DELTA-2 campaign: 極域下部熱圏の力学とエネルギー収支のロケット・地上総合観測計画

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DELTA-2 campaign: Coordinated rocket and ground-based observations of the dynamics and energetics in the polar lower thermosphere

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In order to investigate the dynamics and energetics in the polar lower thermosphere, coordinated sounding rocket observation with ground-based Fabry-Perot Interferometers (FPIs) and the European Incoherent Scatter (EISCAT) radar was successfully conducted during the Dynamics and Energetics of the Lower Thermosphere in Aurora (DELTA) campaign on 13 December 2004. In the DELTA campaign, the vertical profile of neutral temperature in the lower thermosphere was obtained by the sounding rocket experiment, the time variations of neutral temperature and winds at the auroral emission altitudes were measured with two FPIs, and the vertical and temporal profiles of ionospheric parameters and neutral winds were observed by the EISCAT radar. Although the upward vertical winds up to 40m/s were observed at an altitude of 120 km associated with the strong Joule and particle heating event during the campaign, vertical profile and horizontal distribution of this upwelling is unknown. For a better understanding of the spatial structure and source mechanism of such large vertical wind events, neutral wind observation that measures vertical and horizontal profiles with high spatial resolution is required.

Based on the success of the DELTA campaign in 2004, the DELTA-2 campaign is being planned for January 2009. In the next campaign, the Japanese S-310-39 rocket, which will be launched from the Andoya Rocket Range, will release Trimethyl Aluminum (TMA) along the rocket trajectory and high-resolution neutral winds are derived from the TMA trails by observing with ground-based cameras at three sites. By releasing the TMA puffs intermittently with a solenoid valve, it is possible to measure not only horizontal winds but also vertical winds in this experiment. In addition, neutral temperature measurement by a rocket-borne instrument will be made simultaneously with the neutral wind measurement. Many ground-based instruments such as the EISCAT radar, FPIs, and networks of all-sky cameras and magnetometers will provide comprehensive information on the thermospheric response to auroral energy inputs.