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電離層 E 領域の Ca+密度と F 領域の中規模伝搬性電離圏擾乱の初同時観測
First simultaneous observation of Ca+ densities in the E region and MSTIDs in the F region

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In the mesosphere and lower thermosphere region, there are permanent layers of metal atoms and ions, the source of which is vaporization of cosmic dust and meteoroids during their entry into the Earth's atmosphere. Some metal atom layers e.g. Na, K, Ca, and Fe layers, and only Ca^+ (Calcium ion) can be observed by ground-based resonance scattering lidars. The National Institute of Polar Research (NIPR) is developing a new resonance scattering lidar system with a frequency-tunable laser. The lidar transmitter is based on injection-seeded, pulsed alexandrite laser for 768-788 nm and a second-harmonic generation (SHG) unit for 384-394 nm. The new lidar is able to measure density variations of minor constituents including Ca^+ (393.477 nm). As a part of the development, observation tests are carried out at NIPR (35.7N, 139.4E) since 2013, and we got the first light from Ca^+ layer on 21 August, 2014. The Ca^+ density profiles were obtained for ∼5 hours (23:13 LT-28:28 LT) with temporal and height resolutions of 1 min and 15 m, respectively. During the night, high density and narrow Ca^+ layer was observed. The layer descended from ∼107 km to 99 km with quasi-periodic density perturbations until ∼17 UT and then stayed at around 99 km until sunrise. At the same night, sporadic E (E_s) layer was observed with an ionosonde at Kokubunji by National Institute of Information and Communications Technology (NICT) (35.7N, 139.5E), also medium scale traveling ionospheric disturbances (MSTIDs) were observed with the dense GPS receiver network (GEONET). In this presentation, we compare these data in detail and discuss relationships between observed Ca+ density perturbations, E_s layer and MSTIDs

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