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Recurring magnetic field anomalies in the South Atlantic and the first palaeointensities from Saint Helena

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A long-lived hypothesis is that, if averaged over sufficient time (ca 10 million years), the Earth's magnetic field approximates a geocentric axial dipole (GAD). Despite this common assumption, the question of how significant the non-GAD features are in the time-averaged field is an important and unresolved one. In the present-day field, the South Atlantic Anomaly (SAA) is the biggest irregularity in the field. We know that this anomaly has not always been a part of the field, but in Engbers et al., 2020, it was shown that the magnetic field shows irregular behaviour in this region on a million-year timescale. The irregular behaviour was demonstrated through a substantially high VGP dispersion (21.9º) for lava flows from Saint Helena that are between 8 and 11 million years old. The island of Saint Helena is located at the margin of the present-day SAA and has declination -16.6º, inclination -57.5º relative to expected GAD values of 0.0º/-7.8º (Dec/Inc). We have now commenced the measurements of absolute palaeointensity data from this location. So far, we have performed thermal and microwave IZZI-Thellier experiments on 2 localities from Saint Helena. The site mean results show variable but generally very low field intensities, although further work is required to make these sufficiently robust. Our low field estimates suggest a field in the South Atlantic that is not only unstable, but mainly weaker than expected. This could mean that recurring reversed flux patches (RFP) are responsible for the irregularities and weaknesses in the field in this region, stretching back up to 11 million years ago.