

New perspective of the ionosphere-thermosphere-mesosphere with satellite-borne airglow observation

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Remote sensing of the ionosphere-thermosphere-mesosphere (ITM) with satellite-borne airglow imager has been planned to obtain a new perspective of the Earth's upper atmospheric research. The observations of the ITM region have been done by point observations of ground-based instruments and one-dimensional observations by in-situ measurements with satellites and rockets for decades. In the last decade, however, novel observational techniques, such as CCD imagers and GPS receiver networks, were developed and enabled to observe the two-dimensional structures of the ITM region from ground. Although these two-dimensional observations have clarified many new features of the ITM phenomena, the observation is restricted by the conditions of the observational sites, and the field-of-view is limited. Thus the global observation with satellite-borne remote sensing techniques is inevitable to understand the whole system of the phenomena. The global imaging of airglow by satellite-borne imager can provide crucial information on the coupling processes between high and low latitudes, and lower and upper atmospheres. Besides the scientific goals that can be achieved by the ITM remote sensing satellite, the data from the satellite can also be applied to the engineering field. In recent years, the usage of the radio waves has been highly sophisticated. The higher the requirement of the precision gets, the more the effect of the Earth's plasma on the radio waves significant. The global observation of the ITM region can contribute the correction of the radio wave used in the scientific observations, such as GPS and VLBI, and engineering, such as GPS-based navigation system for aviations, radio communication and broadcasting with satellites. The scientific and engineering goals, and satellite instruments to achieve the goals have been discussed.