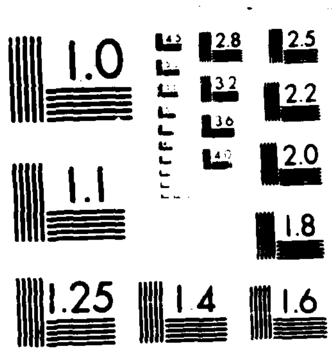
AD-A179 859   MIDDLE ATMOSPHERE DENSITY AND MODELS(U) AIR FORCE GEOPHYSICS LAB HANSCOM AFB MA   K CHAMPION 09 APR 87   AFGL-TR-87-0116   1/1

UNCLASSIFIED   F/G 4/1   NL



MICROCOPY RESOLUTION TEST CHART

NATIONAL BUREAU [illegible]

Unclassified

SECURITY CLASSIFICATION OF THIS PAGE

DTIC FILE COPY (1)

AD-A179 059

REPORT DOCUMENTATION PAGE

1a. REPORT SECURITY CLASSIFICATION: Unclassified	1b. RESTRICTIVE MARKINGS
2a. SECURITY CLASSIFICATION AUTHORITY	3. DISTRIBUTION/AVAILABILITY OF REPORT: Approved for Public Release; Distribution Unlimited
2b. DECLASSIFICATION / DOWNGRADING SCHEDULE	
4. PERFORMING ORGANIZATION REPORT NUMBER(S): AFGL-TR-87-0116	5. MONITORING ORGANIZATION REPORT NUMBER(S)
6a. NAME OF PERFORMING ORGANIZATION: Air Force Geophysics Laboratory — 6b. OFFICE SYMBOL (If applicable): LY	7a. NAME OF MONITORING ORGANIZATION
6c. ADDRESS (City, State, and ZIP Code): Hanscom AFB Massachusetts, 01731-5000	7b. ADDRESS (City, State, and ZIP Code)
8a. NAME OF FUNDING/SPONSORING ORGANIZATION — 8b. OFFICE SYMBOL (If applicable)	9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER
8c. ADDRESS (City, State, and ZIP Code)	10. SOURCE OF FUNDING NUMBERS

PROGRAM ELEMENT NO.	PROJECT NO.	TASK NO.	WORK UNIT ACCESSION NO.
62101F	6670	18	04

11. TITLE (Include Security Classification)
Middle Atmosphere Density and Models

12. PERSONAL AUTHOR(S)
K.S.W. Champion

13a. TYPE OF REPORT	13b. TIME COVERED	14. DATE OF REPORT (Year, Month, Day)	15. PAGE COUNT
Reprint	FROM ______ TO ______	1987 April 9	8

16. SUPPLEMENTARY NOTATION Reprinted from Upper and Middle Atmospheric Density Modeling Requirements for Spacecraft Design and Operations, Proceedings of a Workshop held in Huntsville, Alabama, November 19-21, 1985

17. COSATI CODES			18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number)
FIELD	GROUP	SUB-GROUP	Middle atmosphere, Density, Models, Shuttle reentry

19. ABSTRACT (Continue on reverse if necessary and identify by block number)

The 80 to 130 km altitude region is our old "ignorosphere" - the region of the atmosphere that no one seems to be interested in, and yet the critical region for shuttle entry and atmospheric braking. Comparison between the Air Force reference atmosphere and Shuttle IMU data shows large fluctuations at high latitudes. New data sources are available new, such as the Arecibo and Millstone Hill ionospheric scatter radars.

20. DISTRIBUTION/AVAILABILITY OF ABSTRACT: ☐ UNCLASSIFIED/UNLIMITED ☒ SAME AS RPT. ☐ DTIC USERS	21. ABSTRACT SECURITY CLASSIFICATION: Unclassified
22a. NAME OF RESPONSIBLE INDIVIDUAL: K.S.W. Champion	22b. TELEPHONE (Include Area Code): (617) 377-3033 — 22c. OFFICE SYMBOL: AFGL/LY

DD FORM 1473, 84 MAR — 83 APR edition may be used until exhausted. All other editions are obsolete.

SECURITY CLASSIFICATION OF THIS PAGE
Ujclassified

NASA Conference Publication 2460

Upper and Middle Atmospheric Density Modeling Requirements for Spacecraft Design and Operations

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Proceedings of a workshop held in
Huntsville, Alabama
November 19–21, 1985

NASA
National Aeronautics
and Space Administration

Scientific and Technical
Information Branch

1987

MIDDLE ATMOSPHERE DENSITY AND MODELS

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MIDDLE ATMOSPHERE DENSITY AND MODELS

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The 80 to 130 km altitude region is our old "ignorosphere" - the region of the atmosphere that no one seems to be interested in, and yet the critical region for shuttle entry and atmospheric braking. Comparison between the Air Force reference atmosphere and Shuttle IMU data shows large fluctuations at high latitudes. New data sources are available now, such as the Arecibo and Millstone Hill ionospheric scatter radars.

Conclusions:

In the 20-80 km altitude range there is a reasonable quantity of data on the mean atmosphere; however, information on diurnal variability is needed.

In the 80-120 km altitude range data is needed to identify systematic variations and models for the region are preliminary. Unpredictable variations are observed: turbulence, storm effects, gravity waves.

SHUTTLE REENTRY DENSITY DATA

AF REFERENCE ATMOSPHERES 1978

DRAFT NEW REFERENCE MIDDLE ATMOSPHERE

A GLOBAL REFERENCE ATMOSPHERE FROM 18 TO 80KM

TIDAL EFFECTS

NEW MODELS FOR 80 TO 120KM

CONCLUSIONS

SHUTTLE LAUNCH AND LANDING DATES AND TIMES

FLIGHT	LAUNCH	LANDING
STS-1	APRIL 12, 1981 0700 EST	APRIL 14, 1981 1021 PST
STS-2	NOVEMBER 12, 1981 1010 EST	NOVEMBER 14, 1981 1323 PST
STS-4	JUNE 27, 1982 1000 EST	JULY 4, 1982 0809 PST
STS-5	NOVEMBER 11, 1982 0719 EST	NOVEMBER 16, 1982 0633 PST

A GLOBAL REFERENCE ATMOSPHERE FROM 18 TO 80KM

BASED ON NORTHERN AND SOUTHERN HEMISPHERE ROCKET DATA AND GLOBAL SATELLITE REMOTE SOUNDING DATA

CONTAINS DISTINCT NORTHERN AND SOUTHERN HEMISPHERE MODELS

ZONAL MEAN MODELS

- TEMPERATURE
- PRESSURE
- DENSITY
- NUMBER DENSITY
- PRESSURE SCALE HEIGHT
- GEOSTROPHIC (W-E) WIND

LONGITUDINAL MODELS

- TEMPERATURE
- PRESSURE
- DENSITY

NEW MODELS FOR 80 TO 120 KM ALTITUDES

BASED ON NORTHERN AND SOUTHERN HEMISPHERE ROCKET DATA AND ARECIBO AND MILLSTONE HILL INCOHERENT SCATTER TEMPERATURES

SINGLE HEMISPHERE MODELS
ZONAL MEAN MODELS

ANALYTIC TEMPERATURE FITS WITH LATITUDE AND ALTITUDE BUT NOT WITH TIME OF YEAR

TEMPERATURES AND PRESSURES FITTED AF REFERENCE ATMOSPHERES AT 68KM

CONCLUSIONS

SHUTTLE REENTRY DATA DEMONSTRATE PROBLEMS

CLIMATOLOGY OR PREDICTABLE VARIATIONS

20-80KM   REASONABLE QUANTITY OF DATA
MODELS REASONABLY GOOD

NEED - DIURNAL VARIATIONS, CORRELATION DISTANCES AND TIMES, VARIABILITY

80-120KM   REQUIRE ADEQUATE DATA TO IDENTIFY SYSTEMATIC VARIATIONS
MODELS ARE PRELIMINARY

NEED - MORE THEORETICAL AND EMPIRICAL MODELS
MORE DATA WITH GLOBAL AND TEMPORAL COVERAGE

UNPREDICTABLE VARIATIONS

TURBULENCE
STORM EFFECTS IN REAL TIME
LOCATION, AMPLITUDE, PHASE AND VELOCITY OF GRAVITY WAVES

END
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