684- 4

HURDAT STORM 779, # STATIONS-MAX SURGE 57
164- 3 165- 4 166- 5 167- 5 168- 6 169- 5 170- 5 171- 8 172-10 173-15 174-18 175-16 176-12 177-18 178-13
179-11 180-10 181-10 182- 8 183- 8 184- 8 185- 7 186- 7 187- 7 188- 8 189- 9 190- 9 346- 4 375- 3 376- 3
488-11 489-11 490-11 491-10 492- 8 493- 8 494- 8 495- 9 496-10 497-10 498-11 499-12 500-13 501-14 502-20
503-25 504-31 505-28 506-18 507-11 508- 7 511- 7 512- 8 513- 8 514- 5 515- 4 516- 3

HURDAT STORM 783, # STATIONS-MAX SURGE 48
101- 6 102- 5 105- 6 106- 4 107- 9 108-11 109-18 110-21 111-25 112-20 113-13 114-23 115-21 116-19 117-12
118-13 119-15 120-11 121-14 122-11 123-14 124-12 125-10 126-13 127-11 128-10 550-13 551-13 552-14 553-14
554-14 555-15 556-15 557-16 558-16 559-16 560-18 561-19 562-22 563-29 564-26 565-28 566-31 567-33 568-24
569-19 684- 3 685- 3

HURDAT STORM 797, # STATIONS-MAX SURGE 30
223- 5 259- 3 260- 3 261- 4 262- 4 263- 5 264- 4 265- 4 266- 4 267- 5 268- 4 269- 4 270- 7 271- 7 272-10
273- 7 274- 6 275- 7 276- 6 277- 5 278- 6 400- 3 401- 3 403- 4 404- 8 405-13 406-13 407-11 408-10 409- 7
410-10 411-13 412-11 413-10 414- 8 415- 7 416- 6 417- 5 418- 6 419- 6 420- 7 421- 6 422- 5 423- 5 424- 4

425- 4 453- 3 457- 5 458- 4 459- 4

HURDAT STORM 805, # STATIONS-MAX SURGE 14
310- 3 313- 3 317- 3 360- 3 363- 4 364- 3 366- 3 367- 3 368- 3 369- 3 370- 3 371- 3 372- 3 381- 3

HURDAT STORM 807, # STATIONS-MAX SURGE 93
197- 3 199- 4 200- 3 201- 4 202- 4 203- 3 204- 5 205- 6 206- 6 207- 5 208- 8 209- 6 210- 4 211- 7 212- 5
213- 3 214- 5 215- 3 216- 5 217- 3 258- 5 259- 5 260- 6 261- 6 262- 6 263- 5 264- 5 265- 4 266- 3 269- 4
270- 4 271- 5 272- 5 273- 6 274- 8 275- 9 276- 6 277- 5 278- 7 279- 4 280- 4 286- 3 287- 3 397- 5 398- 4
401- 5 402- 5 403- 5 404-11 405-14 406-14 407-12 408-10 409- 9 410- 7 411- 5 412- 5 413- 5 414- 4 416- 4
417- 4 418- 5 419- 6 420- 7 421- 6 422- 7 423- 7 424- 5 425- 7 426- 5 459- 3 460- 4 461- 3 462- 4 463- 5
464- 6 465- 7 466- 8 467- 6 468- 7 469- 7 470- 9 471- 9 472- 9 473- 8 474- 8 475- 8 476- 6 477- 4 478- 4
479- 4 480- 4 481- 4 482- 4 483- 4

HURDAT STORM 809, # STATIONS-MAX SURGE 43
129- 3 130- 4 131- 4 132- 5 133- 5 134- 7 135- 7 136- 7 137- 9 138-10 139-11 140-12 141-10 142- 9 143- 7
144- 7 145- 7 146- 4 147- 3 148- 3 149- 3 528- 3 529- 6 530- 5 531- 5 532- 6 533- 7 534- 7 535- 9 536-12
537-17 538-20 539-17 540-11 541- 9 542- 8 543- 7 544- 7 545- 6 546- 5 547- 4 548- 4 549- 3

HURDAT STORM 812, # STATIONS-MAX SURGE 34
127- 3 128- 4 129- 4 130- 6 131- 9 132-15 133-16 134-29 135-20 136-17 137-26 138-22 139-19 140-15 141-13
142- 9 143- 3 533- 3 535- 3 536-14 537-19 538-22 539-24 540-26 541-29 542-29 543-29 544-32 545-28 546-17
547- 8 548- 5 549- 3 550- 3

HURDAT STORM 813, # STATIONS-MAX SURGE 15
108- 4 109- 5 110- 4 111- 3 114- 3 562- 3 563- 4 564- 3 565- 4 566- 4 567- 5 568- 6 569- 7 570- 6 571- 4

HURDAT STORM 820, # STATIONS-MAX SURGE 16
269- 6 270- 9 271-10 273-16 274-24 275-20 276-11 277- 5 278- 4 406-13 407-19 408-25 409-17 410- 7 413- 9
414- 4

HURDAT STORM 832, # STATIONS-MAX SURGE 25
143- 5 144-11 145-15 146- 7 147- 7 148- 7 149- 6 150- 4 151- 4 152- 4 153- 3 510- 3 525- 3 526- 5 527- 5
528- 6 529-10 530-10 531-12 532-14 533-17 534-12 535- 5 536- 3 539- 3

HURDAT STORM 833, # STATIONS-MAX SURGE 68
171- 4 172- 5 173- 5 174- 6 175- 6 176- 5 177-10 178- 7 179- 5 180- 5 181- 5 183- 3 184- 3 187- 4 188- 7
189-11 190-11 191- 9 192-13 193- 7 194- 6 195- 6 196- 6 197- 6 198- 7 199-10 200- 9 201-11 202- 9 203- 8
204- 6 205- 4 474- 5 475- 7 476- 9 477-10 478-13 479-10 480-10 481- 8 482- 6 483- 6 484- 6 485- 7 486- 8
487-16 488-14 489-14 490-13 491- 9 492- 4 494- 4 495- 4 496- 4 497- 5 498- 5 499- 6 500- 7 501- 8 502-11
503-13 504-14 505-12 506- 9 507-10 508- 8 509- 7 510- 4

HURDAT STORM 835, # STATIONS-MAX SURGE 138
268- 4 269- 5 270- 6 271- 5 272- 4 273- 5 274- 8 275- 6 276- 6 277- 5 278- 4 279- 7 280-13 281-13 282-15
283-10 284-12 285-18 286-21 287-22 288-33 289-36 290-35 291-33 292-29 293-28 294-26 295-25 296-28 297-33
298-32 299-29 300-31 301-32 302-42 303-35 304-36 305-42 306-42 307-40 308-34 309-27 310-30 311-23 312-18
313-16 314-14 315-17 316-15 317-14 318-11 319-10 320- 5 326- 4 327- 5 328- 6 329- 7 330- 9 331-10 332- 6
333- 7 334- 5 335- 4 336- 4 337- 3 339- 3 340- 3 341- 4 342- 4 343- 4 344- 4 345- 5 346- 8 347- 7 348- 8
349- 8 350-10 351-10 352- 9 353- 6 354- 8 355- 5 359- 4 360- 6 361- 5 362-12 363-15 364-24 365-25 366-26
367-23 368-29 369-22 370-27 371-33 372-39 373-55 374-61 375-55 376-45 377-39 378-35 379-45 380-37 381-44
382-39 383-36 384-32 385-33 386-29 387-27 388-34 389-28 390-28 391-31 392-33 393-38 394-37 395-38 396-33
397-31 398-27 399-20 400-15 401-18 402-17 403-12 404- 6 405- 3 406- 5 407- 6 408- 6 409- 9 410- 5 411- 3
412- 6 413- 7 414- 5

HURDAT STORM 838, # STATIONS-MAX SURGE 99
143- 8 144-16 145-24 146-13 147-14 148-10 149-18 150-10 151-10 152-11 153-13 154-14 155-13 156- 8 157- 6
158- 5 159- 3 160- 3 161- 3 164- 3 165- 5 166- 8 167-12 168-17 169-19 170-15 171-12 172-10 173-10 174-10
175- 8 176- 6 177-13 178- 9 179- 7 180- 7 181- 7 182- 4 183- 5 184- 6 185- 4 186- 5 187- 4 188- 4 189- 5
190- 5 191- 5 192- 7 193- 7 486-11 487- 9 488- 7 489- 6 490- 6 491- 6 492- 5 493- 5 494- 6 495- 7 496- 7
497- 7 498- 8 499- 9 500-10 501-11 502-16 503-16 504-17 505-15 506-12 507-12 508-13 509-14 510-20 511-24

512-16 513-25 514- 6 515- 4 516- 4 517- 4 518- 4 519- 4 520- 6 521- 9 522-13 523-10 524-20 525-17 526-20
527-18 528-18 529-19 530-18 531-11 532- 8 533-26 534-16 535- 6

HURDAT STORM 839, 0 STATIONS-MAX SURGE 101
169- 3 170- 3 177- 3 178- 3 179- 3 180- 4 181- 4 182- 4 183- 4 184- 5 185- 7 186-10 187-12 188-17 189-18
190-16 191-14 192-20 193-18 194-17 195-18 196-13 197-14 198-11 199-13 200-10 201-11 202- 9 203- 7 204- 6
205- 5 265- 3 266- 5 267- 8 268- 5 270- 6 271- 8 272-15 273- 8 274- 6 275- 8 276- 7 277- 7 278- 8 279- 6
280- 4 281- 3 402- 4 403- 4 404- 8 405-10 406-12 407- 9 408-11 409- 7 410-12 411-19 412-14 413- 8 414- 9
415-10 416-12 417- 9 418- 8 419- 5 475- 6 476- 8 477-10 478-13 479-12 480-13 481-15 482-16 483-19 484-24
485-33 486-28 487-26 488-20 489-20 490-22 491-23 492-16 493-12 494- 7 495- 5 496- 4 497- 4 498- 4 499- 4
500- 4 501- 3 502- 3 503- 3 504- 3 505- 3 509- 3 510- 4 511- 4 512- 3 513- 4

HURDAT STORM 841, 0 STATIONS-MAX SURGE 31
133- 3 134- 4 135- 4 136- 4 137- 5 138- 7 139- 8 140- 8 141- 7 142- 6 143- 5 144- 5 145- 5 146- 3 530- 3
531- 4 532- 4 533- 5 534- 5 535- 6 536- 8 537-10 538-12 539-13 540-10 541- 5 542- 4 543- 4 544- 4 545- 4
546- 3

HURDAT STORM 852, 0 STATIONS-MAX SURGE 2
454- 5 455- 4

HURDAT STORM 859, 0 STATIONS-MAX SURGE 25
161- 3 166- 4 167- 7 168-12 169-15 170- 9 171- 6 172- 4 173- 3 504- 3 505- 4 506- 4 507- 5 508- 7 509-16
510-24 511-21 512-12 513-23 514- 4 515- 4 516- 4 517- 4 518- 4 519- 3

HURDAT STORM 864, 0 STATIONS-MAX SURGE 36
206- 4 207- 5 208- 5 209- 8 210- 6 211-11 212- 8 213- 5 214- 8 215- 5 216- 7 217- 4 219- 4 220- 3 221- 4
222- 4 223- 4 224- 3 453- 3 457- 4 458- 5 459- 5 460- 5 461- 4 462- 6 463- 8 464-10 465-11 466-13 467-11
468-13 469-12 470-11 471- 5 472- 4 473- 3

HURDAT STORM 867, 0 STATIONS-MAX SURGE 39
130- 3 131- 3 132- 4 133- 4 134- 5 135- 6 136- 6 137- 9 138-10 139-11 140-10 141- 9 142- 8 143- 7 144- 6
145- 6 146- 4 147- 4 148- 4 149- 3 529- 4 530- 5 531- 5 532- 6 533- 7 534- 7 535- 8 536-10 537-12 538-15
539-16 540-15 541-10 542- 8 543- 7 544- 5 545- 4 546- 4 547- 3

HURDAT STORM 873, 0 STATIONS-MAX SURGE 51
231- 4 232- 3 253- 3 254- 3 255- 4 256- 4 257- 4 258- 4 259- 3 260- 3 261- 3 263- 4 264- 5 265- 6 266- 6
267- 8 268-25 269-29 270-45 271-38 272-36 273-19 274-19 275-16 276-12 277- 9 406-14 407-16 408-18 409-23
410-23 411-44 412-56 413-65 414-58 415-36 416- 9 417- 6 418- 6 419- 5 420- 3 422- 3 423- 3 424- 3 425- 4
426- 4 427- 4 428- 4 679- 5 680- 8 681- 5

HURDAT STORM 874, 0 STATIONS-MAX SURGE 39
128- 3 129- 4 130- 5 131- 7 132-12 133-13 134-23 135-16 136-12 137-16 138-13 139-10 140- 8 141- 7 142- 6
143- 6 144- 6 145- 7 146- 3 530- 4 531- 7 532- 7 533- 8 534- 7 535- 8 536- 9 537-11 538-12 539-13 540-15
541-18 542-20 543-22 544-25 545-23 546-12 547- 7 548- 5 549- 3

MIS/NEARSHORE STATION 101, 0 HURDAT STORMS-MAX SURGE 5
693- 6 703- 4 739- 9 756-13 783- 6

MIS/NEARSHORE STATION 102, 0 HURDAT STORMS-MAX SURGE 5
693- 5 703- 4 739-11 756-14 783- 5

MIS/NEARSHORE STATION 103, 0 HURDAT STORMS-MAX SURGE 4
693- 5 703- 5 739-13 756-13

MIS/NEARSHORE STATION 104, 0 HURDAT STORMS-MAX SURGE 5
651- 3 693- 6 703- 7 739-13 756-13

MIS/NEARSHORE STATION 105, 0 HURDAT STORMS-MAX SURGE 4
703- 3 739- 6 756- 9 783- 6

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MIS/NEARSHORE STATION  106, # HURDAT STORMS-MAX SURGE    6
324- 3  693- 3  703- 5  739- 7  756- 9  783- 4

MIS/NEARSHORE STATION  107, # HURDAT STORMS-MAX SURGE    5
324- 4  703- 3  739- 4  756- 7  783- 9

MIS/NEARSHORE STATION  108, # HURDAT STORMS-MAX SURGE    7
324- 5  445- 3  703- 5  739- 4  756- 7  783-11  813- 4

MIS/NEARSHORE STATION  109, # HURDAT STORMS-MAX SURGE    8
324- 8  445- 4  602- 3  703- 6  739- 3  756- 8  783-18  813- 5

MIS/NEARSHORE STATION  110, # HURDAT STORMS-MAX SURGE    8
218- 4  324-10  445- 4  602- 3  703- 6  756- 7  783-21  813- 4

MIS/NEARSHORE STATION  111, # HURDAT STORMS-MAX SURGE    8
218-10  324-12  445- 5  602- 4  703- 5  756- 7  783-25  813- 3

MIS/NEARSHORE STATION  112, # HURDAT STORMS-MAX SURGE    7
218-15  324-10  445- 5  602- 4  703- 4  756- 7  783-20

MIS/NEARSHORE STATION  113, # HURDAT STORMS-MAX SURGE    7
218-14  324- 8  445- 4  602- 4  703- 4  756- 6  783-13

MIS/NEARSHORE STATION  114, # HURDAT STORMS-MAX SURGE    8
218-20  324-10  445- 5  602- 5  703- 4  756- 7  783-23  813- 3

MIS/NEARSHORE STATION  115, # HURDAT STORMS-MAX SURGE    7
218-22  324- 9  445- 6  602- 5  703- 4  756- 7  783-21

MIS/NEARSHORE STATION  116, # HURDAT STORMS-MAX SURGE    9
218-21  324- 7  445- 6  602- 4  690- 6  703- 3  704- 3  756- 6  783-19

MIS/NEARSHORE STATION  117, # HURDAT STORMS-MAX SURGE    7
218-13  324- 6  445- 5  602- 5  690- 6  756- 5  783-12

MIS/NEARSHORE STATION  118, # HURDAT STORMS-MAX SURGE    9
218-14  324- 6  445- 6  602- 5  690-10  703- 3  704- 4  756- 5  783-13

MIS/NEARSHORE STATION  119, # HURDAT STORMS-MAX SURGE    9
218-16  324- 6  445- 7  602- 5  690-16  703- 3  704- 7  756- 5  783-15

MIS/NEARSHORE STATION  120, # HURDAT STORMS-MAX SURGE   10
  5- 3  218-10  324- 5  445- 6  602- 8  690-15  703- 3  704- 4  756- 4  783-11

MIS/NEARSHORE STATION  121, # HURDAT STORMS-MAX SURGE    9
  5- 5  218-12  324- 6  445- 8  602-10  690-26  703- 4  704- 7  783-14

MIS/NEARSHORE STATION  122, # HURDAT STORMS-MAX SURGE   10
  5- 6  218- 9  324- 5  445- 8  602-16  690-21  703- 3  704- 4  756- 4  783-11

MIS/NEARSHORE STATION  123, # HURDAT STORMS-MAX SURGE   10
  5-12  218-12  295- 6  324- 5  445-10  602-24  690-34  703- 4  704- 8  783-14

MIS/NEARSHORE STATION  124, # HURDAT STORMS-MAX SURGE   11
  5- 9  218- 9  295- 6  324- 5  405- 4  445-11  602-29  690-24  703- 4  704- 7  783-12

MIS/NEARSHORE STATION  125, # HURDAT STORMS-MAX SURGE   11
  5- 6  218- 7  295- 5  324- 4  405- 6  445- 9  602-28  690-18  703- 3  704- 6  783-10
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MIS/NEARSHORE STATION  126, @ HURDAT STORMS-MAX SURGE   15
  5- 9  183- 4  218-10  295-10  324- 5  405- 7  445-17  565- 3  586- 4  602-44  690-25  703- 4  704-11  722- 3  783-13

MIS/NEARSHORE STATION  127, @ HURDAT STORMS-MAX SURGE   17
  5- 7  183- 4  211- 4  218- 8  295- 7  324- 5  405-11  445-10  565- 4  586- 4  602-33  690-20  703- 4  704- 9  722- 4
783-11  812- 3

MIS/NEARSHORE STATION  128, @ HURDAT STORMS-MAX SURGE   20
  5- 5  117- 4  183- 4  211- 6  218- 7  295- 6  310- 4  324- 5  405-13  445- 6  565- 4  586- 4  602-24  690-16  703- 5
704- 8  722- 6  783-10  812- 4  874- 3

MIS/NEARSHORE STATION  129, @ HURDAT STORMS-MAX SURGE   20
  5- 7  117- 4  183- 5  211- 9  218- 9  295- 8  310- 5  324- 6  405-19  445-11  565- 4  586- 5  602-33  690-20  703- 5
704-15  722-10  809- 3  812- 4  874- 4

MIS/NEARSHORE STATION  130, @ HURDAT STORMS-MAX SURGE   22
  5- 6  117- 6  183- 5  211-12  218- 8  232- 3  295- 6  310- 9  324- 6  405-19  445- 6  565- 4  586- 5  602-25  690-16
703- 6  704-11  722-11  809- 4  812- 6  867- 3  874- 5

MIS/NEARSHORE STATION  131, @ HURDAT STORMS-MAX SURGE   22
  5- 5  117- 7  183- 5  211-13  218- 7  232- 4  295- 5  310-13  324- 5  405-16  445- 4  565- 4  586- 5  602-19  690-13
703- 6  704- 8  722- 6  809- 4  812- 9  867- 3  874- 7

MIS/NEARSHORE STATION  132, @ HURDAT STORMS-MAX SURGE   21
  5- 6  117-10  183- 8  211-24  232- 5  295- 6  310-19  324- 6  405-26  445- 9  565- 5  586-12  602-26  690-18  703- 7
704-13  722-11  809- 5  812-15  867- 4  874-12

MIS/NEARSHORE STATION  133, @ HURDAT STORMS-MAX SURGE   22
  5- 5  117-11  183- 8  211-24  232- 6  295- 5  310-27  324- 6  405-21  445- 7  565- 6  586- 9  602-21  690-15  703- 7
704- 9  722-12  809- 5  812-16  841- 3  867- 4  874-13

MIS/NEARSHORE STATION  134, @ HURDAT STORMS-MAX SURGE   23
  5- 6  117-19  183-15  211-42  232- 9  295- 6  310-47  324- 8  405-33  445-12  565- 7  586-16  602-30  634- 3  690-20
703- 8  704-13  722-21  809- 7  812-29  841- 4  867- 5  874-23

MIS/NEARSHORE STATION  135, @ HURDAT STORMS-MAX SURGE   22
  5- 5  117-18  183-11  211-36  232- 9  295- 4  310-48  324- 6  405-25  445-10  565- 6  586-10  602-23  690-14  703- 8
704- 9  722-17  809- 7  812-20  841- 4  867- 6  874-16

MIS/NEARSHORE STATION  136, @ HURDAT STORMS-MAX SURGE   22
  5- 4  117-16  183- 9  211-31  232- 9  295- 4  310-45  324- 6  405-20  445- 8  565- 7  586- 7  602-19  690-10  703- 8
704- 6  722-15  809- 7  812-17  841- 4  867- 6  874-12

MIS/NEARSHORE STATION  137, @ HURDAT STORMS-MAX SURGE   22
  5- 5  117-24  183-12  211-42  232-11  295- 4  310-62  324- 6  405-27  445-12  565- 7  586-10  602-24  690-13  703- 8
704- 8  722-20  809- 9  812-26  841- 5  867- 9  874-16

MIS/NEARSHORE STATION  138, @ HURDAT STORMS-MAX SURGE   24
  5- 4  117-21  183-10  211-35  232-11  295- 4  310-53  324- 5  397- 5  405-22  445-10  565-11  586- 9  602-21  690- 9
703- 8  704- 5  722-17  731- 4  809-10  812-22  841- 7  867-10  874-13

MIS/NEARSHORE STATION  139, @ HURDAT STORMS-MAX SURGE   24
  5- 4  117-18  183- 8  211-30  232-12  295- 3  310-46  324- 5  397-11  405-19  445- 9  565-18  586- 8  602-10  690- 5
703-10  704- 4  722-15  731- 4  809-11  812-19  841- 8  867-11  874-10

MIS/NEARSHORE STATION  140, @ HURDAT STORMS-MAX SURGE   23
  5- 3  117-14  183- 7  211-25  232-13  310-38  324- 5  397-16  405-16  445- 8  565-23  586- 7  602-10  690- 4  703-12
704- 3  722-13  731- 5  809-12  812-15  841- 8  867-10  874- 8

MIS/NEARSHORE STATION  141, @ HURDAT STORMS-MAX SURGE   18
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117-11  183- 6  211-21  232-15  310-32  324- 3  397-18  405-13  445- 7  565-27  586- 6  703-12  722-11  809-10  812-13
841- 7  867- 9  874- 7

WIS/NEARSHORE STATION  142, # HURDAT STORMS-MAX SURGE  17
117- 9  183- 6  211-17  232-17  310-28  397-20  405-12  445- 6  565-28  586- 5  703-15  722-10  809- 9  812- 9  841- 6
867- 8  874- 6

WIS/NEARSHORE STATION  143, # HURDAT STORMS-MAX SURGE  20
117- 9  183- 6  211-15  232-20  310-24  397-22  405-10  445- 5  565-26  586- 3  703-18  722- 9  731- 5  809- 7  812- 3
832- 5  838- 8  841- 5  867- 7  874- 6

WIS/NEARSHORE STATION  144, # HURDAT STORMS-MAX SURGE  19
117- 9  183- 5  211-14  232-24  310-22  397-25  405-10  565-24  586- 3  639- 3  703-21  722- 8  731-10  809- 7  832-11
838-16  841- 5  867- 6  874- 6

WIS/NEARSHORE STATION  145, # HURDAT STORMS-MAX SURGE  19
117- 9  183- 5  211-13  232-29  310-22  397-21  405-10  565-26  586- 3  639- 5  703-24  722- 8  731-19  809- 7  832-15
838-24  841- 5  867- 6  874- 7

WIS/NEARSHORE STATION  146, # HURDAT STORMS-MAX SURGE  17
117- 7  183- 4  211- 9  232-17  310-16  397-14  405- 6  565-13  703-10  722- 6  731- 8  809- 4  832- 7  838-13  841- 3
867- 4  874- 3

WIS/NEARSHORE STATION  147, # HURDAT STORMS-MAX SURGE  16
117- 6  183- 4  211- 8  232-17  310-15  397-13  565-13  634- 3  639- 3  703-11  722- 5  731-11  809- 3  832- 7  838-14
867- 4

WIS/NEARSHORE STATION  148, # HURDAT STORMS-MAX SURGE  17
117- 6  183- 4  211- 7  232-16  310-13  397-10  565-13  634-10  639- 4  703-11  722- 5  731-15  757- 3  809- 3  832- 7
838-10  867- 4

WIS/NEARSHORE STATION  149, # HURDAT STORMS-MAX SURGE  17
117- 5  183- 3  211- 5  232-15  310-10  397- 6  565-14  634-21  639- 7  703-13  722- 4  731-19  757- 3  809- 3  832- 6
838-18  867- 3

WIS/NEARSHORE STATION  150, # HURDAT STORMS-MAX SURGE  14
117- 5  211- 5  232-14  310- 9  397-10  565- 6  634-13  639- 4  703- 6  722- 3  731-11  757- 3  832- 4  838-10

WIS/NEARSHORE STATION  151, # HURDAT STORMS-MAX SURGE  14
117- 5  211- 5  232-14  310- 9  397-10  565- 6  634-13  639- 4  703- 6  722- 3  731-11  757- 3  832- 4  838-10

WIS/NEARSHORE STATION  152, # HURDAT STORMS-MAX SURGE  13
117- 4  211- 4  232-15  310- 9  397-10  565- 6  634-20  639- 7  703- 7  731-17  757- 5  832- 4  838-11

WIS/NEARSHORE STATION  153, # HURDAT STORMS-MAX SURGE  16
117- 5  211- 4  232-17  241- 4  310-10  324- 4  397-12  565- 6  634-24  639-10  703- 8  731-24  757- 7  775- 4  832- 3
838-13

WIS/NEARSHORE STATION  154, # HURDAT STORMS-MAX SURGE  18
 76- 9  117- 4  127- 3  211- 4  232-16  241- 8  310-10  324- 5  397-13  471- 4  565- 5  634-20  639-11  703- 7  731-28
757- 6  775- 8  838-14

WIS/NEARSHORE STATION  155, # HURDAT STORMS-MAX SURGE  17
 76-13  117- 3  127- 3  214- 3  232-12  241- 8  324- 5  397- 9  471- 6  565- 5  634-15  639-11  703- 6  731-28  757- 4
775- 8  838-13

WIS/NEARSHORE STATION  156, # HURDAT STORMS-MAX SURGE  15
 76-16  127- 5  187- 4  214-14  232- 8  241- 6  324- 5  397- 7  471- 6  562- 4  634- 8  639- 9  731-19  775- 8  838- 8

WIS/NEARSHORE STATION  157, # HURDAT STORMS-MAX SURGE  15
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76-14 127- 6 187- 5 214-18 232- 5 241- 4 324- 4 397- 6 471- 4 562- 4 634- 4 639- 8 731-12 775- 5 838- 6

WIS/NEARSHORE STATION 158, 0 HURDAT STORMS-MAX SURGE 12
76-11 127- 7 187- 3 214-16 232- 3 397- 5 562- 4 639- 8 672- 5 731- 8 775- 3 838- 5

WIS/NEARSHORE STATION 159, 0 HURDAT STORMS-MAX SURGE 8
76- 6 127- 5 214-11 397- 4 639- 6 672- 5 731- 6 838- 3

WIS/NEARSHORE STATION 160, 0 HURDAT STORMS-MAX SURGE 8
76- 5 127- 4 214-10 397- 3 639- 4 672- 7 731- 5 838- 3

WIS/NEARSHORE STATION 161, 0 HURDAT STORMS-MAX SURGE 7
76- 4 214- 8 639- 3 672- 9 731- 4 838- 3 859- 3

WIS/NEARSHORE STATION 162, 0 HURDAT STORMS-MAX SURGE 6
76- 3 214- 6 231- 3 276- 3 672-11 731- 3

WIS/NEARSHORE STATION 163, 0 HURDAT STORMS-MAX SURGE 5
214- 4 231- 4 276- 4 461- 3 672-11

WIS/NEARSHORE STATION 164, 0 HURDAT STORMS-MAX SURGE 9
76- 4 214- 5 231- 4 276- 3 461- 4 672-11 731- 3 779- 3 838- 3

WIS/NEARSHORE STATION 165, 0 HURDAT STORMS-MAX SURGE 8
76- 6 214- 7 231- 4 461- 5 672-15 731- 4 779- 4 838- 5

WIS/NEARSHORE STATION 166, 0 HURDAT STORMS-MAX SURGE 17
76-11 127- 6 214-11 215- 3 231- 4 324- 3 397- 4 461- 6 562- 5 598- 5 639- 6 672-22 704- 3, 731- 6 779- 5
838- 8 859- 4

WIS/NEARSHORE STATION 167, 0 HURDAT STORMS-MAX SURGE 17
76-20 127-11 214-18 215- 3 231- 5 324- 5 397- 6 461- 7 562- 7 598- 7 639-11 672-33 704- 6 731- 9 779- 5
838-12 859- 7

WIS/NEARSHORE STATION 168, 0 HURDAT STORMS-MAX SURGE 22
76-32 127-18 187- 4 214-29 215- 5 231- 6 324- 6 357- 3 397- 7 461-10 471- 5 562- 7 598-10 634- 5 639-18
672-41 704- 8 731-15 775- 5 779- 6 838-17 859-12

WIS/NEARSHORE STATION 169, 0 HURDAT STORMS-MAX SURGE 26
76-41 127-26 187- 5 214-38 215- 5 231- 5 241- 4 276- 3 324- 6 357- 3 397- 7 461-15 471- 9 562- 7 598-12
634-11 639-24 672-50 703- 6 704-10 731-19 775- 7 779- 5 838-19 839- 3 859-15

WIS/NEARSHORE STATION 170, 0 HURDAT STORMS-MAX SURGE 26
76-30 127-18 187- 3 214-25 215- 9 231- 6 276- 4 324- 5 357- 3 397- 6 461-16 471- 6 490- 3 562- 5 598-12
634- 8 639-16 672-46 703- 4 704- 7 731-13 775- 4 779- 5 838-15 839- 3 859- 9

WIS/NEARSHORE STATION 171, 0 HURDAT STORMS-MAX SURGE 24
76-22 127-12 214-17 215- 9 231- 5 276- 5 324- 4 397- 4 461-16 471- 4 490- 3 562- 4 598- 9 634- 7 639-10
672-35 703- 3 704- 5 731- 9 775- 3 779- 8 833- 4 838-12 859- 6

WIS/NEARSHORE STATION 172, 0 HURDAT STORMS-MAX SURGE 21
76-17 127- 9 214-14 215- 7 231- 5 276- 6 324- 3 397- 4 461-14 490- 4 562- 4 598- 7 634- 6 639- 7 672-26
704- 4 731- 7 779-10 833- 5 838-10 859- 4

WIS/NEARSHORE STATION 173, 0 HURDAT STORMS-MAX SURGE 20
76-14 127- 7 214-11 215- 6 231- 6 276- 7 324- 3 397- 3 461-12 490- 5 562- 4 598- 5 634- 6 639- 6 672-21
731- 6 779-15 833- 5 838-10 859- 3

WIS/NEARSHORE STATION 174, 0 HURDAT STORMS-MAX SURGE 19
76-11 127- 6 214-10 215- 5 227- 4 231- 7 276- 8 324- 3 397- 3 461-10 490- 5 562- 5 598- 4 634- 5 639- 4

672-17 779-18 833- 6 838-10

WIS/NEARSHORE STATION 175, # HURDAT STORMS-MAX SURGE 15
76- 8 127- 5 214- 8 215- 3 227- 6 231- 8 276- 9 461- 8 490- 4 562- 5 634- 4 672-13 779-16 833- 6 838- 8

WIS/NEARSHORE STATION 176, # HURDAT STORMS-MAX SURGE 14
76- 7 127- 4 214- 7 227- 6 231- 8 276- 8 461- 6 490- 3 562- 4 634- 4 672-10 779-12 833- 5 838- 6

WIS/NEARSHORE STATION 177, # HURDAT STORMS-MAX SURGE 21
76-12 127- 7 214-10 215- 4 227-13 231-12 276-17 324- 3 357- 4 397- 3 461- 9 490- 7 562- 6 598- 4 634- 8
639- 4 672-15 779-18 833-10 838-13 839- 3

WIS/NEARSHORE STATION 178, # HURDAT STORMS-MAX SURGE 18
76- 9 127- 5 214- 8 227-10 231-12 276-13 357- 3 461- 6 490- 4 526- 3 562- 6 598- 3 634- 7 672-12 779-13
833- 7 838- 9 839- 3

WIS/NEARSHORE STATION 179, # HURDAT STORMS-MAX SURGE 19
76- 8 127- 5 214- 7 227- 8 231-12 276-10 357- 4 362- 4 461- 5 490- 3 526- 4 562- 6 598- 3 634- 7 672-10
779-11 833- 5 838- 7 839- 3

WIS/NEARSHORE STATION 180, # HURDAT STORMS-MAX SURGE 18
76- 9 127- 5 227- 7 231-14 276- 9 357- 4 362- 6 461- 5 526- 6 562- 7 598- 3 634- 8 672-11 741- 6 779-10
833- 5 838- 7 839- 4

WIS/NEARSHORE STATION 181, # HURDAT STORMS-MAX SURGE 18
76- 9 127- 5 227- 7 231-15 276- 8 357- 4 362- 8 461- 5 526- 8 562- 9 598- 3 634- 9 672-10 741-11 779-10
833- 5 838- 7 839- 4

WIS/NEARSHORE STATION 182, # HURDAT STORMS-MAX SURGE 15
76- 6 227- 4 231- 9 276- 5 357- 4 362- 4 461- 4 526- 4 562- 3 634- 5 672- 8 741- 5 779- 8 838- 4 839- 4

WIS/NEARSHORE STATION 183, # HURDAT STORMS-MAX SURGE 17
76- 7 227- 5 231-10 276- 4 357- 4 362- 6 461- 4 526- 6 562- 7 634- 7 672- 8 712- 4 741- 8 779- 8 833- 3
838- 5 839- 4

WIS/NEARSHORE STATION 184, # HURDAT STORMS-MAX SURGE 17
76- 8 227- 6 231-12 276- 5 296- 3 357- 5 362- 8 461- 4 526- 6 562- 9 634- 9 712- 5 741-11 779- 8 833- 3
838- 6 839- 5

WIS/NEARSHORE STATION 185, # HURDAT STORMS-MAX SURGE 17
76- 6 227- 4 231- 8 276- 4 296- 3 357- 4 362- 5 461- 4 526- 4 562- 5 634- 5 672- 7 712- 5 741- 7 779- 7
838- 4 839- 7

WIS/NEARSHORE STATION 186, # HURDAT STORMS-MAX SURGE 17
76- 7 227- 5 231- 9 276- 5 296- 7 299- 3 357- 5 362- 6 461- 4 526- 5 562- 7 634- 7 712- 8 741-10 779- 7
838- 5 839-10

WIS/NEARSHORE STATION 187, # HURDAT STORMS-MAX SURGE 17
76- 5 227- 3 231- 6 276- 8 296- 6 299- 4 357- 5 362- 6 461- 5 562- 4 634- 4 712- 8 741- 6 779- 7 833- 4
838- 4 839-12

WIS/NEARSHORE STATION 188, # HURDAT STORMS-MAX SURGE 19
76- 7 227- 4 231- 8 276-12 296-11 299- 4 357- 6 362- 9 461- 7 526- 3 562- 6 634- 5 712-13 741- 8 746- 5
779- 8 833- 7 838- 4 839-17

WIS/NEARSHORE STATION 189, # HURDAT STORMS-MAX SURGE 21
76- 7 141- 5 227- 4 231- 9 276-14 296-19 299- 4 357- 6 362-12 461- 9 526- 3 562- 6 634- 5 669- 4 712-16
741- 8 746- 7 779- 9 833-11 838- 5 839-18

WIS/NEARSHORE STATION 190, # HURDAT STORMS-MAX SURGE 20

141- 5 227- 4 231- 9 276-15 296-23 357- 6 362-12 461- 9 526- 3 562- 7 634- 6 643- 4 669- 4 712-15 741- 7
746- 9 779- 9 833-11 838- 5 839-16

MIS/NEARSHORE STATION 191, # HURDAT STORMS-MAX SURGE 19
141- 4 227- 4 231- 9 276-13 296-23 331- 3 357- 6 362-11 461- 7 526- 4 562- 8 634- 6 643- 7 712-14 741- 7
746-10 833- 9 838- 5 839-14

MIS/NEARSHORE STATION 192, # HURDAT STORMS-MAX SURGE 19
141- 7 227- 5 231-13 276-17 296-35 353- 4 357- 6 362-14 461-11 526- 5 562-11 634- 9 643-14 712-20 741-10
746-13 833-13 838- 7 839-20

MIS/NEARSHORE STATION 193, # HURDAT STORMS-MAX SURGE 22
94- 3 141- 6 227- 5 231-13 276-16 289- 5 296-31 331- 5 353-11 357- 6 362-12 461- 7 526- 6 562-12 634- 9
643-15 712-18 741-10 746-14 833- 7 838- 7 839-18

MIS/NEARSHORE STATION 194, # HURDAT STORMS-MAX SURGE 23
94- 4 141- 6 231-13 271- 4 276-11 289- 7 296-28 331-10 353-20 357- 6 362-11 456- 3 463- 3 477- 4 526- 8
562-14 634-11 643-21 712-17 741-10 746-14 833- 6 839-17

MIS/NEARSHORE STATION 195, # HURDAT STORMS-MAX SURGE 22
94- 4 231-14 271- 6 289-11 296-25 331-20 353-38 357- 5 362-11 456- 4 463- 5 477- 5 499- 3 526-11 562-17
634-13 643-32 712-18 741-11 746-19 833- 6 839-18

MIS/NEARSHORE STATION 196, # HURDAT STORMS-MAX SURGE 21
94- 3 231-10 271- 4 289- 7 296-18 331-15 353-33 357- 4 362- 8 456- 4 463- 4 477- 4 526- 7 562-11 634- 8
643-17 712-14 741- 8 746-15 833- 6 839-13

MIS/NEARSHORE STATION 197, # HURDAT STORMS-MAX SURGE 24
94- 3 231-12 271- 6 289-11 296-13 331-26 353-58 357- 5 362- 7 456- 5 463- 8 477- 7 499- 3 526- 9 562-14
634-10 643-27 688- 3 712-14 741- 9 746-22 807- 3 833- 6 839-14

MIS/NEARSHORE STATION 198, # HURDAT STORMS-MAX SURGE 21
94- 4 231- 9 271- 4 289- 6 296- 8 331-18 353-43 357- 5 362- 5 456- 4 463- 7 477- 6 526- 6 562- 9 634- 7
643- 7 712-12 741- 7 746-15 833- 7 839-11

MIS/NEARSHORE STATION 199, # HURDAT STORMS-MAX SURGE 23
94- 7 194- 7 231-10 271- 7 289-11 296- 3 331-31 353-71 357- 5 456- 7 463-13 477-10 526- 8 562-13 634- 9
643- 8 668- 4 712-13 741- 8 746-20 807- 4 833-10 839-13

MIS/NEARSHORE STATION 200, # HURDAT STORMS-MAX SURGE 23
94- 5 194- 7 231- 8 271- 5 289- 7 331-22 353-44 357- 5 456- 6 463-11 477- 7 493- 4 526- 6 562- 9 634- 6
643- 5 688- 4 712-10 741- 6 746-14 807- 3 833- 9 839-10

MIS/NEARSHORE STATION 201, # HURDAT STORMS-MAX SURGE 24
94- 7 194-14 231- 9 271- 8 289-12 331-32 353-43 357- 5 440- 5 456-11 463-21 477-14 493-11 499- 4 526- 8
562-12 634- 8 669- 5 688- 7 712-11 746-18 807- 4 833-11 839-11

MIS/NEARSHORE STATION 202, # HURDAT STORMS-MAX SURGE 23
94- 6 194-13 249- 3 271- 6 289- 8 331-21 353-27 357- 4 440- 4 456- 8 463-17 477-10 493-18 526- 6 562- 9
634- 5 669- 7 688- 6 712- 9 746-13 807- 4 833- 9 839- 9

MIS/NEARSHORE STATION 203, # HURDAT STORMS-MAX SURGE 24
94- 5 194-11 249-10 271- 4 289- 6 299- 6 331-18 353-29 357- 4 397- 4 440- 4 456- 6 463-16 477- 7 493- 3
526- 4 634- 4 669- 8 688- 5 712- 7 746-10 807- 3 833- 8 839- 7

MIS/NEARSHORE STATION 204, # HURDAT STORMS-MAX SURGE 23
94- 5 194-10 249-16 271- 3 289- 5 299-12 331-15 353-32 357- 3 397- 5 440- 6 456- 7 463-17 477- 5 493- 9
634- 3 669-12 688- 4 712- 6 746- 9 807- 5 833- 6 839- 6

MIS/NEARSHORE STATION 205, # HURDAT STORMS-MAX SURGE 21

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 94- 4 194- 9 249-20 289- 4 299-16 331-13 353-35 357- 4 397- 5 440- 8 456- 8 463-18 477- 6 493-13 669-15
688- 4 712- 6 746- 7 807- 6 833- 4 839- 5

MIS/NEARSHORE STATION  206, # HURDAT STORMS-MAX SURGE  22
 94- 4 194- 7 249-23 296- 8 299-18 331-10 353-38 357- 6 397- 3 440- 7 456- 8 463-18 477- 5 493-16 584- 4
643- 3 669-16 688- 4 712- 5 746- 5 807- 6 864- 4

MIS/NEARSHORE STATION  207, # HURDAT STORMS-MAX SURGE  20
 94- 3 194- 5 249-24 296- 9 299-22 331- 8 353-32 357- 5 440- 7 456- 7 463-15 477- 4 493- 5 584- 5 669-13
688- 3 712- 4 746- 4 807- 5 864- 5

MIS/NEARSHORE STATION  208, # HURDAT STORMS-MAX SURGE  25
 94- 4 141- 5 194-11 249-39 289- 3 292- 3 296- 8 299-33 331-15 353-38 357- 7 397- 3 440-[illegible] 456-12 463-23
477- 7 493- 6 584- 7 643- 5 669-17 688- 4 712- 5 746- 5 807- 8 864- 5

MIS/NEARSHORE STATION  209, # HURDAT STORMS-MAX SURGE  24
 94- 3 127- 5 141- 4 194- 8 249-34 296-11 299-30 324- 3 331-10 353-36 357- 6 440-11 456-10 463-19 477- 5
493- 5 584- 8 643- 4 669-12 688- 3 712- 4 746- 4 807- 6 864- 8

MIS/NEARSHORE STATION  210, # HURDAT STORMS-MAX SURGE  21
127- 5 141- 3 194- 8 249-27 276- 5 296-10 299-24 324- 3 331- 8 353-33 357- 4 440-10 456- 8 463-16 477- 4
493- 4 584- 6 669- 8 712- 3 807- 4 864- 6

MIS/NEARSHORE STATION  211, # HURDAT STORMS-MAX SURGE  26
127- 8 141- 5 194-16 249-36 276-10 296-10 299-30 324- 6 331-13 353-45 357- 6 362- 3 440-17 456-13 461- 4
463-22 477- 6 493- 7 584-12 643- 5 662- 4 669-11 688- 3 712- 4 807- 7 864-11

MIS/NEARSHORE STATION  212, # HURDAT STORMS-MAX SURGE  26
127- 7 141- 3 194-15 249-27 276-14 296-11 299-23 324- 4 331-10 353-40 357- 4 362- 4 440-15 456-11 461- 6
463-18 477- 4 493- 5 530- 4 584- 8 643- 4 662- 4 669- 8 712- 3 807- 5 864- 8

MIS/NEARSHORE STATION  213, # HURDAT STORMS-MAX SURGE  24
127- 6 194-13 249-20 276-14 296-11 299-19 324- 4 331- 8 353-35 362- 4 440-12 456- 9 461- 8 463-15 477- 3
493- 3 521- 5 530- 4 584- 6 643- 3 662- 4 669- 3 807- 3 864- 5

MIS/NEARSHORE STATION  214, # HURDAT STORMS-MAX SURGE  27
127- 9 141- 3 194-23 249-26 276-21 296-14 299-22 324- 5 331-12 353-45 357- 4 362- 7 440-20 456-14 461-12
463-18 477- 4 493- 4 521- 5 530- 6 584- 9 597- 5 643- 5 662- 7 669- 4 807- 5 864- 8

MIS/NEARSHORE STATION  215, # HURDAT STORMS-MAX SURGE  24
127- 7 194-20 249-19 276-18 296-16 299-17 324- 4 331- 9 353-42 362- 6 440-16 456-10 461-14 463-15 493- 3
521- 8 530- 4 584- 7 597- 5 643- 4 662- 6 669- 3 807- 3 864- 5

MIS/NEARSHORE STATION  216, # HURDAT STORMS-MAX SURGE  25
127-10 194-33 249-24 276-28 296-21 299-20 324- 5 331-12 353-52 362- 7 440-23 449- 3 456-14 461-18 463-18
493- 5 521-11 530- 8 584-10 597-12 643- 5 662-10 669- 3 807- 5 864- 7

MIS/NEARSHORE STATION  217, # HURDAT STORMS-MAX SURGE  23
127- 7 194-27 249-18 276-21 292- 3 296-19 299-16 324- 3 331- 9 353-45 362- 7 440-17 456-10 461-18 463-14
521-13 530- 5 584- 7 597- 9 643- 4 662- 7 807- 3 864- 4

MIS/NEARSHORE STATION  218, # HURDAT STORMS-MAX SURGE  19
127- 5 194-24 249-13 276-16 292- 4 296-18 299-13 331- 8 353-39 362- 6 440-13 456- 7 461-20 463-10 521-13
530- 3 584- 5 597- 9 662- 5

MIS/NEARSHORE STATION  219, # HURDAT STORMS-MAX SURGE  23
127- 7 194-37 249-17 276-25 292- 5 296-28 299-15 331-10 353-52 362-10 440-17 449- 4 456- 9 461-33 463-12
473- 3 521-19 530- 5 584- 6 597-19 643- 4 662- 7 864- 4

MIS/NEARSHORE STATION  220, # HURDAT STORMS-MAX SURGE  24
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127- 5 194-29 249-10 276-20 292- 6 296-19 299-11 331- 9 353-38 357- 8 362- 6 440- 9 449- 4 456- 5 461-27
463- 7 473- 3 521-18 530- 4 584- 6 597-16 639- 6 662- 5 864- 3

WIS/NEARSHORE STATION 221, @ HURDAT STORMS-MAX SURGE 24
127- 6 194-37 249-14 276-25 292- 8 296-21 299-12 331-10 353-41 357- 8 362- 7 440-14 449- 5 456- 7 461-32
463- 7 473- 8 521-25 530- 5 584- 6 597-22 635- 4 662- 6 864- 4

WIS/NEARSHORE STATION 222, @ HURDAT STORMS-MAX SURGE 24
127- 6 194-37 249-14 276-25 292- 8 296-21 299-12 331-10 353-41 357- 8 362- 7 440-14 449- 5 456- 7 461-32
463- 7 473- 8 521-25 530- 5 584- 6 597-22 635- 4 662- 6 864- 4

WIS/NEARSHORE STATION 223, @ HURDAT STORMS-MAX SURGE 25
127- 8 194-43 249-16 276-30 292-10 296-23 299-13 331-12 353-37 357-12 362- 6 440-16 449- 6 456- 8 461-34
463- 7 473-17 521-32 530- 5 584- 7 597-26 635-10 662- 6 797- 5 864- 4

WIS/NEARSHORE STATION 224, @ HURDAT STORMS-MAX SURGE 22
127- 6 194-25 276-23 292- 9 296-15 331- 8 353-25 357-16 362- 4 440- 7 449- 4 456- 4 461-23 463- 3 473-11
521-25 530- 4 584- 5 597-16 635- 8 662- 5 864- 3

WIS/NEARSHORE STATION 225, @ HURDAT STORMS-MAX SURGE 23
127- 5 194-20 249- 7 276-18 292- 7 296-14 299- 8 331- 8 353-26 357-14 362- 3 440- 6 449- 4 456- 3 461-22
473- 5 521-20 530- 4 584- 5 597-14 635- 4 639- 7 662- 4

WIS/NEARSHORE STATION 226, @ HURDAT STORMS-MAX SURGE 20
127- 3 194-15 249- 5 276-13 292- 5 296-15 299- 8 331- 6 353-30 357-12 362- 4 440- 3 456- 3 461-20 463- 3
521-15 584- 5 597-12 635- 6 639-11

WIS/NEARSHORE STATION 227, @ HURDAT STORMS-MAX SURGE 18
194-16 249- 5 276- 9 292- 4 296-15 299- 8 331- 5 353-37 357- 9 362- 3 440- 5 461-17 463- 5 521-11 584- 4
597-10 635- 5 639-15

WIS/NEARSHORE STATION 228, @ HURDAT STORMS-MAX SURGE 12
194-11 276- 5 292- 3 296- 9 353-21 357-10 461- 7 493- 4 521- 5 597- 8 635- 4 639-15

WIS/NEARSHORE STATION 229, @ HURDAT STORMS-MAX SURGE 8
117- 3 189- 5 194-10 299- 3 353- 4 493- 5 635- 3 639- 3

WIS/NEARSHORE STATION 230, @ HURDAT STORMS-MAX SURGE 2
112- 5 292- 4

WIS/NEARSHORE STATION 231, @ HURDAT STORMS-MAX SURGE 2
112- 4 872- 4

WIS/NEARSHORE STATION 232, @ HURDAT STORMS-MAX SURGE 2
112- 3 872- 3

WIS/NEARSHORE STATION 233, @ HURDAT STORMS-MAX SURGE 10
189- 7 194- 6 276- 4 292- 3 296- 5 299- 4 353- 9 474- 3 597- 7 639- 3

WIS/NEARSHORE STATION 234, @ HURDAT STORMS-MAX SURGE 9
189- 7 194- 5 276- 4 292- 3 296- 5 299- 4 353-11 597- 8 639- 3

WIS/NEARSHORE STATION 235, @ HURDAT STORMS-MAX SURGE 9
189- 6 194- 4 276- 5 292- 4 296- 5 299- 3 337- 3 353-13 597- 9

WIS/NEARSHORE STATION 236, @ HURDAT STORMS-MAX SURGE 10
189- 7 194- 4 276- 6 292- 4 296- 7 299- 3 353-16 357- 3 597-10 639- 4

WIS/NEARSHORE STATION 237, @ HURDAT STORMS-MAX SURGE 10
112- 3 189- 7 194- 4 276- 8 292- 5 296- 9 353-16 357- 4 597-10 639- 7

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MIS/NEARSHORE STATION  238, # HURDAT STORMS-MAX SURGE   13
112- 4  189- 6  194- 3  276- 9  292- 6  296- 7  353-12  357- 4  449- 5  499- 3  597- 7  629- 3  639- 6

MIS/NEARSHORE STATION  239, # HURDAT STORMS-MAX SURGE   13
112- 4  189- 6  194- 3  276-10  292- 6  296- 7  353-11  357- 5  449- 4  499- 3  597- 6  629- 4  639- 4

MIS/NEARSHORE STATION  240, # HURDAT STORMS-MAX SURGE   12
112- 4  127- 3  189- 5  194- 3  276-10  292- 7  296- 6  353-10  357- 6  597- 6  629- 5  639- 3

MIS/NEARSHORE STATION  241, # HURDAT STORMS-MAX SURGE   13
112- 4  127- 3  189- 4  194- 3  276-10  292- 7  296- 5  331- 3  353- 9  357- 6  473- 3  597- 6  629- 5

MIS/NEARSHORE STATION  242, # HURDAT STORMS-MAX SURGE   13
112- 4  127- 4  189- 3  276- 9  292- 8  296- 5  331- 4  353- 8  357- 6  461- 5  473- 4  597- 5  629- 4

MIS/NEARSHORE STATION  243, # HURDAT STORMS-MAX SURGE   13
112- 4  127- 4  276- 8  292-10  296- 5  331- 6  353- 8  357- 6  461- 7  473- 4  477- 4  597- 4  629- 3

MIS/NEARSHORE STATION  244, # HURDAT STORMS-MAX SURGE   13
112- 5  127- 4  276- 7  292-11  296- 4  331- 8  353- 7  357- 6  461- 4  473- 5  477- 6  635- 3  777- 4

MIS/NEARSHORE STATION  245, # HURDAT STORMS-MAX SURGE   13
112- 5  127- 3  276- 6  289- 4  292-11  296- 4  331- 8  353- 6  357- 5  461- 3  473- 5  477- 5  777- 5

MIS/NEARSHORE STATION  246, # HURDAT STORMS-MAX SURGE   12
112- 5  271- 4  276- 5  289- 3  292-11  296- 3  331- 7  353- 6  357- 4  473- 5  477- 3  777- 4

MIS/NEARSHORE STATION  247, # HURDAT STORMS-MAX SURGE   10
112- 6  271- 3  276- 5  292- 9  331- 6  353- 5  357- 4  473- 5  662- 3  777- 3

MIS/NEARSHORE STATION  248, # HURDAT STORMS-MAX SURGE    8
112- 6  276- 4  292- 7  331- 5  353- 5  357- 3  473- 4  662- 4

MIS/NEARSHORE STATION  249, # HURDAT STORMS-MAX SURGE   16
112- 8  127- 3  194- 4  271- 5  276- 6  289- 5  292-11  296- 4  331- 9  353- 7  357- 5  473- 5  530- 3  629- 4  662- 5
777- 6

MIS/NEARSHORE STATION  250, # HURDAT STORMS-MAX SURGE   15
112- 8  127- 3  194- 4  271- 5  276- 5  289- 4  292- 8  296- 4  331- 7  353- 7  357- 4  473- 4  629- 3  662- 3  777- 5

MIS/NEARSHORE STATION  251, # HURDAT STORMS-MAX SURGE   10
112- 7  194- 3  271- 4  276- 4  289- 3  292- 6  331- 5  353- 6  357- 3  777- 4

MIS/NEARSHORE STATION  252, # HURDAT STORMS-MAX SURGE    9
112- 6  194- 3  249- 4  271- 3  276- 4  292- 5  331- 4  353- 4  777- 3

MIS/NEARSHORE STATION  253, # HURDAT STORMS-MAX SURGE   11
112- 5  194- 4  249- 6  271- 5  276- 3  289- 4  331- 5  353- 4  493- 3  777- 6  872- 3

MIS/NEARSHORE STATION  254, # HURDAT STORMS-MAX SURGE   18
 72- 3  112- 4  194- 8  249-13  271-10  289- 6  292- 5  299- 8  331- 9  353- 6  440- 5  477- 5  493- 8  597- 3  629- 4
662- 3  777-10  872- 3

MIS/NEARSHORE STATION  255, # HURDAT STORMS-MAX SURGE   26
 72- 6  112- 7  127- 5  194-15  249-19  271-19  289-10  292- 8  299-12  324- 3  331-15  353- 7  397- 6  440- 8  449- 4
456- 3  465- 3  477- 8  493-14  499- 5  597-10  629- 8  662- 5  669- 4  777-17  872- 4

MIS/NEARSHORE STATION  256, # HURDAT STORMS-MAX SURGE   27
 72- 6  112- 6  127- 4  194-14  249-15  271-16  289- 8  292- 7  299-13  331-10  353- 8  397- 7  440- 8  449- 4  456- 3
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463- 3 465- 3 477- 7 493-13 499- 5 597-11 629- 7 662- 4 669-10 711- 3 777-15 872- 4

WIS/NEARSHORE STATION 257, # HURDAT STORMS-MAX SURGE 25
72- 6 112- 5 194-14 249-11 271-13 289- 7 292- 7 299-12 331- 8 353- 8 397- 7 440- 9 449- 5 456- 4 463- 4
477- 7 493-13 499- 5 597- 9 629- 6 662- 4 669-13 711- 3 777-13 872- 4

WIS/NEARSHORE STATION 258, # HURDAT STORMS-MAX SURGE 28
72- 7 112- 5 194-22 249-12 271-18 289- 9 292- 9 299-16 324- 3 331-11 353-12 397-10 440-15 449- 8 456- 6
463- 8 477- 7 493-20 499- 7 521- 3 597- 7 629- 8 662- 6 669-21 711- 4 777-16 807- 5 872- 4

WIS/NEARSHORE STATION 259, # HURDAT STORMS-MAX SURGE 28
72- 7 112- 4 194-24 249-10 271-16 289- 8 292- 8 299-13 331-10 353-14 397- 8 440-16 449- 9 456- 8 463-10
477- 6 493-19 499- 8 521- 3 597- 6 629- 6 662- 6 669-22 711- 4 777-16 797- 3 807- 5 872- 3

WIS/NEARSHORE STATION 260, # HURDAT STORMS-MAX SURGE 28
72- 8 112- 4 194-28 249- 8 271-15 289- 8 292-12 299-12 331- 4 353-18 397- 8 440-18 449-11 456-10 463-13
477- 6 493-19 499- 8 521- 3 597- 6 629- 6 662- 5 669-21 711- 5 777-17 797- 3 807- 6 872- 3

WIS/NEARSHORE STATION 261, # HURDAT STORMS-MAX SURGE 31
72- 9 112- 4 194-37 249- 8 271-16 289- 9 292-20 299-12 331- 5 353-24 397- 7 440-22 449-14 456-13 463-20
465- 4 477- 7 493-21 499-10 521- 3 589- 3 597- 5 629- 8 662- 8 669-21 711- 8 746- 5 777-21 797- 4 807- 6
872- 3

WIS/NEARSHORE STATION 262, # HURDAT STORMS-MAX SURGE 30
72- 9 112- 3 194-28 249- 6 271-11 289- 6 292-16 299- 9 331- 4 353-19 397- 5 440-17 449-12 456-10 463-16
465- 6 477- 5 493-13 499- 7 521- 4 597- 4 629- 6 643- 3 662- 6 669-16 711-10 746- 6 777-22 797- 4 807- 6

WIS/NEARSHORE STATION 263, # HURDAT STORMS-MAX SURGE 35
72-13 103- 4 112- 4 194-38 249- 6 271-13 289- 7 292-22 299-10 331- 5 353-25 397- 5 440-22 449-15 456-13
463-21 465-10 477- 7 493-16 499- 8 521- 7 526- 4 589- 4 597- 4 623- 3 629- 7 643- 6 662- 7 669-17 711-15
746- 7 777-31 797- 5 807- 5 872- 4

WIS/NEARSHORE STATION 264, # HURDAT STORMS-MAX SURGE 36
72- 8 103- 5 112- 4 194-33 196- 4 249- 4 271- 9 292-17 299- 8 353-21 398- 5 440-19 449-12 456-10 463-17
465-13 477- 4 493-11 499- 6 521- 9 526- 7 541- 3 589- 5 597- 3 623- 4 629- 7 630- 3 643- 5 662- 5 669-13
711-12 746- 7 777-26 797- 4 807- 5 872- 5

WIS/NEARSHORE STATION 265, # HURDAT STORMS-MAX SURGE 35
72- 6 103- 6 112- 3 194-29 196- 6 271- 7 292-15 296- 4 299- 7 353-19 398- 9 440-15 449-11 456- 8 463-15
465-15 493- 8 499- 4 521-10 526- 9 541- 5 589- 9 597- 4 623- 4 629- 6 643- 5 662- 3 669-10 711-10 746- 6
777-21 797- 4 807- 4 839- 3 872- 6

WIS/NEARSHORE STATION 266, # HURDAT STORMS-MAX SURGE 35
72- 4 103- 5 194-27 196-11 271- 6 292-14 296- 5 299- 6 353-18 398-13 440-12 449-10 456- 7 463-13 465-17
493- 7 499- 3 521-12 526-11 541- 6 562- 4 589-17 597- 4 623- 4 629- 4 630- 3 643- 6 669- 8 711- 8 746- 5
777-16 797- 4 807- 3 839- 5 872- 6

WIS/NEARSHORE STATION 267, # HURDAT STORMS-MAX SURGE 33
72- 3 103- 4 112- 3 194-31 196-13 292-17 296- 8 299- 6 353-22 398-20 440-13 449-11 456- 7 463-13 465-19
493- 6 521-12 526-15 541- 6 562- 6 589-32 597- 4 623- 4 629- 4 630- 3 643- 7 669- 8 711- 7 746- 5 777-17
797- 5 839- 8 872- 8

WIS/NEARSHORE STATION 268, # HURDAT STORMS-MAX SURGE 28
112- 3 194-23 196- 9 217- 6 292-10 296- 5 299- 5 353-14 398-17 440- 7 449- 6 456- 4 463- 7 465-15 521- 7
526-13 541- 6 552- 4 562- 4 589-19 597- 5 643- 4 669- 9 777-11 797- 4 835- 4 839- 5 872-25

WIS/NEARSHORE STATION 269, # HURDAT STORMS-MAX SURGE 24
194-18 196- 5 217-10 292- 6 296- 3 299- 6 353- 9 398-11 440- 4 463- 4 465-11 521- 4 526- 9 541-20 552- 4
589- 9 597- 7 669- 8 777- 6 797- 4 807- 4 820- 6 835- 5 872-29

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WIS/NEARSHORE STATION  270, # HURDAT STORMS-MAX SURGE   31
194-30  196- 7  217-16  292-12  296- 5  299- 8  353-15  398-14  432- 3  436- 3  440- 6  449- 4  463- 6  465-14  521- 6
526-12  541-25  552- 5  562- 5  589-14  597-10  643- 5  669-11  746- 3  777- 9  797- 7  807- 4  820- 9  835- 6  839- 6
872-45

WIS/NEARSHORE STATION  271, # HURDAT STORMS-MAX SURGE   31
194-28  196- 5  217-12  292-15  296- 7  299- 6  353-16  398-10  432- 4  436- 3  440- 6  449- 4  463- 6  465-11  521- 5
526-12  541-33  552- 3  562- 7  589-11  597-10  643- 5  669- 9  712- 3  777- 8  797- 7  807- 5  820-10  835- 5  839- 8
872-38

WIS/NEARSHORE STATION  272, # HURDAT STORMS-MAX SURGE   29
 76- 6  194-33  196- 4  217-11  292-25  296- 9  299- 5  353-24  432- 5  440- 9  449- 4  456- 3  463- 8  465- 9  521- 4
526-12  541-44  562-13  589-13  597- 6  643- 6  669- 7  712- 8  777- 9  797-10  807- 5  835- 4  839-15  872-36

WIS/NEARSHORE STATION  273, # HURDAT STORMS-MAX SURGE   29
194-22  217- 5  292-13  296- 4  299- 6  353-11  432- 8  436- 4  440- 4  463- 3  465- 7  526- 9  541-39  545- 3  546- 5
552- 3  562- 5  589- 7  597-18  643- 4  669- 8  712- 3  777- 4  797- 7  807- 6  820-16  835- 5  839- 8  872-19

WIS/NEARSHORE STATION  274, # HURDAT STORMS-MAX SURGE   28
194-24  217- 5  292-11  296- 3  299- 7  353-11  357- 3  432- 8  436- 5  465- 7  526-10  541-40  545- 8  546-12  552- 6
562- 4  589- 7  597-30  643- 6  669- 9  702- 5  777- 4  797- 6  807- 8  820-24  835- 8  839- 6  872-19

WIS/NEARSHORE STATION  275, # HURDAT STORMS-MAX SURGE   31
 76- 4  194-26  217- 4  292-13  296- 4  299- 6  353-13  432- 8  436- 4  440- 4  463- 3  465- 6  526-10  541-39  545- 9
546-13  552- 6  575- 4  597-33  611- 3  643- 5  669- 8  702- 6  712- 5  777- 3  797- 7  807- 9  820-20  835- 6  839- 8
872-16

WIS/NEARSHORE STATION  276, # HURDAT STORMS-MAX SURGE   29
 76- 3  194-20  217- 3  292-10  296- 3  299- 5  353-10  432- 5  436- 4  440- 3  465- 4  526- 9  541-30  545- 9  546- 9
552- 8  575- 3  597-28  611- 3  643- 4  669- 7  702- 6  712- 4  797- 6  807- 6  820-11  835- 6  839- 7  872-12

WIS/NEARSHORE STATION  277, # HURDAT STORMS-MAX SURGE   24
194-16  292- 8  299- 4  353- 9  432- 4  436- 3  465- 3  526- 8  541-24  545- 8  546- 7  552-10  597-24  611- 3  643- 4
669- 7  702- 6  712- 3  797- 5  807- 5  820- 5  835- 5  839- 7  872- 9

WIS/NEARSHORE STATION  278, # HURDAT STORMS-MAX SURGE   23
 76- 4  194-17  292- 7  299- 4  353-11  432- 3  436- 3  526- 8  541-22  545- 9  546- 6  552-13  597-31  611- 4  643- 3
669- 6  702- 9  712- 4  797- 6  807- 7  820- 4  835- 4  839- 8

WIS/NEARSHORE STATION  279, # HURDAT STORMS-MAX SURGE   18
194-13  292- 4  299- 4  332- 9  353- 6  436- 5  526- 6  541-12  545-10  546- 4  552-18  597-20  611- 4  669- 5  702- 8
807- 4  835- 7  839- 6

WIS/NEARSHORE STATION  280, # HURDAT STORMS-MAX SURGE   20
194-16  292- 4  299- 5  332-16  353- 6  386- 3  436- 7  520- 4  526- 6  541- 9  545-13  552-23  597-19  611- 5  635- 4
669- 5  702-10  807- 4  835-13  839- 4

WIS/NEARSHORE STATION  281, # HURDAT STORMS-MAX SURGE   17
194-10  299- 4  332-13  353- 4  386- 3  436- 9  520- 4  526- 4  541- 5  545- 8  552-14  597-10  611- 3  669- 5  702- 5
835-13  839- 3

WIS/NEARSHORE STATION  282, # HURDAT STORMS-MAX SURGE   16
 76- 3  112- 4  194- 9  332-12  353- 4  436-10  520- 3  535- 3  541- 4  545- 9  552-10  597- 7  611- 4  669- 4  702- 4
835-15

WIS/NEARSHORE STATION  283, # HURDAT STORMS-MAX SURGE    9
112- 5  194- 5  327- 3  332- 6  436- 8  535- 4  545- 5  552- 4  835-10

WIS/NEARSHORE STATION  284, # HURDAT STORMS-MAX SURGE   10
194- 5  327- 5  332- 6  370- 5  386- 3  436- 8  545- 4  552- 3  611- 3  835-12
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WIS/NEARSHORE STATIO        # HURDAT STORMS-MAX SURGE  13
112- 4  194- 7  32?         10  370- 7  386- 4  436-13  535- 4  545- 7  552- 4  597- 3  611- 3  835-18

WIS/NEARSHORE STATION  286, # HURDAT STORMS-MAX SURGE  13
194- 7  327-11  332-10  370- 8  386- 4  436-13  535- 5  545- 7  552- 4  597- 4  712- 3  807- 3  835-21

WIS/NEARSHORE STATION  287, # HURDAT STORMS-MAX SURGE  13
194- 6  327-12  332-11  370- 9  386- 4  436-14  535- 3  545- 8  552- 5  597- 6  712- 4  807- 3  835-22

WIS/NEARSHORE STATION  288, # HURDAT STORMS-MAX SURGE  16
112- 6  194- 7  327-18  332-18  353- 6  370-13  386- 5  436-20  520- 4  541- 3  545-14  552- 9  597-12  629- 4  712- 6
835-33

WIS/NEARSHORE STATION  289, # HURDAT STORMS-MAX SURGE  20
112-10  194- 7  327-23  332-20  353-16  370-14  386- 6  436-20  456- 4  520- 3  541- 4  545-19  552-15  562- 5  597-16
629- 4  657- 5  712- 8  775- 4  835-36

WIS/NEARSHORE STATION  290, # HURDAT STORMS-MAX SURGE  20
112-10  194- 6  327-23  332-18  353-25  370-13  386- 6  436-19  456- 5  463- 4  541- 5  545-20  552-16  562- 6  597-16
629- 4  657- 6  712- 7  775- 3  835-35

WIS/NEARSHORE STATION  291, # HURDAT STORMS-MAX SURGE  22
112- 8  194- 5  292- 3  327-24  332-15  353-32  370-13  386- 6  436-17  456- 5  463- 5  541- 5  545-21  552-16  562- 6
597-14  629- 4  657- 7  672- 3  702- 5  712- 6  835-33

WIS/NEARSHORE STATION  292, # HURDAT STORMS-MAX SURGE  20
112- 6  327-16  332-11  353-29  370-11  386- 5  436-15  440- 4  456- 3  463- 5  541- 4  545-16  552-11  562- 5  597-12
657- 6  672-10  702- 6  712- 4  835-29

WIS/NEARSHORE STATION  293, # HURDAT STORMS-MAX SURGE  19
112- 5  327-17  332-10  353-29  370-10  386- 5  436-14  440- 5  463- 4  541- 6  545-20  552-10  562- 4  597-10  657- 7
672-15  702-10  712- 4  835-28

WIS/NEARSHORE STATION  294, # HURDAT STORMS-MAX SURGE  17
112- 4  327-11  332- 9  353-20  370-10  386- 5  436-13  440- 4  541- 4  545-14  552- 6  597- 7  657- 8  672-10  702- 8
712- 4  835-26

WIS/NEARSHORE STATION  295, # HURDAT STORMS-MAX SURGE  16
112- 3  327- 7  332- 8  353-13  370- 8  386- 5  436-13  541- 3  545- 9  552- 4  597- 5  657- 9  67              712- 4
835-25

WIS/NEARSHORE STATION  296, # HURDAT STORMS-MAX SURGE  17
112- 3  327- 8  332- 8  353-12  370- 8  386- 6  436-13  440- 3  541- 4  545-11  552- 4  597- 5  657-10  672- 5  702- 7
712- 4  835-28

WIS/NEARSHORE STATION  297, # HURDAT STORMS-MAX SURGE  18
112- 4  327- 9  332-11  353-13  370-10  386- 8  436-16  440- 4  541- 5  545-13  552- 4  597- 4  657-11  672- 6  702- 9
712- 5  748- 3  835-33

WIS/NEARSHORE STATION  298, # HURDAT STORMS-MAX SURGE  18
112- 3  327- 9  332-10  353-11  370- 9  386- 7  436-16  440- 4  541- 5  545-13  552- 3  597- 3  657- 9  672- 5  702- 9
712- 5  748- 3  835-32

WIS/NEARSHORE STATION  299, # HURDAT STORMS-MAX SURGE  13
327- 5  332- 7  353- 6  370- 6  386- 8  436-15  541- 5  545- 7  657- 6  702- 8  712- 5  748- 4  835-29

WIS/NEARSHORE STATION  300, # HURDAT STORMS-MAX SURGE  15
327- 4  332- 7  353- 5  370- 5  386- 9  432- 3  436-16  541- 4  545- 5  597- 3  657- 5  702- 8  712- 6  748- 5  835-31
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WIS/NEARSHORE STATION  301, # HURDAT STORMS-MAX SURGE   14
327- 4  332- 7  353- 4  370- 6  386-12  436-18  541- 4  545- 4  597- 5  657- 5  702- 7  712- 8  748- 6  835-32

WIS/NEARSHORE STATION  302, # HURDAT STORMS-MAX SURGE   15
327- 4  332- 8  353- 5  370- 6  386-17  432- 3  436-21  541- 5  545- 5  597- 5  657- 6  702- 9  712-12  748- 8  835-42

WIS/NEARSHORE STATION  303, # HURDAT STORMS-MAX SURGE   16
327- 4  332- 8  353- 5  370- 7  386-20  432- 4  436-23  535- 3  541- 5  545- 5  597- 6  657- 6  702- 7  712-16  748- 9
835-35

WIS/NEARSHORE STATION  304, # HURDAT STORMS-MAX SURGE   16
296- 3  327- 4  332- 6  353- 3  370- 5  386-19  436-19  535- 3  541- 5  545- 4  597- 6  657- 5  702- 8  712-14  748- 9
835-36

WIS/NEARSHORE STATION  305, # HURDAT STORMS-MAX SURGE   16
296- 6  327- 5  332- 6  353- 4  370- 5  386-18  436-19  535- 4  541- 8  545- 5  597- 6  657- 5  702-14  712-14  748-10
835-42

WIS/NEARSHORE STATION  306, # HURDAT STORMS-MAX SURGE   15
296- 4  327- 4  332- 5  353- 4  370- 5  386-24  436-21  535- 4  545- 4  597- 6  657- 5  702-12  712-17  748-12  835-42

WIS/NEARSHORE STATION  307, # HURDAT STORMS-MAX SURGE   12
332- 5  353- 3  370- 5  386-27  436-20  535- 5  597- 7  657- 5  702- 8  712-16  748-12  835-40

WIS/NEARSHORE STATION  308, # HURDAT STORMS-MAX SURGE   12
332- 5  353- 3  370- 5  386-29  436-20  535- 5  597- 9  657- 4  702- 5  712-14  748-10  835-34

WIS/NEARSHORE STATION  309, # HURDAT STORMS-MAX SURGE   11
332- 5  370- 6  386-28  436-19  535- 6  597- 9  657- 4  702- 4  712-12  748- 8  835-27

WIS/NEARSHORE STATION  310, # HURDAT STORMS-MAX SURGE   12
332- 5  370- 6  386-36  436-22  535-10  597- 9  657- 4  702- 4  712-12  748- 9  805- 3  835-30

WIS/NEARSHORE STATION  311, # HURDAT STORMS-MAX SURGE   11
332- 5  370- 7  386-28  436-20  535- 7  597- 9  657- 4  702- 3  712- 9  748- 7  835-23

WIS/NEARSHORE STATION  312, # HURDAT STORMS-MAX SURGE   10
332- 5  370- 7  386-23  436-16  535- 5  597- 7  657- 4  712- 7  748- 5  835-18

WIS/NEARSHORE STATION  313, # HURDAT STORMS-MAX SURGE   11
332- 6  370- 7  386-23  436-17  440- 3  535- 5  597- 6  712- 7  748- 5  805- 3  835-16

WIS/NEARSHORE STATION  314, # HURDAT STORMS-MAX SURGE   10
332- 5  370- 7  386-20  436-14  440- 3  535- 4  597- 5  712- 6  748- 4  835-14

WIS/NEARSHORE STATION  315, # HURDAT STORMS-MAX SURGE   11
332- 5  370- 8  386-24  436-18  440- 4  535- 6  597- 8  643- 3  712- 6  748- 5  835-17

WIS/NEARSHORE STATION  316, # HURDAT STORMS-MAX SURGE   10
332- 5  370- 9  386-22  436-15  440- 4  535- 6  597- 7  712- 5  748- 4  835-15

WIS/NEARSHORE STATION  317, # HURDAT STORMS-MAX SURGE   13
332- 5  370-10  386-21  436-13  440- 5  522- 3  535- 5  597- 6  643- 3  712- 5  748- 4  805- 3  835-14

WIS/NEARSHORE STATION  318, # HURDAT STORMS-MAX SURGE   13
332- 6  370-11  386-17  436-11  440- 5  522- 3  535- 4  597- 5  604- 4  643- 3  712- 4  748- 3  835-11

WIS/NEARSHORE STATION  319, # HURDAT STORMS-MAX SURGE   12
332- 6  370-11  386-15  436- 9  440- 6  522- 3  535- 4  597- 5  604- 4  606- 3  712- 3  835-10
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MIS/NEARSHORE STATION  320, @ HURDAT STORMS-MAX SURGE    7
332- 8  370- 8  386- 8  436- 5  522- 4  606- 3  835- 5

MIS/NEARSHORE STATION  321, @ HURDAT STORMS-MAX SURGE    7
332- 8  370- 8  386- 5  522- 5  604- 4  606- 4  623- 4

MIS/NEARSHORE STATION  322, @ HURDAT STORMS-MAX SURGE    8
332- 6  370- 8  386- 4  440- 3  522- 5  604- 3  606- 4  623- 4

MIS/NEARSHORE STATION  323, @ HURDAT STORMS-MAX SURGE    7
332- 6  370- 6  386- 4  522- 4  604- 3  606- 4  623- 4

MIS/NEARSHORE STATION  324, @ HURDAT STORMS-MAX SURGE    8
332- 5  370- 5  386- 5  436- 4  522- 4  604- 3  606- 4  623- 4

MIS/NEARSHORE STATION  325, @ HURDAT STORMS-MAX SURGE    8
332- 6  370- 5  386- 5  436- 4  522- 5  604- 5  606- 4  623- 4

MIS/NEARSHORE STATION  326, @ HURDAT STORMS-MAX SURGE    9
332- 5  370- 4  386- 6  436- 6  522- 5  604- 4  606- 4  623- 4  835- 4

MIS/NEARSHORE STATION  327, @ HURDAT STORMS-MAX SURGE    9
332- 5  370- 4  386- 6  436- 8  522- 5  604- 4  606- 4  623- 4  835- 5

MIS/NEARSHORE STATION  328, @ HURDAT STORMS-MAX SURGE   11
332- 5  370- 4  386- 7  436-10  522- 5  535- 3  597- 4  604- 4  606- 4  623- 4  835- 6

MIS/NEARSHORE STATION  329, @ HURDAT STORMS-MAX SURGE   11
332- 5  370- 4  386- 7  436-10  522- 5  535- 4  597- 6  604- 4  606- 4  623- 4  835- 7

MIS/NEARSHORE STATION  330, @ HURDAT STORMS-MAX SURGE   11
332- 5  370- 4  386- 8  436-12  522- 5  535- 5  589- 4  597- 7  604- 4  606- 4  835- 9

MIS/NEARSHORE STATION  331, @ HURDAT STORMS-MAX SURGE   12
332- 5  370- 4  386- 7  436-12  522- 5  535- 5  589- 4  597- 9  604- 4  606- 4  623- 5  835-10

MIS/NEARSHORE STATION  332, @ HURDAT STORMS-MAX SURGE   10
332- 5  370- 4  386- 5  436- 8  522- 5  535- 3  597- 5  606- 4  623- 5  835- 6

MIS/NEARSHORE STATION  333, @ HURDAT STORMS-MAX SURGE   10
332- 4  370- 4  386- 5  436- 9  522- 5  535- 3  597- 5  606- 3  623- 5  835- 7

MIS/NEARSHORE STATION  334, @ HURDAT STORMS-MAX SURGE    8
332- 4  370- 3  436- 7  522- 5  597- 4  606- 3  623- 5  835- 5

MIS/NEARSHORE STATION  335, @ HURDAT STORMS-MAX SURGE    6
332- 4  436- 8  522- 5  597- 3  623- 5  835- 4

MIS/NEARSHORE STATION  336, @ HURDAT STORMS-MAX SURGE    7
332- 4  436-11  522- 6  597- 3  623- 5  676- 4  835- 4

MIS/NEARSHORE STATION  337, @ HURDAT STORMS-MAX SURGE    6
332- 4  436- 8  522- 5  623- 5  676- 5  835- 3

MIS/NEARSHORE STATION  338, @ HURDAT STORMS-MAX SURGE    5
332- 4  436- 6  522- 6  623- 5  676- 3

MIS/NEARSHORE STATION  339, @ HURDAT STORMS-MAX SURGE    7
332- 4  370- 3  436- 8  522- 6  623- 5  676- 4  835- 3
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WIS/NEARSHORE STATION  340, # HURDAT STORMS-MAX SURGE    8
332- 4  370- 4  436-10  522- 6  597- 3  623- 6  676- 4  835- 3

WIS/NEARSHORE STATION  341, # HURDAT STORMS-MAX SURGE    9
332- 4  370- 4  436-12  522- 6  597- 3  623- 6  676- 5  777- 3  835- 4

WIS/NEARSHORE STATION  342, # HURDAT STORMS-MAX SURGE    8
332- 4  370- 3  436-11  522- 6  597- 3  623- 5  676- 7  835- 4

WIS/NEARSHORE STATION  343, # HURDAT STORMS-MAX SURGE    7
332- 4  436-10  522- 6  597- 3  623- 5  676- 8  835- 4

WIS/NEARSHORE STATION  344, # HURDAT STORMS-MAX SURGE    7
332- 4  436-11  522- 6  597- 4  623- 5  676- 4  835- 4

WIS/NEARSHORE STATION  345, # HURDAT STORMS-MAX SURGE    9
332- 4  370- 3  436-15  522- 6  597- 4  606- 4  623- 5  676- 4  835- 5

WIS/NEARSHORE STATION  346, # HURDAT STORMS-MAX SURGE   13
332- 5  370- 4  436-14  477- 4  522- 6  535- 4  597- 7  604- 3  623- 6  676- 4  777- 4  779- 4  835- 8

WIS/NEARSHORE STATION  347, # HURDAT STORMS-MAX SURGE   10
332- 4  370- 3  386- 6  436-11  522- 5  535- 3  597- 6  606- 4  623- 5  835- 7

WIS/NEARSHORE STATION  348, # HURDAT STORMS-MAX SURGE   10
332- 4  370- 4  386- 6  436-11  522- 5  535- 4  597- 7  606- 3  623- 5  835- 8

WIS/NEARSHORE STATION  349, # HURDAT STORMS-MAX SURGE   11
332- 4  370- 4  386- 6  436-10  522- 5  535- 4  597- 7  604- 3  606- 3  623- 5  835- 8

WIS/NEARSHORE STATION  350, # HURDAT STORMS-MAX SURGE   12
332- 5  370- 4  386- 8  436-12  522- 5  535- 5  589- 4  597- 9  604- 4  606- 4  623- 5  835-10

WIS/NEARSHORE STATION  351, # HURDAT STORMS-MAX SURGE   11
332- 5  370- 4  386- 8  436-12  522- 5  535- 5  589- 4  597- 8  604- 4  606- 4  835-10

WIS/NEARSHORE STATION  352, # HURDAT STORMS-MAX SURGE   11
332- 5  370- 4  386- 8  436-12  522- 5  535- 5  589- 3  597- 8  604- 4  606- 4  835- 9

WIS/NEARSHORE STATION  353, # HURDAT STORMS-MAX SURGE   10
332- 5  370- 4  386- 7  436-12  522- 5  535- 3  597- 5  604- 4  606- 4  835- 6

WIS/NEARSHORE STATION  354, # HURDAT STORMS-MAX SURGE   10
332- 5  370- 4  386- 9  436-14  522- 5  535- 4  597- 6  604- 4  606- 4  835- 8

WIS/NEARSHORE STATION  355, # HURDAT STORMS-MAX SURGE    8
332- 5  370- 4  386- 7  436- 8  522- 5  604- 5  606- 4  835- 5

WIS/NEARSHORE STATION  356, # HURDAT STORMS-MAX SURGE    8
332- 6  370- 5  386- 5  436- 5  522- 5  604- 5  606- 4  623- 4

WIS/NEARSHORE STATION  357, # HURDAT STORMS-MAX SURGE    8
332- 5  370- 5  386- 4  436- 3  522- 4  604- 3  606- 4  623- 4

WIS/NEARSHORE STATION  358, # HURDAT STORMS-MAX SURGE    7
332- 6  370- 7  386- 4  522- 4  604- 4  606- 4  623- 4

WIS/NEARSHORE STATION  359, # HURDAT STORMS-MAX SURGE   10
332- 7  370-10  386- 6  436- 5  440- 5  522- 5  604- 5  606- 4  623- 4  835- 4
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WIS/NEARSHORE STATION  360, # HURDAT STORMS-MAX SURGE   11
332- 8  370-13  386-10  436- 6  440- 5  522- 4  604- 5  606- 4  623- 3  805- 3  835- 6

WIS/NEARSHORE STATION  361, # HURDAT STORMS-MAX SURGE   10
332- 8  370-13  386- 8  436- 5  440- 5  522- 5  604- 5  606- 4  623- 4  835- 5

WIS/NEARSHORE STATION  362, # HURDAT STORMS-MAX SURGE   15
332- 6  370-13  386-14  436-14  440- 8  522- 4  535- 6  597- 7  604- 7  606- 4  623- 3  643- 5  712- 4  748- 3  835-12

WIS/NEARSHORE STATION  363, # HURDAT STORMS-MAX SURGE   16
332- 6  370-12  386-19  436-18  440- 7  522- 4  535- 7  597- 9  604- 7  606- 4  623- 3  643- 7  712- 5  748- 4  805- 4
835-15

WIS/NEARSHORE STATION  364, # HURDAT STORMS-MAX SURGE   15
332- 5  370- 9  386-31  436-26  440- 5  535-11  546- 4  597-14  604- 4  643- 5  702- 3  712- 8  748- 7  805- 3  835-24

WIS/NEARSHORE STATION  365, # HURDAT STORMS-MAX SURGE   15
332- 3  370- 6  386-31  436-28  440- 5  477- 4  535-12  546- 4  589- 4  597-14  643- 5  702- 3  712- 7  748- 7  835-25

WIS/NEARSHORE STATION  366, # HURDAT STORMS-MAX SURGE   15
332- 5  370- 9  386-33  436-29  440- 5  535-12  546- 4  597-14  604- 3  643- 4  702- 4  712- 8  748- 8  805- 3  835-26

WIS/NEARSHORE STATION  367, # HURDAT STORMS-MAX SURGE   15
332- 6  370- 9  386-30  436-27  440- 4  522- 3  535-10  597-13  604- 3  643- 4  702- 3  712- 9  748- 7  805- 3  835-23

WIS/NEARSHORE STATION  368, # HURDAT STORMS-MAX SURGE   16
332- 5  370- 8  386-36  436-33  440- 4  522- 3  535-13  546- 3  597-17  604- 3  643- 3  702- 4  712-10  748- 9  805- 3
835-29

WIS/NEARSHORE STATION  369, # HURDAT STORMS-MAX SURGE   10
332- 5  370- 7  386-29  436-22  535- 8  597-10  712- 9  748- 7  805- 3  835-22

WIS/NEARSHORE STATION  370, # HURDAT STORMS-MAX SURGE   12
332- 5  353- 3  370- 7  386-34  436-25  535- 9  597-14  702- 4  712-11  748- 8  805- 3  835-27

WIS/NEARSHORE STATION  371, # HURDAT STORMS-MAX SURGE   12
332- 5  353- 3  370- 7  386-39  436-25  535-11  597-11  702- 5  712-14  748-11  805- 3  835-33

WIS/NEARSHORE STATION  372, # HURDAT STORMS-MAX SURGE   13
332- 5  353- 3  370- 6  386-43  436-24  535-12  597-10  657- 5  702- 6  712-16  748-13  805- 3  835-39

WIS/NEARSHORE STATION  373, # HURDAT STORMS-MAX SURGE   13
296- 5  332- 5  353- 4  370- 5  386-43  436-25  535- 6  597- 9  657- 5  702-11  712-22  748-19  835-55

WIS/NEARSHORE STATION  374, # HURDAT STORMS-MAX SURGE   15
296- 6  327- 4  332- 5  353- 4  370- 5  386-36  436-22  535- 4  545- 4  597- 6  657- 5  702-14  712-23  748-17  835-61

WIS/NEARSHORE STATION  375, # HURDAT STORMS-MAX SURGE   18
296- 8  327- 5  332- 6  353- 4  370- 6  386-29  436-21  477- 4  535- 4  545- 5  546- 3  597- 6  657- 5  702-20  712-20
748-16  779- 3  835-55

WIS/NEARSHORE STATION  376, # HURDAT STORMS-MAX SURGE   19
296- 8  327- 5  332- 6  353- 4  370- 5  386-19  432- 3  436-18  477- 4  535- 4  541- 9  545- 5  597- 6  657- 5  702-18
712-14  748-10  779- 3  835-45

WIS/NEARSHORE STATION  377, # HURDAT STORMS-MAX SURGE   17
296- 4  327- 5  332- 7  353- 4  370- 6  386-18  432- 3  436-21  535- 3  541- 6  545- 5  597- 5  657- 5  702- 9  712-16
748-10  835-39

WIS/NEARSHORE STATION  378, # HURDAT STORMS-MAX SURGE   16
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327- 5 332- 8 353- 5 370- 7 386-20 432- 4 436-23 535- 3 541- 6 545- 5 597- 6 657- 6 702- 8 712-16 748- 9
835-35

MIS/NEARSHORE STATION 379, # HURDAT STORMS-MAX SURGE 16
327- 5 332- 9 353- 5 370- 7 386-16 432- 4 436-22 535- 3 541- 5 545- 6 597- 4 657- 6 702-10 712-12 748- 9
835-45

MIS/NEARSHORE STATION 380, # HURDAT STORMS-MAX SURGE 16
296- 3 327- 6 332- 8 353- 5 370- 6 386-12 432- 5 436-19 541- 6 545- 7 597- 4 657- 6 702-11 712- 7 748- 6
835-37

MIS/NEARSHORE STATION 381, # HURDAT STORMS-MAX SURGE 16
327- 5 332- 9 353- 6 370- 7 386-14 432- 4 436-21 541- 6 545- 6 597- 5 657- 6 702-11 712- 9 748- 7 805- 3
835-44

MIS/NEARSHORE STATION 382, # HURDAT STORMS-MAX SURGE 17
296- 5 327- 7 332- 8 353- 6 370- 6 386-12 432- 6 436-17 440- 3 541- 7 545- 8 597- 4 657- 6 702-14 712- 6
748- 5 835-39

MIS/NEARSHORE STATION 383, # HURDAT STORMS-MAX SURGE 16
296- 4 327- 6 332- 8 353- 6 370- 6 386-11 432- 4 436-16 541- 6 545- 8 597- 3 657- 6 702-12 712- 5 748- 4
835-36

MIS/NEARSHORE STATION 384, # HURDAT STORMS-MAX SURGE 17
296- 4 327- 7 332- 8 353- 8 370- 7 386- 8 432- 4 436-15 440- 3 541- 7 545-10 597- 4 657- 8 702-12 712- 5
748- 4 835-32

MIS/NEARSHORE STATION 385, # HURDAT STORMS-MAX SURGE 20
112- 3 289- 3 296- 3 327-10 332-10 353-12 370- 9 386- 8 436-16 440- 5 541- 6 545-14 552- 4 597- 3 657-10
672- 6 702- 9 712- 5 748- 3 835-33

MIS/NEARSHORE STATION 386, # HURDAT STORMS-MAX SURGE 17
112- 4 327- 9 332- 9 353-13 370- 9 386- 6 436-13 440- 4 541- 5 545-13 552- 5 597- 5 657-11 672- 6 702- 8
712- 4 835-29

MIS/NEARSHORE STATION 387, # HURDAT STORMS-MAX SURGE 17
112- 4 327-12 332- 9 353-17 370-10 386- 5 436-13 440- 5 541- 5 545-16 552- 6 597- 6 657-10 672-10 702- 9
712- 4 835-27

MIS/NEARSHORE STATION 388, # HURDAT STORMS-MAX SURGE 18
112- 4 327-10 332-11 353-13 370-10 386- 8 436-17 440- 4 541- 5 545-14 552- 4 597- 4 657-11 672- 6 702-10
712- 6 748- 3 835-34

MIS/NEARSHORE STATION 389, # HURDAT STORMS-MAX SURGE 20
112- 6 296- 4 327-18 332-10 353-25 370-11 386- 5 436-13 440- 7 463- 3 541- 7 545-24 552- 9 562- 4 597- 9
657-11 672-17 702-13 712- 4 835-28

MIS/NEARSHORE STATION 390, # HURDAT STORMS-MAX SURGE 22
112- 6 292- 4 296- 4 327-21 332-11 353-31 370-11 386- 5 436-15 440- 6 456- 3 463- 5 541- 7 545-24 552-11
562- 5 597-11 657- 9 672-17 702-12 712- 4 835-28

MIS/NEARSHORE STATION 391, # HURDAT STORMS-MAX SURGE 24
112- 9 194- 4 292- 5 296- 3 327-29 332-15 353-41 370-12 386- 5 436-16 440- 5 456- 5 463- 6 541- 6 545-27
552-16 562- 7 597-13 629- 5 657-10 672-12 702-10 712- 6 835-31

MIS/NEARSHORE STATION 392, # HURDAT STORMS-MAX SURGE 23
112-10 194- 5 292- 5 327-30 332-16 353-39 370-13 386- 6 436-17 440- 4 456- 6 463- 7 541- 5 545-26 552-18
562- 8 597-13 629- 6 657-10 672- 5 702-10 712- 7 835-33

MIS/NEARSHORE STATION 393, # HURDAT STORMS-MAX SURGE 22

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112-13  194- 7  292- 4  327-30  332-21  353-31  370-15  386- 6  436-20  456- 7  463- 5  541- 5  545-27  552-21  562- 7
597-18  629- 6  657- 9  702- 4  712- 9  775- 5  835-38

WIS/NEARSHORE STATION  394, # HURDAT STORMS-MAX SURGE   20
112-12  194- 7  327-25  332-21  353-18  370-15  386- 6  436-20  456- 4  520- 3  541- 5  545-22  552-16  562- 5  597-16
629- 5  657- 5  712- 8  775- 5  835-37

WIS/NEARSHORE STATION  395, # HURDAT STORMS-MAX SURGE   18
112- 8  194- 8  327-23  332-21  353- 7  370-15  386- 6  436-21  520- 4  541- 4  545-18  552-11  597-16  629- 5  657- 3
712- 7  775- 4  835-38

WIS/NEARSHORE STATION  396, # HURDAT STORMS-MAX SURGE   16
112- 5  194- 9  327-21  332-18  370-14  386- 6  436-22  520- 4  535- 3  541- 3  545-14  552- 7  597- 9  629- 5  712- 5
835-33

WIS/NEARSHORE STATION  397, # HURDAT STORMS-MAX SURGE   17
 76- 3  112- 5  194-10  327-15  332-17  370-11  386- 5  436-18  520- 4  535- 4  541- 3  545-12  552- 8  597- 8  712- 4
807- 5  835-31

WIS/NEARSHORE STATION  398, # HURDAT STORMS-MAX SURGE   15
112- 7  194-10  327-13  332-14  370-10  386- 5  436-19  535- 3  541- 3  545-10  552- 7  597- 5  611- 4  807- 4  835-27

WIS/NEARSHORE STATION  399, # HURDAT STORMS-MAX SURGE   15
112- 7  194- 9  327- 7  332-12  370- 5  386- 4  436-12  535- 5  541- 3  545- 9  552- 7  597- 5  611- 4  669- 3  835-20

WIS/NEARSHORE STATION  400, # HURDAT STORMS-MAX SURGE   21
 76- 5  112- 7  194-11  327- 3  332-16  353- 6  386- 3  436-11  520- 4  535- 6  541- 5  545-12  552-12  597- 8  611- 4
635- 3  669- 4  702- 4  712- 5  797- 3  835-15

WIS/NEARSHORE STATION  401, # HURDAT STORMS-MAX SURGE   23
 76- 5  112- 3  194-15  292- 4  299- 4  332-19  353- 7  386- 3  436-12  520- 6  526- 4  541- 7  545-14  552-18  597-13
611- 4  635- 4  669- 4  702- 6  712- 5  797- 3  807- 5  835-18

WIS/NEARSHORE STATION  402, # HURDAT STORMS-MAX SURGE   21
194-17  292- 4  299- 5  332-19  353- 6  386- 4  436-10  520- 5  526- 5  541- 8  545-14  552-22  575- 3  597-17  611- 4
635- 5  669- 5  702- 9  807- 5  835-17  839- 4

WIS/NEARSHORE STATION  403, # HURDAT STORMS-MAX SURGE   23
194-18  292- 4  299- 5  332-19  353- 8  386- 4  436- 7  520- 5  526- 6  541-11  545-16  546- 4  552-27  597-23  611- 5
623- 3  635- 5  669- 5  702-12  797- 4  807- 5  835-12  839- 4

WIS/NEARSHORE STATION  404, # HURDAT STORMS-MAX SURGE   30
 76- 6  194-24  292- 8  296- 3  299- 5  332-10  353-13  386- 3  436- 5  463- 3  520- 3  526- 8  541-19  545-16  546- 6
552-28  562- 3  597-39  611- 5  623- 4  635- 5  643- 4  662- 4  669- 5  702-18  712- 5  797- 8  807-11  835- 6  839- 8

WIS/NEARSHORE STATION  405, # HURDAT STORMS-MAX SURGE   27
 76-10  194-27  292-13  296- 5  299- 4  353-20  432- 5  440- 5  456- 4  463- 6  526-10  541-30  545- 9  546- 9  552-15
562- 6  597-55  611- 4  643- 4  662- 6  669- 6  702-15  712- 9  797-13  807-14  835- 3  839-10

WIS/NEARSHORE STATION  406, # HURDAT STORMS-MAX SURGE   33
 76-10  194-32  217- 4  292-17  296- 7  299- 5  353-23  432- 7  436- 4  440- 7  456- 5  463- 7  465- 4  526-11  541-40
545-10  546-14  552- 7  562- 7  597-49  611- 4  643- 5  662- 7  669- 7  702-10  712-10  777- 4  797-13  807-14  820-13
835- 5  839-12  872-14

WIS/NEARSHORE STATION  407, # HURDAT STORMS-MAX SURGE   33
 76- 8  194-33  217- 5  292-18  296- 6  299- 6  353-20  432- 8  436- 4  440- 6  456- 3  463- 5  465- 5  526-11  541-44
545-10  546-16  552- 5  562- 5  597-46  611- 4  643- 5  662- 6  669- 8  702- 8  712- 8  777- 4  797-11  807-12  820-19
835- 6  839- 9  872-16

WIS/NEARSHORE STATION  408, # HURDAT STORMS-MAX SURGE   32
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76- 6 194-34 217- 5 292-19 296- 6 299- 6 353-19 432-10 436- 4 440- 6 463- 5 465- 6 526-11 541-49 545- 8
546-19 562- 3 575- 3 597-37 611- 4 643- 6 662- 5 669- 8 702- 6 712- 9 777- 5 797-10 807-10 820-25 835- 6
839-11 872-18

MIS/NEARSHORE STATION 409, @ HURDAT STORMS-MAX SURGE 34
194-31 217- 6 292-15 296- 4 299- 9 332- 3 353-14 357- 3 432-11 436- 6 440- 4 463- 3 465- 8 526-11 541-49
545- 8 546-16 552- 6 562- 6 589- 9 597-34 611- 3 630- 3 643- 7 669-10 702- 5 712- 4 777- 4 797- 7 807- 9
820-17 835- 9 839- 7 872-23

MIS/NEARSHORE STATION 410, @ HURDAT STORMS-MAX SURGE 29
76- 5 194-29 217- 7 292-20 296- 6 299- 6 353-17 432-12 436- 3 440- 6 463- 5 465- 7 526-11 541-49 546- 4
562- 9 589- 9 597-16 630- 9 643- 5 669- 7 712- 6 777- 5 797-10 807- 7 820- 7 835- 5 839-12 872-23

MIS/NEARSHORE STATION 411, @ HURDAT STORMS-MAX SURGE 30
76-10 194-41 196- 5 217-14 292-33 296-14 299- 6 353-35 432- 5 440-14 449- 6 456- 6 463-13 465-10 521- 5
526-13 541-53 562-19 589-18 597- 5 630- 5 643- 6 669- 8 712-13 777-12 797-13 807- 5 835- 3 839-19 872-44

MIS/NEARSHORE STATION 412, @ HURDAT STORMS-MAX SURGE 34
76- 5 194-43 196- 7 217-19 292-24 296-12 299- 8 353-28 398-15 432- 4 436- 3 440-11 449- 6 456- 4 463-10
465-14 521- 6 526-15 541-36 562-13 589-19 597- 9 630- 4 643- 7 662- 3 669-10 712- 7 746- 3 777-13 797-11
807- 5 835- 6 839-14 872-56

MIS/NEARSHORE STATION 413, @ HURDAT STORMS-MAX SURGE 35
112- 4 194-42 196-10 217-26 292-17 296- 8 299- 9 353-22 398-21 432- 3 436- 4 440- 9 449- 7 456- 5 463- 9
465-19 521- 9 526-16 541-22 552- 4 562- 8 589-22 597-10 629- 3 630- 8 643- 7 669-13 746- 4 777-14 797-10
807- 5 820- 9 835- 7 839- 8 872-65

MIS/NEARSHORE STATION 414, @ HURDAT STORMS-MAX SURGE 33
112- 3 194-37 196- 9 217-21 292-17 296- 8 299- 7 353-21 398-18 440-10 449- 7 456- 5 463- 9 465-16 521- 8
526-16 541-12 552- 4 562- 8 589-20 597- 6 629- 3 630- 7 643- 6 669-10 746- 3 777-14 797- 8 807- 4 820- 4
835- 5 839- 9 872-58

MIS/NEARSHORE STATION 415, @ HURDAT STORMS-MAX SURGE 31
103- 3 112- 4 194-40 196-12 217- 6 292-19 296-10 299- 6 353-26 398-26 440-15 449-11 456- 8 463-13 465-21
521-11 526-18 541- 6 552- 3 562- 9 589-34 597- 5 623- 4 629- 5 643- 8 669-10 746- 4 777-20 797- 7 839-10
872-36

MIS/NEARSHORE STATION 416, @ HURDAT STORMS-MAX SURGE 35
72- 5 94- 4 103- 6 112- 3 194-41 196-16 292-26 296-12 299- 6 353-32 398-26 440-20 449-17 456-11 463-20
465-22 477- 4 493- 8 521-15 526-18 541- 7 562-11 589-45 597- 3 623- 4 629- 7 643-11 669- 8 711- 8 746- 8
777-26 797- 6 807- 4 839-12 872- 9

MIS/NEARSHORE STATION 417, @ HURDAT STORMS-MAX SURGE 38
72- 7 94- 3 103-10 112- 3 194-41 196-18 271- 9 292-25 296-10 299- 7 353-32 398-21 440-21 449-18 456-12
463-22 465-25 477- 4 493-10 499- 5 521-18 526-16 541- 5 562- 8 589-17 597- 3 623- 4 629- 8 643-11 662- 4
669-10 711-10 746- 7 777-27 797- 5 807- 4 839- 9 872- 6

MIS/NEARSHORE STATION 418, @ HURDAT STORMS-MAX SURGE 37
72-11 94- 4 103-11 112- 3 194-45 196-13 271-10 292-27 296- 9 299- 7 353-35 398-16 440-25 449-19 456-15
463-27 465-25 477- 5 493-12 499- 6 521-16 526-16 541- 4 562- 7 589- 4 623- 4 629-10 643-11 662- 5 669-12
711-12 746- 9 777-36 797- 6 807- 5 839- 8 872- 6

MIS/NEARSHORE STATION 419, @ HURDAT STORMS-MAX SURGE 39
72-16 94- 3 103- 6 112- 4 194-49 196- 4 249- 5 271-13 292-28 296- 6 299- 9 353-33 397- 3 398- 6 440-28
449-19 456-16 463-27 465-20 477- 6 493-15 499- 8 521-11 526-11 562- 5 589- 4 597- 3 623- 4 629-11 643-10
662- 6 669-15 711-15 746-10 777-43 797- 6 807- 6 839- 5 872- 5

MIS/NEARSHORE STATION 420, @ HURDAT STORMS-MAX SURGE 37
72-20 103- 4 112- 4 194-54 249- 8 271-18 289- 9 292-34 296- 5 299-11 331- 8 353-38 397- 6 440-30 449-21
456-20 463-32 465-11 477- 9 493-23 499-11 521- 5 526- 7 562- 3 589- 4 597- 4 623- 3 629-10 643- 9 662-10

669-20 711-20 746-10 777-41 797- 7 807- 7 872- 3

WIS/NEARSHORE STATION 421, 0 HURDAT STORMS-MAX SURGE 32
72-15 112- 4 194-47 249- 8 271-18 289- 9 292-28 299-12 331- 6 353-31 397- 7 440-27 449-18 456-17 463-27
465- 6 477- 9 493-23 499-11 521- 4 526- 3 589- 4 597- 5 629-10 643- 6 662-11 669-21 711-15 746- 8 777-30
797- 6 807- 6

WIS/NEARSHORE STATION 422, 0 HURDAT STORMS-MAX SURGE 32
72- 9 112- 5 194-51 249-10 271-22 289-11 292-30 299-13 331- 8 353-35 397- 8 440-29 449-18 456-20 463-29
465- 3 477-10 493-29 499-14 521- 3 589- 3 597- 6 629-11 643- 5 662-12 669-23 711- 8 746- 6 777-21 797- 5
807- 7 872- 3

WIS/NEARSHORE STATION 423, 0 HURDAT STORMS-MAX SURGE 29
72- 8 112- 5 194-43 249-11 271-23 289-11 292-19 299-16 331- 7 353-26 397-10 440-26 449-16 456-15 463-20
477- 9 493-29 499-12 521- 3 589- 3 597- 6 629-10 662- 9 669-26 711- 6 777-20 797- 5 807- 7 872- 3

WIS/NEARSHORE STATION 424, 0 HURDAT STORMS-MAX SURGE 28
72- 7 112- 5 194-34 249-12 271-21 289-10 292-12 299-16 331-13 353-19 397-10 440-21 449-13 456-11 463-14
477- 7 493-26 499-10 521- 3 597- 7 629- 8 662- 7 669-26 711- 5 777-18 797- 4 807- 5 872- 3

WIS/NEARSHORE STATION 425, 0 HURDAT STORMS-MAX SURGE 30
72- 7 112- 6 141- 3 194-29 249-14 271-23 289-11 292-11 299-19 324- 4 331-13 353-15 397-12 440-19 449-11
456- 8 463-10 477- 8 493-26 499-10 521- 3 597- 7 629-10 662- 8 669-25 711- 4 777-18 797- 4 807- 7 872- 4

WIS/NEARSHORE STATION 426, 0 HURDAT STORMS-MAX SURGE 27
72- 6 112- 6 194-24 249-16 271-22 289-11 292-11 299-19 324- 4 331-13 353-13 397-12 440-16 449- 9 456- 7
463- 8 477- 9 493-22 499- 9 597-10 629-10 662- 7 669-18 711- 4 777-17 807- 5 872- 4

WIS/NEARSHORE STATION 427, 0 HURDAT STORMS-MAX SURGE 27
72- 6 112- 7 127- 5 194-21 249-20 271-23 289-11 292-10 299-19 324- 4 331-13 353-10 397-10 440-13 449- 7
456- 5 463- 5 477-10 493-20 499- 8 597-13 629-11 662- 6 669-12 711- 4 777-19 872- 4

WIS/NEARSHORE STATION 428, 0 HURDAT STORMS-MAX SURGE 27
72- 6 112- 7 127- 5 194-18 249-22 271-22 289-11 292- 9 299-15 324- 4 331-17 353- 8 397- 6 440-10 449- 5
456- 4 463- 3 465- 3 477- 9 493-17 499- 7 597-14 629-10 662- 6 669- 5 777-19 872- 4

WIS/NEARSHORE STATION 429, 0 HURDAT STORMS-MAX SURGE 25
72- 4 112- 7 127- 5 194-15 249-19 271-18 276- 6 289-11 292- 8 299- 9 324- 3 331-16 353- 8 397- 3 440- 9
449- 4 456- 4 473- 3 477- 8 493-13 499- 6 597- 6 629- 9 662- 6 777-16

WIS/NEARSHORE STATION 430, 0 HURDAT STORMS-MAX SURGE 17
72- 3 112- 127- 3 194- 8 249- 8 271-10 276- 4 289- 7 292- 4 331-10 353- 6 440- 4 477- 4 493- 5 629- 5
662- 4 777-10

WIS/NEARSHORE STATION 431, 0 HURDAT STORMS-MAX SURGE 13
112- 7 127- 3 194- 6 271- 7 276- 5 289- 5 292- 8 331- 8 353- 5 357- 4 629- 4 662- 3 777- 8

WIS/NEARSHORE STATION 432, 0 HURDAT STORMS-MAX SURGE 14
112- 7 127- 4 194- 6 271- 7 276- 6 289- 6 292- 9 296- 4 331-10 353- 8 357- 5 473- 4 629- 4 777- 7

WIS/NEARSHORE STATION 433, 0 HURDAT STORMS-MAX SURGE 20
112- 9 127- 5 194- 7 271- 9 276- 8 289- 9 292-14 296- 6 331-14 353-11 357- 6 440- 3 461- 3 473- 5 477- 4
499- 3 530- 3 629- 7 662- 7 777-11

WIS/NEARSHORE STATION 434, 0 HURDAT STORMS-MAX SURGE 22
112-10 127- 6 194- 8 271- 9 276-10 289-10 292-19 296- 6 324- 4 331-17 353-12 357- 7 440- 3 461- 4 473- 8
477- 6 499- 4 530- 5 629- 8 639- 5 662- 8 777-12

WIS/NEARSHORE STATION 435, 0 HURDAT STORMS-MAX SURGE 20
112- 9 127- 6 194- 7 271- 8 276-10 289- 9 292-21 296- 6 324- 6 331-17 353-11 357- 7 461- 4 473-10 477- 7

499- 3 629- 7 639- 4 662- 4 777-12

WIS/NEARSHORE STATION 436, # HURDAT STORMS-MAX SURGE 18
112- 7 127- 5 194- 5 271- 6 276- 8 289- 7 292-18 296- 5 324- 5 331-14 353- 9 357- 7 461- 4 473- 8 477- 6
629- 5 639- 3 777- 9

WIS/NEARSHORE STATION 437, # HURDAT STORMS-MAX SURGE 16
112- 6 127- 5 194- 4 271- 4 276- 7 289- 5 292-14 296- 4 331-10 353- 8 357- 6 461- 4 473- 7 477- 6 629- 4
777- 6

WIS/NEARSHORE STATION 438, # HURDAT STORMS-MAX SURGE 13
112- 5 127- 4 276- 6 289- 4 292-11 296- 4 331- 8 353- 7 357- 5 461- 3 473- 5 477- 5 777- 5

WIS/NEARSHORE STATION 439, # HURDAT STORMS-MAX SURGE 14
112- 5 127- 4 276- 7 292-11 296- 4 331- 8 353- 7 357- 6 461- 4 473- 5 477- 6 629- 3 635- 3 777- 4

WIS/NEARSHORE STATION 440, # HURDAT STORMS-MAX SURGE 13
112- 4 127- 4 276- 8 292- 9 296- 5 331- 5 353- 8 357- 6 461- 7 473- 4 477- 3 597- 4 629- 4

WIS/NEARSHORE STATION 441, # HURDAT STORMS-MAX SURGE 13
112- 4 127- 4 189- 3 276- 9 292- 8 296- 5 331- 4 353- 9 357- 6 461- 5 473- 4 597- 5 629- 5

WIS/NEARSHORE STATION 442, # HURDAT STORMS-MAX SURGE 12
112- 4 127- 4 189- 4 194- 3 276-10 292- 7 296- 6 353-10 357- 6 473- 3 597- 6 629- 5

WIS/NEARSHORE STATION 443, # HURDAT STORMS-MAX SURGE 16
112- 4 127- 3 189- 6 194- 4 276-13 292- 6 296- 8 353-13 357- 6 362- 3 449- 5 474- 3 499- 4 597- 8 629- 5
639- 5

WIS/NEARSHORE STATION 444, # HURDAT STORMS-MAX SURGE 14
112- 4 189- 8 194- 4 276-12 292- 6 296-11 353-18 357- 5 362- 4 449- 8 474- 4 597-11 629- 3 639- 7

WIS/NEARSHORE STATION 445, # HURDAT STORMS-MAX SURGE 12
112- 4 189- 7 194- 4 276-10 292- 5 296-11 353-18 357- 4 362- 4 449- 5 597-11 639- 8

WIS/NEARSHORE STATION 446, # HURDAT STORMS-MAX SURGE 12
112- 4 189- 9 194- 5 276- 6 292- 5 296-10 353-22 357- 3 362- 4 597-15 639- 7 651- 3

WIS/NEARSHORE STATION 447, # HURDAT STORMS-MAX SURGE 11
112- 3 189- 8 194- 5 276- 5 292- 4 296- 8 299- 4 353-17 357- 3 597-12 639- 5

WIS/NEARSHORE STATION 448, # HURDAT STORMS-MAX SURGE 10
189- 8 194- 6 276- 4 292- 4 296- 6 299- 4 353-15 474- 3 597-11 639- 4

WIS/NEARSHORE STATION 449, # HURDAT STORMS-MAX SURGE 11
117- 3 189- 8 194- 8 276- 4 292- 3 296- 5 299- 4 353-12 474- 4 597- 8 639- 4

WIS/NEARSHORE STATION 450, # HURDAT STORMS-MAX SURGE 12
117- 4 189- 9 194-10 292- 3 296- 3 299- 4 353- 8 473- 5 474- 4 493- 4 597- 6 639- 3

WIS/NEARSHORE STATION 451, # HURDAT STORMS-MAX SURGE 9
117- 3 189- 6 194-11 299- 4 353- 5 473- 3 493- 5 597- 3 639- 3

WIS/NEARSHORE STATION 452, # HURDAT STORMS-MAX SURGE 14
189- 9 194- 9 276- 5 292- 3 296- 8 299- 3 353-16 357- 8 461- 4 473- 6 521- 3 597- 9 639- 7 651- 5

WIS/NEARSHORE STATION 453, # HURDAT STORMS-MAX SURGE 23
127- 6 194-25 276-24 292- 9 296-17 331- 8 353-28 357-16 362- 4 440- 8 449- 4 456- 4 461-23 463- 4 465- 3
473-12 521-25 530- 4 597-17 635- 9 662- 4 797- 3 864- 3

WIS/NEARSHORE STATION 454, # HURDAT STORMS-MAX SURGE 16
189-10 194-17 276- 5 296-10 353-21 357- 5 461- 6 465- 4 473- 9 474- 5 493- 4 521- 5 597-11 635- 4 639- 8
852- 5

WIS/NEARSHORE STATION 455, # HURDAT STORMS-MAX SURGE 17
189-10 194-18 276- 5 292- 3 296- 9 353-21 357- 8 461- 7 465- 4 473-11 474- 4 521- 6 597-12 635- 4 639- 9
651- 4 852- 4

WIS/NEARSHORE STATION 456, # HURDAT STORMS-MAX SURGE 15
189-11 194-12 276- 5 292- 4 296-11 353-26 357-11 362- 3 461- 7 473- 9 474- 4 521- 6 597-14 639-11 651- 7

WIS/NEARSHORE STATION 457, # HURDAT STORMS-MAX SURGE 24
127- 8 194-40 249-16 276-31 292-11 296-19 299-12 331-11 353-33 357-15 362- 6 440-15 449- 6 456- 8 461-32
463- 7 473-18 521-32 530- 5 597-25 635-11 662- 6 797- 5 864- 4

WIS/NEARSHORE STATION 458, # HURDAT STORMS-MAX SURGE 24
127- 8 194-50 249-19 276-33 292-10 296-28 299-15 331-13 353-50 357- 6 362- 9 440-19 449- 7 456-10 461-38
463-11 473-17 521-33 530- 6 597-31 635- 7 662- 8 797- 4 864- 5

WIS/NEARSHORE STATION 459, # HURDAT STORMS-MAX SURGE 25
127- 8 194-52 249-20 276-34 292- 8 296-35 299-17 331-13 353-60 362-13 440-21 449- 6 456-11 461-43 463-13
473-11 521-31 530- 6 597-33 635- 4 643- 3 662- 8 797- 4 807- 3 864- 5

WIS/NEARSHORE STATION 460, # HURDAT STORMS-MAX SURGE 26
127- 9 194-51 249-21 276-34 292- 5 296-39 299-19 324- 3 331-13 353-67 362-14 440-22 449- 5 456-12 461-46
463-16 473- 5 493- 3 521-28 530- 6 597-31 635- 3 643- 4 662- 9 807- 4 864- 5

WIS/NEARSHORE STATION 461, # HURDAT STORMS-MAX SURGE 23
127- 8 194-37 249-19 276-25 292- 4 296-25 299-16 324- 3 331-11 353-52 362- 9 440-19 449- 4 456-11 461-27
463-14 521-19 530- 6 597-16 643- 4 662- 8 807- 3 864- 4

WIS/NEARSHORE STATION 462, # HURDAT STORMS-MAX SURGE 24
127- 9 194-40 249-22 276-29 292- 4 296-23 299-18 324- 4 331-12 353-53 362- 9 440-22 449- 4 456-12 461-23
463-16 493- 4 521-18 530- 7 597-16 643- 5 662- 9 807- 4 864- 6

WIS/NEARSHORE STATION 463, # HURDAT STORMS-MAX SURGE 26
127-12 194-43 249-27 276-32 292- 4 296-21 299-21 324- 6 331-15 353-56 362-10 440-27 449- 5 456-15 461-18
463-19 493- 5 521-13 530-10 584- 4 597-17 643- 6 662-13 669- 3 807- 5 864- 8

WIS/NEARSHORE STATION 464, # HURDAT STORMS-MAX SURGE 27
127-14 141- 4 194-40 249-32 276-33 296-20 299-26 324- 7 331-16 353-59 362-11 440-30 449- 4 456-18 461-18
463-22 477- 4 493- 7 521- 9 530-11 584- 3 597-14 643- 6 662-14 669- 4 807- 6 864-10

WIS/NEARSHORE STATION 465, # HURDAT STORMS-MAX SURGE 28
127-14 141- 5 194-36 249-34 276-27 292- 3 296-13 299-27 324- 8 331-18 353-53 362- 8 440-29 449- 4 456-19
461-11 463-22 477- 6 493- 5 521- 4 530-10 597-10 643- 6 662-12 669- 4 688- 3 807- 7 864-11

WIS/NEARSHORE STATION 466, # HURDAT STORMS-MAX SURGE 29
127-14 141- 6 194-34 249-38 276-23 289- 4 292- 3 296- 9 299-30 324- 9 331-19 353-54 357- 6 362- 6 440-30
449- 4 456-20 461- 4 463-24 477- 8 493- 5 530- 5 597- 9 643- 8 662-10 669-11 688- 3 807- 8 864-13

WIS/NEARSHORE STATION 467, # HURDAT STORMS-MAX SURGE 25
127-11 141- 5 194-22 249-35 276-18 296-10 299-29 324- 7 331-15 353-51 357- 6 362- 5 440-22 456-16 461- 7
463-22 477- 6 493- 6 597- 5 643- 6 662- 6 669-10 688- 4 807- 6 864-11

WIS/NEARSHORE STATION 468, # HURDAT STORMS-MAX SURGE 25
127- 9 141- 5 194-18 249-39 276-11 296-10 299-32 324- 6 331-15 353-48 357- 6 362- 3 440-19 456-14 461- 4
463-23 477- 7 493- 7 643- 6 662- 4 669-12 688- 3 712- 4 807- 7 864-13

WIS/NEARSHORE STATION 469, # HURDAT STORMS-MAX SURGE 26

94- 3 127- 8 141- 5 194-13 249-40 276- 7 296-13 299-34 324- 6 331-13 353-45 357- 7 362- 3 440-16 456-13
463-23 477- 6 493- 7 643- 5 662- 3 669-12 688- 4 712- 4 746- 4 807- 7 864-12

WIS/NEARSHORE STATION 470, # HURDAT STORMS-MAX SURGE 25
94- 4 127- 5 141- 6 194-13 249-45 289- 3 292- 3 296-11 299-38 324- 4 331-15 353-42 357- 7 440-16 456-14
463-24 477- 8 493- 6 643- 5 669-15 688- 4 712- 5 746- 4 807- 9 864-11

WIS/NEARSHORE STATION 471, # HURDAT STORMS-MAX SURGE 24
94- 4 141- 6 194-14 249-44 289- 4 292- 4 296- 7 299-37 331-18 353-34 357- 7 397- 4 440-14 456-14 463-25
477- 9 493- 6 643- 5 669-18 688- 4 712- 5 746- 5 807- 9 864- 5

WIS/NEARSHORE STATION 472, # HURDAT STORMS-MAX SURGE 24
94- 5 141- 8 194-13 249-44 289- 4 292- 4 296-10 299-36 331-19 353-50 357- 8 397- 4 440-14 456-15 463-30
477- 9 493-25 643- 7 669-24 688- 5 712- 6 746- 6 807- 9 864- 4

WIS/NEARSHORE STATION 473, # HURDAT STORMS-MAX SURGE 23
94- 5 141- 4 194-10 249-30 289- 4 296- 8 299-25 331-15 353-45 357- 7 397- 4 440-10 456-11 463-24 477- 7
493-21 643- 4 669-21 688- 5 712- 6 746- 6 807- 8 864- 3

WIS/NEARSHORE STATION 474, # HURDAT STORMS-MAX SURGE 22
94- 5 194-14 249-27 271- 3 289- 5 292- 4 299-23 331-19 353-35 357- 4 397- 6 440-11 456-11 463-23 477- 9
493-18 669-20 688- 5 712- 6 746- 8 807- 8 833- 5

WIS/NEARSHORE STATION 475, # HURDAT STORMS-MAX SURGE 24
94- 5 194-17 249-23 271- 5 289- 7 292- 5 299-17 331-22 353-28 357- 3 397- 7 440-10 456-11 463-23 477- 8
493-16 634- 4 669-18 688- 5 712- 6 746-10 807- 8 833- 7 839- 6

WIS/NEARSHORE STATION 476, # HURDAT STORMS-MAX SURGE 26
94- 6 194-23 249-19 271- 8 289-11 292- 7 299-13 331-25 353- 8 397- 8 440-10 449- 3 456-12 463-25 477-11
493-12 499- 3 526- 6 634- 5 669-17 688- 5 712- 7 746-13 807- 6 833- 9 839- 8

WIS/NEARSHORE STATION 477, # HURDAT STORMS-MAX SURGE 25
94- 9 194-28 249- 9 271-11 289-16 292- 6 331-30 397- 4 440-10 449- 3 456-15 463-30 477-16 493-26 499- 5
526- 8 562-12 634- 8 669-15 688- 7 712- 9 746-19 807- 4 833-10 839-10

WIS/NEARSHORE STATION 478, # HURDAT STORMS-MAX SURGE 25
94-11 194-24 231-11 271-13 289-19 292- 5 331-44 353-43 357- 5 440- 8 456-17 463-32 477-22 493-16 499- 6
526-11 562-16 634-11 669- 9 688- 9 712-13 746-24 807- 4 833-13 839-13

WIS/NEARSHORE STATION 479, # HURDAT STORMS-MAX SURGE 23
94- 7 194-12 231-10 271- 8 289-13 331-36 353-72 357- 5 440- 3 456-10 463-18 477-13 499- 4 526- 9 562-14
634- 9 643- 4 688-10 712-13 746-20 807- 4 833-10 839-12

WIS/NEARSHORE STATION 480, # HURDAT STORMS-MAX SURGE 23
94- 8 194- 8 231-11 271- 7 289-12 331-36 353-79 357- 5 456- 8 463-14 477-11 499- 3 526- 9 562-14 634-10
643- 8 688- 6 712-13 741- 9 746-22 807- 4 833-10 839-13

WIS/NEARSHORE STATION 481, # HURDAT STORMS-MAX SURGE 25
94- 4 194- 6 231-12 271- 8 289-13 296- 5 331-35 353-78 357- 5 362- 4 456- 6 463-11 477- 9 499- 3 526-10
562-15 634-11 643-11 688- 5 712-15 741-10 746-25 807- 4 833- 8 839-15

WIS/NEARSHORE STATION 482, # HURDAT STORMS-MAX SURGE 25
94- 3 194- 6 231-13 271- 9 289-15 296-11 331-35 353-77 357- 5 362- 6 456- 6 463-10 477- 8 499- 4 526-12
562-17 634-13 643-34 688- 4 712-15 741-11 746-28 807- 4 833- 6 839-16

WIS/NEARSHORE STATION 483, # HURDAT STORMS-MAX SURGE 24
94- 3 231-15 271- 9 289-16 296-15 331-33 353-71 357- 5 362- 8 456- 6 463- 8 477- 7 499- 4 526-13 562-20
634-15 643-40 688- 3 712-18 741-12 746-29 807- 4 833- 6 839-19

WIS/NEARSHORE STATION 484, # HURDAT STORMS-MAX SURGE 23

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 94- 4  231-18  271- 9  289-17  296-25  331-27  353-35  357- 5  362-11  456- 5  463- 7  477- 6  499- 4  526-16  562-24
634-20  643-48  688- 3  712-21  741-14  746-25  833- 6  839-24

MIS/NEARSHORE STATION  485, # HURDAT STORMS-MAX SURGE  26
 94- 5  141- 8  227- 9  231-22  271- 7  276-18  289-13  296-45  331-11  353-15  357- 7  362-14  461- 4  463- 3  477- 4
499- 4  526-17  562-28  634-23  643-40  688- 3  712-29  741-17  746-19  833- 7  839-33

MIS/NEARSHORE STATION  486, # HURDAT STORMS-MAX SURGE  21
 76-14   94- 4  141- 8  227- 7  231-19  276-20  289- 6  296-46  357- 7  362-16  461- 8  526-10  562-20  634-16  643-27
712-27  741-15  746-17  833- 8  838-11  839-28

MIS/NEARSHORE STATION  487, # HURDAT STORMS-MAX SURGE  20
 76-12   94- 3  141- 9  227- 6  231-16  276-19  296-45  357- 7  362-16  461-13  526- 6  562-15  634-11  643-19  712-25
741-13  746-15  833-16  838- 9  839-26

MIS/NEARSHORE STATION  488, # HURDAT STORMS-MAX SURGE  19
141- 7  227- 5  231-12  276-17  296-33  357- 7  362-14  461-11  526- 4  562-10  634- 7  643- 9  712-19  741-10  746-12
779-11  833-14  838- 7  839-20

MIS/NEARSHORE STATION  489, # HURDAT STORMS-MAX SURGE  21
 76- 9  141- 7  227- 4  231-11  276-17  296-30  357- 7  362-15  461-11  526- 4  562- 9  634- 7  643- 4  669- 3  712-19
741- 9  746-10  779-11  833-14  838- 6  839-20

MIS/NEARSHORE STATION  490, # HURDAT STORMS-MAX SURGE  21
 76- 9  141- 7  227- 4  231-10  276-16  296-21  299- 4  357- 7  362-14  461-10  526- 4  562- 8  634- 7  669- 4  712-19
741-10  746- 8  779-11  833-13  838- 6  839-22

MIS/NEARSHORE STATION  491, # HURDAT STORMS-MAX SURGE  20
 76- 8  141- 5  227- 5  231-11  276-12  296-13  299- 4  357- 6  362-11  461- 8  526- 4  562- 8  634- 7  712-17  741-10
746- 5  779-10  833- 9  838- 6  839-23

MIS/NEARSHORE STATION  492, # HURDAT STORMS-MAX SURGE  18
 76- 7  227- 5  231-10  276- 7  296- 9  299- 4  357- 5  362- 7  461- 6  526- 4  562- 7  634- 7  712-10  741- 9  779- 8
833- 4  838- 5  839-16

MIS/NEARSHORE STATION  493, # HURDAT STORMS-MAX SURGE  17
 76- 7  227- 5  231-10  276- 4  296- 9  299- 3  357- 5  362- 7  461- 4  526- 5  562- 8  634- 8  712- 9  741-10  779- 8
838- 5  839-12

MIS/NEARSHORE STATION  494, # HURDAT STORMS-MAX SURGE  18
 76- 8  227- 6  231-12  276- 5  296- 6  357- 5  362- 8  461- 4  490- 3  526- 6  562- 9  634- 9  712- 7  741-12  779- 8
833- 4  838- 6  839- 7

MIS/NEARSHORE STATION  495, # HURDAT STORMS-MAX SURGE  18
 76- 9  227- 6  231-14  276- 5  296- 4  357- 5  362- 9  461- 5  490- 3  526- 7  562-11  634-11  712- 6  741-13  779- 9
833- 4  838- 7  839- 5

MIS/NEARSHORE STATION  496, # HURDAT STORMS-MAX SURGE  19
 76-10  227- 7  231-15  276- 6  357- 5  362-10  461- 5  490- 3  526- 9  562-12  598- 3  634-11  672-10  712- 4  741-12
779-10  833- 4  838- 7  839- 4

MIS/NEARSHORE STATION  497, # HURDAT STORMS-MAX SURGE  19
 76- 9  127- 6  227- 7  231-15  276- 7  357- 4  362- 9  461- 5  526- 9  562-11  598- 3  634- 9  672-10  712- 3  741-11
779-10  833- 5  838- 7  839- 4

MIS/NEARSHORE STATION  498, # HURDAT STORMS-MAX SURGE  19
 76-10  127- 6  227- 8  231-17  276- 9  357- 4  362-10  461- 5  490- 3  526- 9  562-10  598- 4  634-10  672-11  741-10
779-11  833- 5  838- 8  839- 4

MIS/NEARSHORE STATION  499, # HURDAT STORMS-MAX SURGE  20
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 76-11  127- 6  227- 9  231-17  276-11  357- 4  362- 8  461- 6  490- 4  526- 7  562- 9  598- 4  634-10  672-12  703- 3
741- 4  779-12  833- 6  838- 9  839- 4

WIS/NEARSHORE STATION  500, # HURDAT STORMS-MAX SURGE   20
 76-11  127- 6  214- 9  227-10  231-15  276-13  357- 4  362- 6  461- 6  490- 4  526- 5  562- 7  598- 4  634-10  672-13
741- 3  779-13  833- 7  838-10  839- 4

WIS/NEARSHORE STATION  501, # HURDAT STORMS-MAX SURGE   21
 76-11  127- 6  214- 9  215- 3  227-12  231-13  276-15  357- 4  362- 3  461- 7  490- 5  526- 3  562- 6  598- 4  634- 9
639- 3  672-13  779-14  833- 8  838-11  839- 3

WIS/NEARSHORE STATION  502, # HURDAT STORMS-MAX SURGE   21
 76-15  127- 8  214-11  215- 4  227-14  231-12  276-20  324- 3  357- 4  397- 3  461-10  490- 8  562- 7  598- 5  634-10
639- 5  672-17  779-20  833-11  838-16  839- 3

WIS/NEARSHORE STATION  503, # HURDAT STORMS-MAX SURGE   21
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WIS/NEARSHORE STATION  504, # HURDAT STORMS-MAX SURGE   24
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672-24  704- 3  779-28  833-12  838-15  839- 3  859- 4

WIS/NEARSHORE STATION  506, # HURDAT STORMS-MAX SURGE   24
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WIS/NEARSHORE STATION  507, # HURDAT STORMS-MAX SURGE   24
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WIS/NEARSHORE STATION  514, # HURDAT STORMS-MAX SURGE   16
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76- 8 127- 4 214-12 231- 4 324- 4 397- 5 461- 5 562- 4 598- 5 639- 5 672-26 704- 4 731- 6 779- 5 838- 6
859- 4

WIS/NEARSHORE STATION 515, # HURDAT STORMS-MAX SURGE 13
76- 6 127- 3 214- 9 231- 3 397- 4 461- 4 598- 3 639- 4 672-17 731- 5 779- 4 838- 4 859- 4

WIS/NEARSHORE STATION 516, # HURDAT STORMS-MAX SURGE 11
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WIS/NEARSHORE STATION 517, # HURDAT STORMS-MAX SURGE 9
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WIS/NEARSHORE STATION 518, # HURDAT STORMS-MAX SURGE 9
76- 7 127- 5 214-11 397- 4 639- 5 672- 9 731- 5 838- 4 859- 4

WIS/NEARSHORE STATION 519, # HURDAT STORMS-MAX SURGE 9
76- 7 127- 5 214-12 397- 4 639- 5 672- 7 731- 6 838- 4 859- 3

WIS/NEARSHORE STATION 520, # HURDAT STORMS-MAX SURGE 14
76-13 127- 8 187- 4 214-18 232- 3 397- 4 461- 3 562- 5 634- 3 639-11 672- 8 731- 8 775- 3 838- 6

WIS/NEARSHORE STATION 521, # HURDAT STORMS-MAX SURGE 17
76-19 127- 7 187- 7 214-26 232- 6 241- 4 397- 5 461- 3 471- 7 562- 4 634- 6 639-17 672- 9 703- 4 731-14
775- 7 838- 9

WIS/NEARSHORE STATION 522, # HURDAT STORMS-MAX SURGE 16
76-25 127- 9 187- 9 214-29 232- 9 241- 7 324- 5 397- 8 471- 9 562- 5 634- 9 639-17 703- 4 731-21 775- 9
838-13

WIS/NEARSHORE STATION 523, # HURDAT STORMS-MAX SURGE 16
76-16 127- 4 187- 4 214-12 232- 9 241- 7 324- 5 397- 7 471- 8 562- 4 634-10 639-11 703- 4 731-23 775- 9
838-10

WIS/NEARSHORE STATION 524, # HURDAT STORMS-MAX SURGE 18
76-10 117- 4 187- 3 211- 4 232-18 241-15 324- 5 397-13 461- 3 471- 6 565- 9 634-25 639-20 703-10 731-46
757- 6 775-12 838-20

WIS/NEARSHORE STATION 525, # HURDAT STORMS-MAX SURGE 18
76- 6 117- 5 211- 4 232-19 241-10 310-11 324- 5 397-14 471- 4 565- 8 634-26 639-14 703- 9 731-35 757- 7
775- 9 832- 3 838-17

WIS/NEARSHORE STATION 526, # HURDAT STORMS-MAX SURGE 15
117- 5 183- 3 211- 5 232-21 241- 5 310-12 397-14 565-12 634-38 639-16 703-13 731-39 757-12 832- 5 838-20

WIS/NEARSHORE STATION 527, # HURDAT STORMS-MAX SURGE 16
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838-18

WIS/NEARSHORE STATION 529, # HURDAT STORMS-MAX SURGE 16
117- 5 183- 4 211- 5 232-19 310-11 565-24 634-31 639- 9 703-25 722- 5 731-25 757-11 809- 6 832-10 838-19
867- 4

WIS/NEARSHORE STATION 530, # HURDAT STORMS-MAX SURGE 19
117- 6 183- 4 211- 8 232-20 310-14 397- 3 565-22 634-15 639- 5 703-17 722- 5 731-20 757- 5 809- 5 832-10
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841- 4  867- 5  874- 7

WIS/NEARSHORE STATION  532, @ HURDAT STORMS-MAX SURGE  19
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838- 8  841- 4  867- 6  874- 7

WIS/NEARSHORE STATION  533, @ HURDAT STORMS-MAX SURGE  20
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832-17  838-26  841- 5  867- 7  874- 8

WIS/NEARSHORE STATION  534, @ HURDAT STORMS-MAX SURGE  19
117- 9  183- 5  211-14  232-26  310-23  397-26  405-10  565-27  586- 3  639- 3  703-24  722- 9  731-11  809- 7  832-12
838-16  841- 5  867- 7  874- 7

WIS/NEARSHORE STATION  535, @ HURDAT STORMS-MAX SURGE  20
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832- 5  838- 6  841- 6  867- 8  874- 8

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WIS/NEARSHORE STATION  545, @ HURDAT STORMS-MAX SURGE  23
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703- 8  704-15  722-17  809- 6  812-28  841- 4  867- 4  874-23
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704-16  722-13  809- 5  812-17  841- 3  867- 4  874-12

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WIS/NEARSHORE STATION  680, # HURDAT STORMS-MAX SURGE    3
112- 7  292- 3  872- 8

WIS/NEARSHORE STATION  681, # HURDAT STORMS-MAX SURGE    3
112- 7  292- 7  872- 5

WIS/NEARSHORE STATION  682, # HURDAT STORMS-MAX SURGE    3
112- 6  299- 5  651- 3

WIS/NEARSHORE STATION  683, # HURDAT STORMS-MAX SURGE    3
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112- 3  299- 4  651- 7  777- 4  783- 3

MIS/NEARSHORE STATION  685, # HURDAT STORMS-MAX SURGE    4
112- 4  299- 4  651- 6  783- 3

MIS/NEARSHORE STATION  686, # HURDAT STORMS-MAX SURGE    3
112- 5  299- 5  651- 4
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13. ABSTRACT *(Maximum 200 words)*

This report summarizes results of a numerical storm surge study conducted for the east coast of the United States and the Gulf of Mexico. The report describes a database of surge elevations and currents produced from the numerical simulation of 134 historically based tropical storm events and their maximum water level surge impact at 486 discrete locations along the east and gulf coasts of the United States and Puerto Rico. A visual indication of the spatial distribution of the peak surge elevation is provided in the form of an atlas of storm track and maximum storm surge corresponding to a 246-station nearshore subset of the 486-location database.

The simulated events used to generate the results contained in this report are not intended to be hindcasts of historic events. The goal was to provide a database of events similar to historic events which can be used to evaluate project response to, or protection afforded from, events which are realistic in both magnitude and duration for a specific location. If use of the database indicates a more detailed study is necessary, then the modeling techniques described in this report can be used to hindcast specific events. This hindcasting procedure requires detailed verification of the storm event by comparing computed results to prototype data, a procedure which was beyond the scope of this study.

(Continued)

14. SUBJECT TERMS		15. NUMBER OF PAGES
Circulation model	Storm surge	313
Finite element method	Tropical storm modeling	16. PRICE CODE
Hydrodynamic model	Two-dimensional model	

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13. ABSTRACT. (Concluded).

This database represents one component of a family of databases generated in support of the goals of the Dredging Research Program (DRP) Work Unit No. 32466, "Numerical Simulation Techniques for Evaluating Long-Term Fate and Stability of Dredged Material Disposed in Open Water" of Technical Area 1 of the DRP. The primary goal is to develop a database of site-specific information which can be used to evaluate the fate and stability of open-water dredged material disposal sites. Other databases include tidal elevations and currents for the east and Gulf of Mexico coasts and Caribbean sea and a capability for generating simulated time sequences of wave height, period, and direction for all coasts of the United States.