[EE] Evening Poster | P (Space and Planetary Sciences) | P-EM Solar-Terrestrial Sciences, Space Electromagnetism & Space Environment

[P-EM10]Coupling Processes in the Atmosphere-Ionosphere System

convener:Huixin Liu(Earth and Planetary Science Division, Kyushu University SERC, Kyushu University), Loren Chang(Institute of Space Science, National Central University), Yuichi Otsuka(名古屋大学宇宙地球環境研究所)
Tue. May 22, 2018 5:15 PM - 6:30 PM Poster Hall (International Exhibition Hall7, Makuhari Messe)
Vertical coupling mechanisms throughout the whole atmosphere are critical to understanding the near Earth space environment, as well as its sensitivity to the solar, geomagnetic, and atmospheric drivers. This international session focuses on physical/chemical processes occurring in the mesosphere, thermosphere, and ionosphere (MTI) from both the poles to the equatorial region. Both quiet and disturbed states in response to lower atmospheric forcing or solar forcing are important for understanding the MTI system and its coupling to other regions. We invite presentations of observations and observational concepts with ground-based and/or space-borne instruments, theoretical studies, numerical simulations, and development of data analysis systems for various kinds of temporal and spatial variations in MTI system.

[PEM10-P12]Development of a Phase Velocity Spectral Analysis Software Package (M-Transform) for Airglow Imaging Data

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Airglow imaging observation, among other ground-based techniques, has been proven to be very effective to study energy and propagation characteristics of atmospheric gravity waves (AGWs). However, the lack of sophisticated analysis methods prevented quantitative studies using huge amount data that have been collected over long period of observation. *Matsuda et al*. [2014] developed a new phase velocity spectrum analysis method based on 3D FFT algorithm (M-transform) to address this issue. This algorithm can efficiently deal with extensive amounts of imaging data obtained on different years and at various observation sites without bias and treat dynamical/physical effect of AGWs by precisely reflecting amplitude, area and lifetime of each AGW event. Based on *Matsuda et al*. [2014] method, we have developed a simple and user-friendly function to be used in IDL. The input of this program is a three dimensional array of a time series of 2-D image array where the wave parameters (e.g. horizontal wavelength (*λh*), wave period (*τ*), phase speed (*c*), image resolution in space (*dx*, *dy*) and time (*dt*)) can be customized by the user in one-line command to execute the program. Various simulations by using artificial wave images as test data have been done in order to exhibit the new program’s performance and the characteristics/interpretation of the spectral analysis. The simulation was done by using test data with different time resolution (*dt*=1 min, 3 min, 5 min and 7 min), image size (256x256, 512x512), duration (30 min, 60 min, 90 min, 120 min) and by changing the horizontal wavelength and wave periods with a fixed phase speed (40 m/s). In addition, by using observational data from Syowa station we conducted an investigation how waves with different horizontal wavelengths behave independently. We divided the horizontal wavelength into three categories: 5< *λh* <20 km, 20< *λh* <100 km and 5< *λh* <100 km. We found that propagation direction for small scale, close to ripple scales (5< *λh* <20 km), showed omni-directional feature, as previously suggested by *Nakamura et al*. [1999]. The presentation also aims to guide how to use the program within a practical computation time.