Geoscientific
Instrumentation
Methods and
Data Systems
Discussions

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Interactive
Comment

Interactive comment on "CLUSTER STAFF search coils magnetometer calibration – comparisons with FGM" *by* P. Robert et al.

Anonymous Referee #1

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General Comments

This manuscript provides a detailed description of the methods used to derive calibrated waveform data from the search-coil instruments onboard the four spinning Cluster spacecraft. The coordinate systems used and the transformations to move between them, are described in depth. Waveform data from the search-coil are compared with spectra from the on-board spectrum analyser. Since these two data sets have been independently processed, the comparison provides a first assurance that the waveform data calibration is good. In the spin-plane, the DC field can be recovered, which when combined with the waveform data allows direct comparison with the FGM instrument. The comparison finds good agreement between the two instruments, over a range of

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different conditions and throughout the mission, providing further assurance on the high quality of the waveform data.

The manuscript is well-written, clearly-presented, and provides an important contribution to the field. It is suitable for publication in the GI journal subject to the following comments, most of which are of an editorial nature.

Specific Comments

Section 3.1

Frequency response is given for each of the four sensors on the Bx axis. The authors could consider to include also By and Bz axes for reference (recommended, but not essential)

Mechanical to magnetic mis-alignments are small, however has the impact on waveform data been quantified? To what extent may this explain the discrepancy with FGM? (probably the effect is minimal, however it would be good to see an upper-limit on the effect)

Are figures 3 and 4 the initial data or the corrected data? This should be made clear

Section 3.4

The 10% correction factor is explained, and assumed to be applied to all ground-test data, however elsewhere (later) in the manuscript it is stated that the SC1 function is derived by averaging the other three. What exactly is the method for deriving each function? This should be clarified.

Section 5.6

Explain how f_s is derived

Phase angle from 'Sun pulse or any other quantity' - please explain which method is used

Various software packages are described. If these are publicly available it would be useful to say so.

Section 6.1

'Non-linearity of the transfer function' could be mis-interpreted:The TF is that of a linear-system so maybe an alternative wording to represent that fact that function is variable and hence requires correction in the frequency-domain

Section 6.3

Refers to the 'previous' trapeze function but I don't believe this has already been introduced. I suggest to provide a brief description of the weighting function here. Can figure 11 be augmented with some more quantitative information?

Section 7

I find this part to be incomplete, in contrast to the other sections. What is Δ_{ij}^{mn} ? More detail could be provided here.

Section 8.1

Fig 15: SA or waveform: which is which?

Section 9.3.2 Using the same table might change the comparison with FGM. Has this been attempted? Maybe this could be mentioned as 'future work'

Clarify how the transfer functions were generated for SC1 vs. SC2/3/4 (see also comment on section 3.4)

Section 9.4.4

Deviation at higher frequency may be due to fall-off in the FGM frequency-response?

Technical Corrections

p680 l25 'built' l26 suggest 'deeply' -> 'substantially'

p681 l11 'on calibration parameters' l24 suggest 'first order high pass. . .'

p690 (x y y) -> (x y z) [twice]

p692 l9 Z_SCS use under script for SCS

p693 l16 suggest to change 'operations' to 'manoeuvres'

p694 (x y y) -> (x y z)

p696 l24 'non-spinning'

p697 Define the window function W_k

p700 l1 'transfer function'

p704 use subscripts in the equations

p707 l14 suggest to reword this last lien as I don't fully understand the meaning

p708 define NBR

p712 l6 STAFF l23 Nykiri

Figure 17/18 Explain which trace is which in the caption

Interactive comment on Geosci. Instrum. Method. Data Syst. Discuss., 3, 679, 2013.