

MLT temperature and Na density profiles observed by Na Lidar at midlatitude

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Vertical transportation of energy and atmospheric component in the mesosphere and lower thermosphere (MLT) is a key of coupling processes between atmosphere and ionosphere. For example, recent researches indicate that Atmospheric Gravity Waves (AGWs) generated in the lower atmosphere (troposphere and stratosphere) possibly work as a trigger for generation of ionospheric disturbances. Current atmosphere-ionosphere coupling model suggests that Nitric Oxide (NO) generated in the thermosphere is transported downward and cause cooling of the mesosphere. In the MLT region, however, observation of temperature profiles and wind fields and tracking of atmospheric components are quite difficult so evidence of the cause-and-effect between atmospheric and ionospheric phenomenon has still not been observed.

At Shigaraki Middle and Upper Atmosphere (MU) Observatory (34.9°N, 136.1°E), there are many instruments for observing atmospheric dynamics in the MLT region. The Optical Mesosphere Thermosphere Imagers (OMTI) of the Solar-Terrestrial Environment Laboratory, Nagoya University can observe various scale AGWs, and new observation technique of the MU radar (Research Institute for Sustainable Humanosphere (RISH), Kyoto University) can measure spatial distribution of wind speed at the MLT region. However, there is no instrument that can measure the MLT temperature profiles. We, therefore, moved Na Lidar of Shinshu University that can measure the MLT temperature (80-110 km) from Nagano to RISH located about 25 km east from Shigaraki. The Na Lidar has been operated several nights per month since August, 2007. For recent half-year, we obtained temperature and Na density profiles for 49 nights (about 420 hours). In this study, we discuss quality of these temperature data by comparing with those obtained by SABER onboard the TIMED satellite. We also show characteristic phenomena seen in the temperature and Na density profiles.