# Initial reports of DELTA-2 campaign: general description of the campaign

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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-1) campaign on 13 December 2004. In the DELTA-1 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-1 campaign, the DELTA-2 campaign was conducted. The Japanese S-310-39 rocket, which was launched northward from the Andoya Rocket Range at 0:15 UT on 26 January 2009, released Trimethyl Aluminum (TMA) along the rocket trajectory during the descent and high-resolution neutral winds were derived from the TMA trails by observing with ground-based cameras at Tromso and Abisko. Fortunately, the aurora arcs began to break up at 0:25 UT when the TMA trails still remains in the field of view of the cameras with sufficient intensity. This experiment provides a unique opportunity to investigate a transition of the wind structure during the typical auroral breakup event. Many ground-based instruments such as the EISCAT radar, FPIs, and networks of all-sky cameras and magnetometers also provide comprehensive information on the thermospheric response to auroral energy inputs.