

信楽でのMLT領域のMUレーダー・光学同時観測の新展開と大気重力波・不安定構造の観測

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Recent upgrades of the MU radar and optical observations in the MLT region over Shigaraki, Japan, and new results.

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The MU radar meteor echo observation has been used to derive precise horizontal wind velocities in the MLT region (80 - 100 km). Relative temperature fluctuation can also be derived using ambipolar diffusion coefficient measured by decay time constants of meteor echoes. Coordinated optical observations such as all-sky imagers, FPI, airglow photometers (OMTI), sodium and rayleigh lidars have been carried out in order to study atmospheric waves and dynamics/structures of the MLT region. Recently, a sodium temperature lidar, which was operated in Syowa, Antarctica, was moved to Uji, near Shigaraki (about 30 km west), and temperature profiling of the MLT region started in 2005. The temperature profiles obtained by this lidar provides important information of N^2 (Buoyancy frequency squared) in discussing vertical wave propagation and instability. The new MU radar capability of ultra-multi channel digital receivers (25 channels) and GPS synchronized radar operation has been applied to improve meteor echo observation for MLT wind and temperature observations (Tsutsumi et al., this conference). The new observation collects much more meteor echoes and precision of wind determination has been improved. More detailed horizontal structure of horizontal wind field are being analyzed than the previous observations by Nakamura et al. (2002).

In this paper, we report the results of two preliminary observation in October/November 2005, and May 2006. On October 31, 2005, all-sky imager captured evolutions of bands (30 - 50 km horizontal wavelength) and ripple structures (~15 km) in OH and OI airglow images. Possibility of shear instability could be indicated by combining the MU radar wind and Na temperature profiles. The ripple structure seemed to be caused by dynamical instability due to strong wind shear exceeding 40 m/s/km at around 90 km. On May 2, 2006, a very strong wave event has been observed with the all sky imager in OI and OH. The horizontal wavelength was about 300 km with a period of 40 m/s propagating north-eastward. The same wave is observed with the improved high-sensitive meteor radar observation with the MU radar. The horizontal structure of this wave will be discussed.