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Geoscientific Instrumentation Methods and Data Systems Discussions



# *Interactive comment on* "In-flight Calibration of the Cluster/CODIF sensor" *by* L. M. Kistler et al.

**L. M. Kistler et al.**

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Thank you very much for your careful reading of the manuscript. Our responses to your comments are given below.

Comment: 1. The term Absolute Efficiency is used for two different concepts. In line 6 on pg 226, it is defined as the product of three separate sensor efficiencies: the start and stop timeof- flight efficiencies and the single_position efficiency. This is a traditional definition. However, in many figures (3, 4, 5, 7, and 14) and their captions and accompanying text, the same term is used for what appear to be Relative Efficiencies, normalized to the beginning of mission. Some different terms should be used with some care taken since the term "Relative efficiencies" has already been used in section 2.4 to refer to efficiency variations among anodes. One possibility is "total efficiency"



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for the threeterm product and “relative total efficiency” and “relative anode efficiency”.

Response: 1. Yes, the referee is right that the “absolute efficiencies” are in in fact often relative. I have changed the wording to “Total Efficiency” and “Normalized Total Efficiency” for the product of the three efficiencies, and that same product, but normalized to 1.0 at the start of the mission. The “relative efficiency” has been changed to “relative anode efficiency” for clarity. These changes have been made throughout the manuscript and in the figures and figure captions.

Comment: 2. The term “single position” efficiency is used in line 1, pg 226 but that is changed to Single_Event_Efficiency in formula (3). It appears that SEV is the rate of single position events so that SEV/SFR should be Single_Position_Efficiency. The two terms are used almost interchangeable after this (e.g. line 19, pg 227) and should all be the same.

Response: 2. Single_Event_Efficiency has been changed to Single_Position_Efficiency in all cases.

Comment: 3. On the same page, there is a discussion of what allows the deduced values of the Start_Efficiency (= SFR/SR; coincidence rate over stop rate) to be larger than 1, which should be impossible. It is argued that the threshold of the SR rate is actually lower than that of the stop signal being fed to the coincidence circuit, which results in an SR rate that is too high. That would appear to produce a start efficiency that is too low, not too high.

Response: 3. Good point. Did I say too high? I meant too low. SR is lower than the actual stop rate on SC3 and SC4. This has been changed in the text.

Comment: 4. Fig. 1 caption should be “Stop, Start, and Single Position efficiencies . . .” to correspond to the figure panels starting from the top.

Response: 4. Fixed

Comment: 5. line 1, pg 227; “start” should be “stop”



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Response: 5. Fixed

Comment: 6. line 20, pg 227; delete “due to”

Response: 6. Fixed

Comment: 7. Figure 6. The fact that the LS/HS density ratio drops with time must mean that corrected HS densities and uncorrected LS densities are being used. Otherwise the more rapid decrease in HS efficiency due to the higher flux of particles incident on that side would be expected to cause the LS/HS ratio to increase with time. If that is true, please make it clear.

Response: 7. Yes, that is true. The LS was corrected after the HS corrections were finalized. This is clarified in the text.

Comment: 8. Why to the Revised Efficiency curves in Fig. 11 cover a larger energy range than the original curves?

Response: 8. In doing the fit, additional points are added outside the range of the data so that the curves don’t start deviating from the main trend in the range just beyond the data points we use. At the high energy end, a data point is added at 60 keV, with the same value as the last point to force the curve to remain flat. The bottom end is particularly tricky as the statistics are generally worse there, and so it is hard to find time periods that give us a reliable measurement down to our lowest total energy (which is 15 kV, our post-acceleration voltage). So we go down as low as we can, and then add a point at lower energies (14 keV) that extends the trend.

Comment: 9. Fig. 12 caption; change “on CODIF” and “on HIA” to “from CODIF” and “from HIA”.

Response: 9. Fixed

Comment: 10. line 20, pg 231; “effect” => “affect” and “plan” => plane

Response: 10. Fixed



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Interactive comment on Geosci. Instrum. Method. Data Syst. Discuss., 3, 221, 2013.