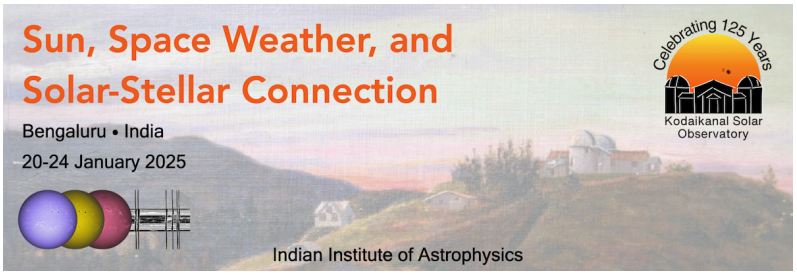

Contribution ID: **41** Type: **Contributed talk**

Statistical Properties of Solar Active Region Potential Magnetic Fields

Monday, January 20, 2025 3:15 PM (15 minutes)

In the solar atmosphere, active regions are dominated by the magnetic field, its complex topology and evolution. To understand the divers nature of active regions, we study a large sample of 3D magnetic field configurations to derive general properties relating magnetic flux, magnetic energy and magnetic field scale-height. We compute the magnetic fields under the potential field assumption for about 900 snapshots of active regions observed by SDO/HMI (CEA SHARP series) during solar cycle 24. We found that the magnetic energy follows a power law of the total unsigned photospheric flux with an index of about 1.5. We show the relationship (or lack of) between the activity solar cycle and the magnetic energy. We also provide a statistical distribution of the decay index during the solar cycle: the magnetic field strength is decaying differently (e-folding) depending on the properties of photospheric magnetic field (i.e., imbalance of flux, center of mass, characteristic size) and the stage of evolution. We discuss the implications for modelling active region magnetic fields and the requirements for advanced models.

Contribution Type

Theme

Solar Magnetism in High-Resolution

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Presenter: REGNIER, Stephane (Northumbria University)

Session Classification: Dynamo Models and Observations