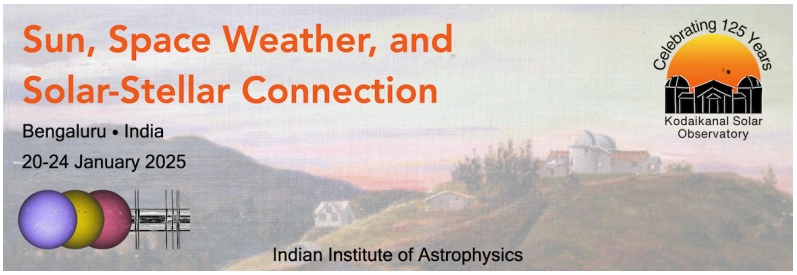

Contribution ID: **181** Type: **Contributed talk**

Deep Cyclic Activity and Radial Flux Transport in the Sun by Assimilating Observed Magnetogram in a 3D Dynamo Model

Monday, January 20, 2025 2:40 PM (15 minutes)

The solar magnetic cycle is crucial for understanding solar activity and space weather. Two key models for studying it are the Surface Flux Transport (SFT) model and the 3D Babcock-Leighton dynamo model, respectively. The SFT model examines large-scale magnetic field evolution on the Sun's surface to predict solar cycles. In contrast, the 3D Babcock-Leighton model explores internal processes that drive the solar magnetic cycle, detailing how toroidal and poloidal magnetic fields regenerate through differential rotation and sunspot decay. In our research, we are the first to incorporate daily magnetogram data into the 3D Babcock-Leighton model. We use a modified data assimilation technique akin to the Advective Flux Transport model. This approach allows us to generate cyclic variations in the toroidal field and investigate the role of internal dynamics in the solar magnetic cycle and polar fields. Additionally, by integrating insights from the SFT model, we also constrain the radial turbulent transport parameters. Our findings will be presented in detail.

Contribution Type

Theme

Solar Magnetism over Long-Time Scales

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Session Classification: Dynamo Models and Observations