

CHARACTERISTICS OF TEMPERATURE AND DENSITY STRUCTURES IN THE EQUATORIAL THERMOSPHERE SIMULATED BY A WHOLE ATMOSPHERE GCM

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Recent observations and simulations have revealed some interesting features in the upper thermosphere: for example, terminator waves, neutral mass density anomaly. In addition to the newly-discovered phenomena, some outstanding problems also still remain: for example, the midnight temperature maximum (MTM), midnight density maximum (MDM), equatorial superrotation, equatorial wind jet, and equatorial temperature and wind anomaly. The MTM and MDM appearing in the upper thermosphere are thought to be a consequence of wind divergence which would be generated in association with tidal interactions. The coupling processes between the lower and upper atmospheres should be essential for many of the above phenomena. In order to investigate the atmospheric coupling processes, we have developed a general circulation model (GCM) which covers all the atmospheric regions. This whole atmosphere GCM successfully describes some typical features in the mesosphere and thermosphere: for example, disturbances caused by gravity waves, tidal waves, and traveling atmospheric disturbances (TADs). In addition, the MTMs simulated by the GCM show large amplitudes (several 10s ~ 150 K) which are consistent with previous observations. Recently, the GCM has been coupled with ionospheric and dynamo models to investigate both the neutral and plasma phenomena. We show some features in the equatorial thermosphere simulated by the GCM and the coupled model.

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