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

[P-EM12]Space Weather, Space Climate, and VarSITI

convener:Ryuho Kataoka(National Institute of Polar Research), Antti A Pulkkinen (NASA Goddard Space Flight Center), Kanya Kusano(名古屋大学宇宙地球環境研究所, 共同), Kazuo Shiokawa(Institute for Space-Earth Environmental Research, Nagoya University)

Thu. May 24, 2018 5:15 PM - 6:30 PM Poster Hall (International Exhibition Hall7, Makuhari Messe)

Past, Present, and Future of Solar-Terrestrial Environment is the keynote of this session. We share the latest scientific papers to understand how the solar-terrestrial environment changes in various time scales, and discuss the necessary international collaboration projects associated with VarSITI. More specifically, welcomed papers include space climate studies using tree rings and ice cores; cutting-edge observational and modeling studies of geospace, heliosphere and the sun; simulation and statistical studies to predict the future space weather and space climate.

[PEM12-P21]Experimental evidence on the dependence of the standard GPS phase scintillation index on the ionospheric plasma drift around noon sector of the polar ionosphere

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Keywords:Polar ionosphere, Ionospheric scintillation, Standard scintillation indices, Plasma drift velocity, Fresnel frequency, GNSS

First ever experimental proof of a clear and strong dependence of the standard phase scintillation index (σ$_{φ}$) derived using Global Positioning System (GPS) measurements on the ionospheric plasma flow around the noon sector of polar ionosphere is presented. σ$_{φ}$ shows a strong linear dependence on the plasma drift speed measured by the SuperDARN radars whereas the amplitude scintillation index (S_4) does not. This observed dependence can be explained as a consequence of Fresnel frequency dependence of the relative drift and the used constant cut-off frequency (0.1 Hz) to detrend the data for obtaining standard σ$_{φ}$. The lack of dependence of S_4 on the drift speed possibly eliminates the plasma instability mechanism(s) involved as a cause of the dependence. These observations further confirm that the standard phase scintillation index is much more sensitive to plasma flow, therefore, utmost care must be taken when identifying phase scintillation (diffractive phase variations) from refractive (deterministic) phase variations, especially in the polar region where the ionospheric plasma drift is much larger than in equatorial and mid-latitude regions.