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

[P-EM13]Study of coupling processes in solar-terrestrial system

convener:Mamoru Yamamoto(Research Institute for Sustainable Humanosphere, Kyoto University), Yasunobu Ogawa(National Institute of Polar Research), Satonori Nozawa(名古屋大学宇宙地球環境研究所, 共同), Akimasa Yoshikawa(Department of Earth and Planetary Sciences, Kyushu University)
Sun. May 20, 2018 5:15 PM - 6:30 PM Poster Hall (International Exhibition Hall7, Makuhari Messe)
The Earth accepts vast input of energy and material from the Sun. The Earth's environment is maintained by the balance between their inputs and outputs. It is important to study energy and material transport of the Earth. This is an international session that discusses studies of the coupling processes in the Sun-Earth system based on the project "Study of coupling processes in solar-terrestrial system" that was approved by the Master Plan 2017 of Science Council of Japan. The facilities and networks included are the Equatorial MU Radar (EMU) in Indonesia to study the whole equatorial atmosphere, the EISCAT_3D radar in northern Scandinavia to study detailed structures and elementary processes of the magnetosphere-ionosphere coupling in the polar region, and global networks of various ground-based instruments and observation data. We will show current status of the project and discuss sciences by soliciting variety papers. This session is open to the world, and we strongly encourage submission of papers related to other facilities and projects, i.e., atmospheric or incoherent scatter radars, observation networks, satellites, and simulation or theoretical studies, etc.

[PEM13-P01]GPS-TEC ionospheric 3D tomograpy; Massive data analysis with supercomputer

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Keywords:GPS-TEC, Ionospheric tomography, Parallel processing

Measurement of ionospheric total electron content (TEC) by using ground-based GPS receivers is now widely used, which we refer to as GPS-TEC. In Japan, there is one of the densest network of GPS receivers that is named as GEONET (GNSS Earth observation network system) operated by Geospatial Information Authority of Japan (GSI). We have developed three-dimensional (3D) tomography analysis based on the constrained least-squares fitting method, and applied it to the GPS-TEC data from GEONET. We started the real-time analysis with 15 minutes interval and about five minutes latency since March 2016. In this paper we report that we analyzed most of GEONET data since 1996 by using the supercomputer of Kyoto University. We assign one core of the supercomputer to one-day analysis (15-minute interval from 200 GPS receivers). By utilizing about 2000 core of the supercomputer syste, we achieved that processing time for one-year data was about 30 hours only. The results are statistically validated through comparisons with ionosondes and COSMIC occultation measurements. The maximum density from the 3D tomography showed good agreement with the foF2 parameter from ionosondes. We also found that the F2-peak of the 3D tomography density profile is lower in density, and higher in altitude compared with corresponding parameters from the COSMIC occultation measurements.