8. ATMOSPHERIC TIDES MIDDLE ATMOSPHERE PROGRAM (ATMAP)

8.1 THE ATMOSPHERIC TIDES MIDDLE ATMOSPHERE PROGRAM

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Atmospheric tides, oscillations in meteorological fields occurring at subharmonics of a solar or lunar day, comprise a major component of middle atmosphere global dynamics. The purpose of the 1982-1986 Atmospheric Tides Atmosphere Program (ATMAP) was to foster an interaction between experimentalists, data analysts, and theoreticians and modelers, in order to better understand the physical mechanisms governing tides and their relationships to other scales of motion, and to thereby explain features of observed tidal structures in the mesosphere and lower thermosphere. The ATMAP consisted of seven observational campaigns, five workshops and a climatological study. This paper provides a historical perspective and summary of major results, conclusions, and recommendations for future study which have emerged from the ATMAP.

PURPOSE: Create an interaction among experimentalists, data analysts, theoreticians, and modellers working towards the following goals:

(1) Delineate the global morphology of middle middle atmosphere tides including temporal and spatial variability on various scales; and

(2) Elucidate the relationships between tides and other scales of motion (zonal mean circulation, gravity waves, turbulence).

ATMAP PARTICIPANTS

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HAMBURG WORKSHOP (1-day)

Global Analyses - Campaigns I, II

Emphasis on Latitudinal Structures

Assessment of Numerical Models

Paucity of Low-Latitude data

Discussion on Data Analysis Techniques
- Fourier fits, filtering, spectral analysis
- weighting, variable data quality
- Groves technique
- minimum 4-day fit span
- vector average vs. amplitude average

KYOTO WORKSHOP (2-day)

Global Analyses - Campaigns I, II, III, IV

Emphasis on Vertical Structures

Typical "High-Latitude" and "Middle-Latitude" Behaviors

Asymmetries Between Kyoto (35°N) and Adelaide (35°S)

Paucity of Low-Latitude Data

Discussion on Tidal 'Variability'
- global (steady-state) vs. local (transient) oscillations
- gravity-wave interactions
- 10-day determinations optimum for global consistency
  - without removing some real variations of global tides

Modelling Needs
- hemispheric asymmetries in background winds/temps
- seasonal-latitudinal variations in dissipation
- better seasonal coverage (month-by-month)

PRAGUE WORKSHOP (1/2-day)

June and December Climatologies

Kyoto/Adelaide Asymmetries with Groves bias removed

Existence of Interannual Variability Noted

Discussion on Global Coherence vs. fit span

Theoretical Relation - $\Phi'/u', v'$
- fit data with orthogonal functions
- formulate l.b.c.'s for thermospheric models

Guidelines for Construction of Monthly Climatologies

TOULOUSE INTERIM MEETING (1/2-day)

Interim Comparison of Climatologies

Global Equinox Transition

VANCOUVER WORKSHOP (1/2-day)

Comparative Analyses of Station Climatologies

Seasonal-Latitudinal Trends in Vertical Structure

Pre-Helsinki Organization

ATMAP CALENDAR

Campaign I	09 NOV 81 - 03 DEC 81 (Core: 19-22 NOV 81)
Campaign II	02 MAY 82 - 08 MAY 82 (Core: 03-06 MAY 82)
ATMAP Workshop IAMAP, Hamburg, FRG	17 AUG 82
Campaign III	21 NOV 83 - 16 DEC 83 (Core: 06-09 DEC 83)
Campaign IV	15 MAR 84 - 15 APR 84 (Core: 28-31 MAR 84)
Campaign V	01 JUN 84 - 30 JUN 84 (Core 1: 12-15 JUN 84)
Global Thermosphere Mapping Study (GTMS)	(Core 2: 26-28 JUN 84)
Campaign VI	15 SEP 84 - 15 OCT 84
ATMAP Workshop MAP Symposium, Kyoto	05,06 DEC 84
Global Thermosphere Mapping Study (GTMS)	15-17 JAN 85
ATMAP Workshop IAMAP, Prague	14 AUG 85
Interim Meeting COSPAR, Toulouse	6 JUL 86
ATMAP Workshop IAMAP, Vancouver	21 AUG 87
ATMAP Session MAP Symposium COSPAR, Helsinki	22 JUL 88