

Atmospheric and ionospheric coupling studies from the CPEA project

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The Japanese initiative called Coupling Processes in the Equatorial Atmosphere (CPEA) has already passed five years since September 2001, and will conclude the six-year project in March 2007. The Equatorial Atmosphere Radar (EAR) is the core facility for CPEA, and has been conducting long-term experiments of the equatorial troposphere and lower stratosphere since July 2001. Various instruments including X band meteorological radars, lidars, ground-based meteorological instruments, airglow imagers, VHF radar, GPS receivers etc. have been gathered to the EAR site.

Based on the data from the EAR and other instruments, we have studied generation, propagation, and breaking of various atmospheric waves in the equatorial region and their interaction with background atmosphere. Finding of breaking of Kelvin waves at the tropical tropopause layer (TTL) was one of our earlier results. We are also interested in cumulus convection in the upper tropopause, its relationship with cirrus, and generation of gravity waves. In addition to these atmospheric capabilities, the EAR is capable to observe echoes from field-aligned irregularities in the E- and F-region ionosphere. Mainly in the equinoctial periods, we have been operating the EAR for the studies of plasma plumes associated with the equatorial spread F (ESF).

The CPEA has conducted the first international observation campaign in March-May 2004, in collaboration with the CAWSES (Climate and Weather of the Sun-Earth System) of SCOSTEP (The Scientific Committee On Solar-Terrestrial Physics). The principal results have been already presented in the Special Issue of the Journal of Meteorological Society of Japan (Vol.84A, 2006). In the present talk, we will briefly review atmospheric and ionospheric studies from the subsequent campaign, CPEA-II, conducted in November-December 2005.