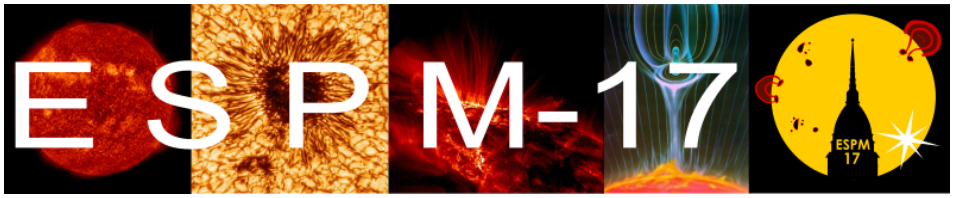

Contribution ID: **345** Type: **Invited**

EPS Invited Speaker - The role of convection during active region emergence

Monday 9 September 2024 09:50 (25 minutes)

Abstract: The role of convection in forming active regions is controversial. In the thin-flux-tube model, the properties of the active regions are set by the flows in the flux tube during its rise: in the mean-field framework the properties are set by the interaction of the magnetic field with the surrounding turbulent convective motions. Recent observational results point to convection playing an important role in the formation and onset of Joy's Law, challenging the thin flux-tube model. To understand how convective flows are involved in the formation of active regions, we aimed to identify where active regions emerge in the supergranulation flow pattern. We discovered that active regions preferentially emerge at specific locations within these flow patterns: the prograde ends of east-west aligned converging flow lanes. Preceding emergence by 0.5 to 1 day, these regions exhibit a net converging flow of 10-20 m/s, independent of magnetic flux, followed by an increase in outflows. Moreover, we propose that the Coriolis force acting on near-surface flows is responsible for Joy's Law, rather than deep-seated dynamics.

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