

Cause of simultaneous enhancement of Na column density and OI-557.7nm emission observed over Japan

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Vertical transportation of atmospheric components in the mesosphere and lower thermosphere (MLT) is a key of coupling processes between atmosphere and ionosphere. There are various temporal/spacial scale perturbations of temperature and atmospheric components in the MLT region. As a phenomenon of them, optical measurements, such as Na temperature lidar, sometimes observe unusually large perturbations of temperature and atmospheric components. Na temperature lidar of Shinshu University was installed at Research Institute for Sustainable Humanosphere (RISH) Kyoto University at Uji (34.9N, 135.8E) located about 25 km east from Shigaraki Middle and Upper Atmosphere (MU) observatory in 2005. After campaign observations with MU radar, the Na lidar has been operated several nights per month since August, 2007. For one and a half year, we have obtained temperature and Na density profiles for ~140 nights (more than 1000 hours). Remarkable increases of Na column density and of OI-557.7 nm airglow intensity were observed from 10 to 21 UT on December 9, 2007 by the Na temperature lidar and a tilting photometer of OMTI (Nagoya University). In this study, a cause of the increases of Na column density and airglow intensity is discussed by using airglow chemistry and global-scale wave data observed with the TIMED satellite.