

WINDs Campaign - Lithium Release Experiment in the Thermosphere -

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Though the ionization rate is less than 1% in the region of thermosphere, the dynamics of neutral atmosphere is strongly controlled by the plasma. The interesting phenomena, related to the coupling between atmosphere and plasma, were obtained from in-situ observations by satellites such as DE, AE, CHAMP, etc, 630nm airglow observation from ground and thermosphere-ionosphere modeling. The coupling is a key process to understand the dynamics and structure of thermosphere, but the direct observation is not yet performed in detail. JAXA/ISAS launched successfully sounding rocket from Kagoshima Space Center (KSC) in evening of September 2, 2007. The rocket experiment is called WINDs (Wind measurement for Ionized and Neutral atmospheric Dynamics Study). The purpose is to investigate the neutral atmosphere - plasma coupling process in F-region through the measurements of atmospheric circulation and super rotation in the low latitude thermosphere. Lithium release canisters as well as instruments for plasma drift velocity, plasma density and temperature and its fluctuations, and electric and magnetic fields were installed in the rocket. The Lithium gas was released at altitudes between 150km and 300km, and the lithium scattered sunlight by resonance scattering with wavelength of 670 nm. The neutral winds in the thermosphere were estimated from the movements of Lithium clouds, which were observed by CCD imagers on ground. From the diffusion of lithium clouds, we estimated neutral density and temperature in the thermosphere.

JAXA/ISAS will launch again sounding rocket from KSC in morning of December 2010. The experiment is called WINDs-2. From those experiments, we will acquire an atomic gas release technology to measure the daytime thermosphere.