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An extended investigation of the long-term trends in the fluxgate magnetometer (FGM) calibration parameters on the four Cluster spacecraft

Leah-Nani Alconcel[1], Tim Oddy[2], Patrick Brown[2], and Chris Carr[2]
[1]University of Birmingham, Metallurgy and Materials, Birmingham, United Kingdom of Great Britain – England, Scotland, Wales (l.alconcel@imperial.ac.uk)
[2]Imperial College London, The Blackett Laboratory, London, United Kingdom

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[1] University of Birmingham, Birmingham, United Kingdom

[2] Imperial College London, London, United Kingdom

Over 20 years of calibrated data from the Cluster fluxgate magnetometer instruments (FGMs) aboard the four Cluster spacecraft are now accessible through the European Space Agency (ESA) Cluster Science Archive (CSA). The FGM team at Imperial College – the PI institute that built and supports operation of the magnetometers – has regularly provided validated data to the CSA since its inception. In 2014, the team published an initial investigation of the long-term trends in the calibration parameter stability between 2001 and 2012. The investigation showed that the offset parameter drift for three of the Cluster spacecraft FGMs (C2, C3 and C4) was nearly negligible, with the fourth being approximately 0.2 nT per year. This remarkable level of consistency is crucial to Cluster mission science, as the FGM data are used for the derivation of some datasets from other Cluster instruments.

With our dataset doubled in length, it is possible to quantitatively analyse very slow variations (years-long) trends observed in both the offsets and other parameters. We are now able to present an update to the earlier work, showing correlations between instrument calibration and housekeeping parameters.