[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-P01]Magnetohydrodynamic Simulation of the Solar Active Region 12673 and eruption accompanied with a Great Solar Flare

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The solar active region (AR) 12673 came out on September 2017 and exhibited rapid evolution during few days. Consequently, the AR12673 produced 4 X-class flares and 27 M-class flares from 2017 September 4 to 10, including a great solar flare (X9.3 flare) which is ranked as largest in the solar cycle 24. In order to reveal a dynamics of the great solar flare, we performed a Magnetoydrodynamic (MHD) simulation. We first reconstructed a three-dimensional magnetic field based on the phtospheric magnetic field, which is obtained prior to the flare, through the MHD relaxation method and then put it in the MHD simulation as the initial condition.

The MHD simulation exhibited a drastic eruption, in particular, we found that a highly twisted flux tube is formed during the eruption through a reconnection of multiple twisted lines formed prior to the flare, and it eventually exhibited a writhe motion. The writhe motion is due to the kink instability because the eruptive flux tube is ultimately composed of highly twisted lines with more than required threshold of the kink instability. Because the reconstructed magnetic field prior to the flare has no such highly twisted lines leading the instability, this writhe motion would come from the nonlinear evolution of the eruptive flux tube. Furthermore, this writhe motion might explain the southward magnetic fields observed in vicinity of Earth whereas the northward magnetic fields were expected from solar observations. We will discuss more detailed dynamics and compare with solar observations and results obtained from solar wind simulation (SUSANOO).