

Commission G

(1) International ionosphere/thermosphere observation campaigns

[Neutral-Ion Coupling In the Ionosphere]

The earth's ionosphere/thermosphere represents a critical transition region between the neutral and ionized gas populations of space where the two gases couple and exchange energy. This region is where much external energy is deposited from above and below, for example from gravity wave and tides, producing heating and instabilities. As a result, this interface region of the atmosphere and space is a highly complex medium that contains both fundamental, large-scale electrodynamics processes and small-scale neutral and plasma instabilities and turbulence.

To understand the neutral-ion coupling in the ionosphere/thermosphere, the rocket experiments are carried out in Japan and US. The first rocket experiment was performed at JAXA/Uchinoura in September, 2007. The second experiment will be carried out in September, 2011. The experiments are called WINDs campaign (Wind measurement for Ionized and Neutral atmospheric Dynamics study). Three Lithium release canisters and plasma/wave instruments are installed in the rockets to measure neutral wind, plasma density, temperature, composition and electro-magnetic waves. The 2007 experiment was successfully carried out and the neutral wind, density and temperature, plasma density, temperature and drift velocity, ExB drift velocity by DC electric field and magnetic field measurements and electro-magnetic waves were obtained from the Lithium clouds generated by the Lithium atom release by rocket. The second rocket experiment of WINDs campaign will be carried out with same instruments during the day in September 2011, which is the first time experiment in Japan. The US campaign in July 2011 uses the 4 rockets launched into different geophysical conditions by NASA, which will be worked out by US and Japan. The JAXA/ISAS provides 12 Lithium canisters for two rockets launched from Wallops Island to measure the neutral wind at 90-150km altitudes in the mid-latitude lower ionosphere/thermosphere during the day. The science objectives are (1) The atmospheric dynamo and large scale electrodynamics and currents, (2) The nature of daytime E-region neutral winds and wind shear profiles and (3) The stability/instability of the dayside, lower ionosphere at mid-latitudes. The final experiment of neutral-ion coupling is to investigate the generation process and instability of plasma bubbles and wavy structure of lower ionospheric plasma density near the magnetic equator. The experiment is being planned in 2012 summer as Japan/US collaboration. Those experiments are in Space weather program in Japan and NASA's living with a star program, which seek to understand ionospheric variability effects on both spacecraft and communications.

(2) Meeting

The 5th Equatorial Atmosphere Radar (EAR) symposium will be held in Jakarta, Indonesia in September 8-9, 2011.