

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

## [P-EM14]Recent Advances in Ionosphere Observation and Modeling for Monitoring and Forecast

convener: Charles Lin (Department of Earth Sciences, National Cheng Kung University), Yang-Yi Sun (China University of Geosciences, Institute of Geophysics and Geomatics)

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Increasing number of observation opportunities in the Earth's ionosphere and upper atmosphere advances the research of the ionosphere weather in the recent two decades. In the ground segment, global deployment of ground-based GNSS receivers, newly planned radars and airglow instruments greatly extend the observation coverages. In the space segment, a number of upcoming new satellite missions with capabilities of airglow, neutral winds and electron density observations will provide a variety of observation worldwide. With the large amount and diversity of datasets, sophisticated theoretical and empirical models can be validated, and implemented for inclusion of new thermosphere and ionosphere phenomena. Additionally, advances in applications of data assimilation technique on the ionosphere monitoring and forecast system are developing in progress. These recent advances in observations and models are important to move forward the status of the ionospheric space weather monitoring and forecast. It is the purpose of this session to solicit studies providing observations, theoretical and empirical modeling and data assimilation on the multiple scales of ionosphere structures, from global morphology to small scale irregularities and traveling ionospheric disturbances. Studies on magnetically quiescent and disturbed conditions will both be addressed.

## [PEM14-P07]Current status and future plans of NICT ionospheric observations

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National Institute of Information and Communications Technology (NICT) has been observing ionosphere by ionosondes and GNSS receiver networks in Japan and in the Southeast Asia for monitoring ionospheric condition and researching ionospheric disturbances. Domestic ionosondes have been replaced with Vertical Incidence Pulsed Ionospheric Radar 2 (VIPIR2) ionosondes which can separate the O- and X-modes of ionospheric echoes which have improved the availability of automatic scaling of the ionogram. Now the O- and X-modes separated ionograms are available online. We have tried to detect arrival directions of ionospheric echo using the 8ch receiving antenna array of the VIPIR2.

In addition to ionosonde observations, we are providing high-resolution two-dimensional maps of absolute TEC, detrended TEC, rate of TEC change index (ROTI), and loss-of-lock on GPS signal over Japan using the dense GNSS network, GEONET, on realtime basis. To expand TEC observation area and spatial resolution, we have tried to use multi-GNSS data including GPS and QZSS for routine data collection and processing.

In Southeast Asia, we have developed the Southeast Asia low-latitude ionospheric network (SEALION) for the purpose of monitoring and researching severe ionospheric disturbances, such as plasma bubble. SEALION mainly consists of five FMCW ionosondes in four countries in Southeast Asia. We are now developing a new FMCW ionosonde system which is GNU Radio based software defined system. We have an on-going project to install a VHF radar at Chumphon and multi-GNSS receivers at equatorial SEALION

stations to study plasma bubbles and their effects on precise GNSS positioning. In this presentation, we will introduce current status and future plans of ionospheric observation in NICT.