

宇宙空間からの超高層大気観測と大型大気レーダーの同時観測

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Coordinated observation of the upper atmosphere by the space-borne instruments and the large atmospheric radars

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The Earth's upper atmosphere is the region where the observational method is limited because of the difficulty of the approach. The large-scale atmospheric radar is the one of the techniques that can elucidate the Mesosphere, Thermosphere and the Ionosphere using various scattering mechanisms from these regions. The ground-based observation can observe over a fixed location with relatively continuous coverage in time. The space-borne instruments on satellites and rockets is another technique for the upper atmospheric observation. The in-situ and remote sensing observations by space-borne instruments can investigate these regions with relatively large field-of-view and without limitation by the local conditions, such as the weather and the moon phase. The coordinated observation of these two observational method is a very powerful tool to study the upper atmosphere where the various phenomena are generated by the combined processes of the neutral and ionized atmospheres. At mid latitudes, the MU radar has conducted several coordinated observations with space-borne instruments. The observation with the Swedish satellite, Freja, elucidated the relation between the Medium-Scale Traveling Ionospheric Disturbances (MSTID) observed by the incoherent scatter (IS) observation of the MU radar, and the Midlatitude Electric field Fluctuations (MEF) observed by the electric field observation of Freja. MSTID was also investigated by the another coordinated observation of the MU radar with the ISS-IMAP mission on the International Space Station (ISS). The horizontal structures obtained by the large field-of-view observation of the ISS-IMAP/VISI instrument was combined with the vertical profile observation of the MU radar to reveal the three-dimensional structures of the phenomenon. The atmospheric gravity waves observations of ISS-IMAP/VISI also can be combined with the PANSY radar observations although the observational field-of-views are not overlapped. The achieved results and learned difficulties of the coordinated observation between the space-borne instruments and the large atmospheric radar, including the IS radar will be discussed in the presentation.