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Identification of the regime of the Solar Dynamo Operation

The theoretical model, excluding meridional flow, magnetic buoyancy, and including the entire α effect from the base of the convection zone to the surface, indicates that multicycle correlations occur near the critical dynamo region, while one-cycle correlations are prevalent in the extremely super-critical dynamo region. These findings align with Kumar et al. (2021), who suggest that solar-cycle memory is influenced by the dynamo regime rather than solely by transport mechanisms, a view that contradicts Yeates et al. (2008). In marginally supercritical regions, minimal non-linearity leads to multi-cycle correlation, whereas in extremely supercritical regimes, heightened non-linearity and randomness reduce the correlation. Observational data analysis corroborates these results, showing multi-cycle correlation in both diffusion and advection-dominated data, which diminishes with fewer data points.

Contribution Type

Poster

Theme

Solar Magnetism over Long-Time Scales

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