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Modelling Earth's magnetic field over the South Atlantic Anomaly region using Swarm satellite and ground-based data

The Earth's magnetic field plays a critical role in shielding our planet from solar and cosmic radiation, yet the South Atlantic Anomaly (SAA) region represents a significant weakening of this protective shield. This research aims to model the temporal and spatial evolution of the SAA region using the Revised Spherical Cap Harmonic Analysis (R-SCHA) technique, providing improved regional characterization and predictive capabilities. Utilizing satellite data from Swarm, alongside ground-based observatory records, we aim to refine regional predictions of the SAA's extent and intensity. The R-SCHA technique offers an enhanced resolution of localized magnetic variations, crucial for understanding the anomaly's underlying geodynamo processes and space weather impacts. Preliminary results will be presented, showcasing advanced data selection and processing techniques, which are essential in core field modelling as external field contributions must be minimized. Additionally, an analysis of all ground-based magnetic station records within the SAA region will be discussed, to further improve modelling accuracy. These findings are evaluated through a comparative analysis with the CHAOS-7 global magnetic field model to assess their accuracy and reliability.

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