[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-P13]Exploration of the solar surface meridional flow and open new window for the solar interior exploration

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Keywords:Sun, Magnetic Field, Image Recognition

The dependence of the surface meridional flow on the magnetic elements’ parameters, such as magnetic field strength, element size, etc. is investigated based on the auto-tracking technique of the magnetic elements.

Meridional flow, which is a north-south flow field at the solar global scale, plays an important role in the solar dynamo theory. However, the velocity amplitude of the meridional flow is approximately 10 m s^{-1}, which is much smaller than that of the convection covering the whole solar surface, and it is difficult to detect in the observation. We reported the detection f the meridional flow through large statistical analysis of magnetic element motion using feature recognition technique at the JpGU2017 meeting. There, we achieved unprecedented detection accuracy by removing the apparent motion caused by frequent splitting and coalescence of the magnetic element. In this presentation, dependency on the magnetic element parameters is investigated using this method.

We analyzed the one-month magnetic field data obtained by Solar Dynamics Observatory at the interval of 6 minutes. We detected ~8,000 magnetic elements in one magnetogram and obtained $5x10^7$ magnetic elements’ motion. It was remarkable that the magnetic elements with a large size has larger north-south anisotropy in motion, e.g. meridional flow. In addition, it was found that the meridional flow also show dependence on the magnetic flux but no significant dependence on the maximum value of the magnetic field strength. These results is explained with the result that the larger magnetic element is more affected by the fast meridian flow inside the sun and open the new window for the exploration of the solar interior.