

The Waves Michelson Interferometer (WaMI) and a Middle Atmosphere Dynamics Mission

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Brief Abstract:

The Waves Michelson Interferometer is designed to measure wind, temperature, ozone and atomic oxygen from the stratopause to the lower thermosphere. The target emissions include lines in the O₂ IR atmospheric band, the oxygen green line and the hydroxyl Meinel bands. The instrument is configured so that common volume measurements of these quantities will be made thereby reducing the effects of geophysical variability. This instrument will contribute to our understanding of tides, planetary waves, zonal means and transport of constituents above the stratopause.

Because the atmosphere is a strongly coupled system, these measurements would be more valuable if they were complemented by information on the dynamics below the stratopause and small scale features throughout the middle atmosphere were simultaneously available. These measurements would allow wave propagation throughout the atmosphere to be investigated and small scale transport effects and gravity wave signatures to be examined. A mission with instrumentation to provide these additional measurements has been conceived and is tentatively called the Middle Atmosphere Dynamics Mission. Candidate instruments include SWIFT (Stratospheric Wind Interferometer for Transport Studies for stratospheric winds), GLORIA (GLobal limb Radiance Imager for the Atmosphere for high resolution measurements of temperature and constituents),

IRIS (Infrared Imaging Spectrometer for high resolution measurements and tomographic analyses from the tropopause to the mesopause), GWIM (Gravity Wave Imager for gravity wave signatures near the mesopause) and a GPS receiver (for temperature measurements throughout the stratosphere). This concept is in contrast to the valuable emphasis on constituents that most current atmospheric missions have in that it emphasizes dynamics. In this paper details of the WaMI instrument will be presented along with arguments for a Middle Atmosphere Dynamics Mission.