[구 SS-08] Distribution characteristics of a solar-surface magnetic field in the recent four solar cycles

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Solar cycles are inherent to the Sun, which experiences temporal changes in its magnetic activity via the surface distribution of the solar magnetic field. This raises a fundamental question of how to derive the distribution characteristics of a solar-surface magnetic field that are responsible for individual solar cycles. We present a new approach to deriving as long-term and large-scale distribution characteristics of this quantity as was ever obtained; that is, we conducted a population ecological analysis of Wilcox Solar Observatory (WSO) Synoptic Charts which provide a more than 40-year time series of latitude-longitude maps of solar-surface magnetic fields. In this approach, solar-surface magnetic fields are assumed as hypothetical trees with magnetic polarities (magnetic trees) distributed on the Sun. Accordingly, we identified a peculiarity of cycle 23 with a longer period than an average period of 11 years; specifically we found that the negative surface magnetic field had much more clumped distributions than the positive surface magnetic field during the first one-third of this cycle, while the latter was dominant over the former. The Sun eventually spent more than one-third of cycle 23 recovering from these imbalances.

[구 SS-09] The Observational Evidence for the Internal Excitation of Umbral Velocity Oscillations

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The umbral oscillations of velocity are commonly observed in the chromosphere of a sunspot. Their sources are considered to be either the external p-mode driving or the internal excitation by magnetoconvection. Even though the possibility of the p-mode driving has been often considered, the internal excitation has been rarely investigated. We report the observational evidence for the internal excitation obtained by analyzing velocity oscillations in the temperature minimum region of a sunspot umbra. The velocity oscillations in the temperature minimum region were determined from Fe I 5435Å line data taken by the Fast Imaging Solar Spectrograph (FISS) of the 1.6 m Goode solar Telescope (GST) at the Big Bear Solar Observatory. As a result, we discovered 4 events of oscillations which appear to be internally excited. We analyze their characteristics and relation to photospheric features. Based on these results, we estimate the contribution of the internal excitation for umbral oscillations and discuss their importance.

[구 SS-10] Science Goal of the Diagnostic Coronagraph on the International Space Station

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The Korea Astronomy and Space Science Institute (KASI) plans to develop a coronagraph in collaboration with the National Aeronautics and Space Administration (NASA), to be installed on the International Space Station (ISS). It uses multiple filters to obtain simultaneous measurements of electron density, temperature, and velocity within a single instrument. The primary science goal is to understand the physical conditions in the solar wind acceleration region, and the secondary goal is to enable and validate the next generation of space weather science models. The planned launch in 2022 provides great potential for synergy with other solar space missions such as Solar Orbiter and Parker Solar Probe.

교육 및 홍보

[구 HA-01] Revival of Miller-Urey Experiment (밀러 유리 실험 설계 및 재연)

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