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SEISMIC ARRAY ANALYSIS CENTER QUARTERLY
TECHNICAL SUMMARY, JANUARY-MARCH 1973

William C. Dean

Teledyne Geotech

Prepared for:

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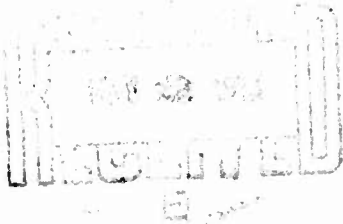
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SEISMIC ARRAY ANALYSIS CENTER QUARTERLY TECHNICAL SUMMARY REPORT JANUARY - MARCH 1973



W.C. DEAN

18 APRIL 1973

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 **TELEDYNE GEOTECH**
ALEXANDRIA LABORATORIES

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SEISMIC ARRAY ANALYSIS CENTER
QUARTERLY TECHNICAL SUMMARY REPORT
January - March 1973

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Project Title:	Seismic Array Analysis Center
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Name of Contractor	TELEDYNE GEOTECH
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INTRODUCTION

This quarterly report summarizes the operations and accomplishments in the SAAC for the period of January, February and March 1973.

TASK A - OPERATE SAAC

Operation

The SAAC Detection Processor (DP) and Event Processor (EP) were run with constant parameter settings, 24 hours a day, seven days a week during this period.

Table I shows the DP uptime and downtime as well as the general problem categories causing the downtime. Monthly percent uptime set a record of 98.7 in January and also exceeded 98% during February. A bad card in the 360/40B microcode unit was the major cause of DP downtime (22 hours) during March 1973. The quarterly percent uptime equals the record high of the third quarter of 1972.

Table II shows the EP and analyst time required to review and edit DP detections.

<u>Month</u>	January	February	March	Total
<u>Problems</u>		(in hours)		
Hardware	2.5	0	22.0	24.5
Software & Testing	4.3	2.3	0	6.6
Power Failure	0.3	0.8	2.1	3.2
50 KB Line	0.7	5.5	1.8	8.1
Preventative Maint.	1.8	3.7	5.0	10.5
<hr/>				
Total DP Downtime	9.6	12.4	70.9	52.9
Total DP Uptime	734.4	655.6	113.1	2107.1
% Uptime	98.7	98.2	95.0	97.6
Total Possible	744	672	744	2160.0

Table I. DP ISRSPS Up-Downtime for IASA Data
in the 1st Quarter 1973

Month	January	February (in hours)	March	Total
DP Recording Time Covered by EP Analysis	734.4	659.6	713.1	2107.1
Analyst Time Required on EOC	92.3	101.7	116.6	310.6
IBM 360/40B Time Required on EP	315.7	311.4	431.8	1058.9
No. of Detections	15925	14798	17113	47836
No of Events Listed on Summary	706	656	683	2045

Table II. DP-EP Analysis Time in the 1st Quarter 1973

Documentation and Programming

During this quarter coding changes were made to the off-line DP support programs to increase the selection of instrument at subarray level or selection of subarrays at array beamforming level. Coding changes were also made to implement the square law algorithm in the detection processor.

Modification of the set 08 (M08) of the Event Processor system has been completed in this quarter. This modification includes adding more and finer iteration steps to aid beampacking convergence, adds velocity and azimuths to the Detection File Report, and installs software to prevent false tape references at the year's end.

Operational documentation of TEMBLOR, SEISFILE, DIGIOP and DATALIB were completed during this quarter. Functional documentation of these programs are progressing on schedule.

The modification of the TEMBLOR program was completed. This modification expands the ability to access the seismic archival file by specifying epicenter, area of interest, phase and depth information.

A program was requested by ACDA to reformat TEMBLOR data and produce a copy of the final LPE Bulletin tape in ACDA specified format. This program was completed and delivered during this quarter.

ARPANET

The ARPANET - 360/44 interface was delivered and installed during February. Development of the Network Control Program (NCP) to enable use of the 360/44 peripherals for ARPANET input and output is proceeding.

The conversion of FKCOMB and support programs to process LP data on 360/91 computer at UCLA is in the final testing stage. Upon completion of the test, processing of LP data will begin with enabling low rate tapes to UCLA computing center. On the completion of the Data Transfer Module, we will begin experimenting the operation to send data via ARPANET.

Data Requests

During the quarter 740 requests for data were completed. Of those were 487 for MIT Lincoln Laboratories, 242 for Texas Instruments, 5 for University of Hawaii, and 6 for Alexandria Laboratories. Routine copying of each Tuesday NORSAR and ALPA long period data for Lincoln Lab are complete through January 1973. At the end of the quarter 273 requests were outstanding.

TASK B - EVALUATION

The off-line DP experiments to evaluate the performance of LASA with reduced numbers of sensors and subarrays continued. Analyses and interpretation of results of these experiments are proceeding. Coding changes to implement square law detector algorithm in off-line DP is in the testing stage.

TASK C - LASA/NORSAR COMPARISON

The noise average of NORSAR is 2.3 times above LASA's noise average, suggesting there will be 0.4 magnitude difference in m_b thresholds. The diurnal variation of both LASA and NORSAR are approximately the same and the range is 0.02 millimicrons, suggesting the contribution of cultural noise is nearly the same for LASA and NORSAR.

The 90% cumulative m_b threshold of LASA is estimated 3.6; and the 90% cumulative threshold of NORSAR is 4.1. Higher than expected threshold at NORSAR is due to travel time anomalies and higher beam losses associated with NORSAR Detection Processor.

TASK D - SPATIAL COHERENCE OF SURFACE WAVES, SAAC REPORT 8

Using spatial coherency estimates of Rayleigh and Love waves recorded at ALPA, LASA and NORSAR, SAAC Report No. 8 demonstrates that for a particular frequency the wave propagation cannot be described by a unique wavevector. Instead, the propagation is better described by a distribution in the wavenumber domain or, in physical terms, a distribution in azimuth and phase velocity. In general the coherency in the mean direction of propagation, which is a function of the velocity distribution, stays high relative to the coherency along the mean wavefront, which is a function of the azimuthal distribution.

TASK E - "FKCOMB," A FAST GENERAL PURPOSE ARRAY PROCESSOR, SAAC REPORT 9

SAAC Report No. 9 describes FKCOMB, a fast general-purpose array processing program which employs frequency-wavenumber analysis. A program package for quasi-online long-period array processing has

been designed around FKCOMB. It is this program which was used to estimate the long-period Rayleigh wave threshold at ALPA, LASA and NORSAR described in SAAC Report No. 4 and 6.

TASK F - STUDY OF WWSSN's, SAAC REPORT No. 11

SAAC Report No. 11 presents a study of selected world-wide standard seismic network status (WWSSN's). The report, which describes their present operational capabilities, how they should be upgraded, and their projected capabilities after upgrading, will be distributed shortly.