Small satellite plan of the ionosphere-mesosphere-thermosphere-plasmasphere imaging observation

Akinori Saito[1]; Saito Akinori MTI satellite working group[2]

[1] Dept. of Geophysics, Kyoto Univ.; [2] -

Small satellite for imaging observation of the ionosphere-mesosphere-thermosphere-plasmasphere is proposed by the MTI satellite working group. This satellite project was discussed in the mesosphere-thermosphere-ionosphere working group of the Society of Geomagnetism and Earth, Planetary and Space Sciences (SGEPSS). One of the motivations for the proposal is the progress of the two-dimensional imaging observation of the airglow using the all-sky CCD imagers in the late 1990s. The airglow imaging observation revealed the two-dimensional structures and propagation characteristics of the atmospheric gravity waves in the mesosphere and the traveling structures of the ionized atmosphere in the ionosphere. The progresses of the observational techniques using radio waves, such as the coherent radars and GPS, also enabled to observe the two-dimensional structures of the ionosphere. These two-dimensional observations by the ground-based techniques have presented several new features of the Earth's upper atmosphere phenomena and limitations of the ground-based observations. The limited observational sites and field-of-view cannot detect the whole features of the phenomena. This limitation of the observation restricts the discussion of the physical mechanism of the phenomena. The satellite observation of the airglow with the global field-of-view is expected to provide the observational evidences that cannot be achieved by the ground-based observation, and clarify the physical mechanism of the phenomena. The combination of the three imagers including the EUV imager for the Plasmasphere can reveal the interactions of the four regions of the Earth's upper atmosphere, ionosphere, mesosphere, thermosphere and plasmasphere. The progress of the planning of the small satellite, designs of the scientific instruments, science targets, space weather applications, and applications of data for engineering, such as the satellite navigation system, will be presented and discussed.