

ひので衛星とSDO衛星から迫る太陽表面における磁場輸送 Investigation of surface magnetic flux transport by use of Hinode/SOT and SDO/HMI

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Since magnetic field on the solar surface triggers various solar activities, it is very important to understand their structure in terms of the space weather. An important issue is transport mechanism of magnetic flux. It is thought that the flow dominates the magnetic field on the solar surface. Although the transport is treated as a pure diffusion process for long time, recent solar observations suggest the differences from the diffusion.

We reported the relationship between the travel distance of the magnetic flux concentration and the elapsed time from the birth of the concentrations. The sub-diffusion scaling was found in the time range longer than 2×10^4 seconds for the first time. The investigation is, however, limited because the analysis is done by using the magnetogram obtained by Solar Optical Telescope onboard the Hinode satellite (Hinode/SOT), which does NOT cover the whole Sun. Thus in this study we investigate the relationship with the Helioseismic and Magnetic Imager on board the Solar Dynamics Observatory (SDO/HMI), which covers the whole Sun. Since the spatial resolution of SDO/HMI is lower than that of Hinode/SOT, we use both telescopes in order to see the influence of the resolution on the analysis. We find the similar sub-diffusion scaling with the power law index of 0.7 ± 0.1 . SDO/HMI shows a slightly larger magnitude. This difference may come from the difference of spatial resolution between the telescopes. In the presentation, we also plan to show the 3D MHD simulation of the magneto-convection if time permits.

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