Nonlinear Processes
in Geophysics
Discussions

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Interactive comment on "Complexity signatures in the geomagnetic H component recorded by the Tromsø magnetometer ($70°$ N, $19°$ E) over the last ¼ century" *by* C. M. Hall

Anonymous Referee #2

Received and published: 26 July 2014

Referee comments:

In this work, the author estimates Hurst exponents of horizontal geomagnetic component from local Tromso magnetometer over a span of 25 years yielding some interesting insights into the nature of data and tries to explain the observed variations in the H exponent.

The paper is written in a lucid fashion and should be suitable for publication pending some changes. Here is a list of comments:

1) In figure 1, showing the two panels does not make much sense in that removal of 1 day moving average values does not seem to have any effect on the nature of the

data - at least in the window size it was shown it is hard to discern between the two panels. It might help to focus on a smaller window to show if such detrending removes any lingering trends in the original data. Also, if H>1 after removing the 1 day average, it is an indication that average removal did not affect the non-stationary nature of the day at low time scales i.e., less than 1 minute for example as evidenced by H=1.6 at such time scales. 2) In figure 3, the Hurst exponent is estimated over a subrange. What helped choose this particular subrange to estimate the Hurst exponent? Also, was there a study of how this choice is optimum? This is particularly relevant because the rms fluctuation plots seemingly looks like it is not linear and has a rather varying slope at every time window or scale. 3) The data is at 10s resolution and it is said that Hurst exponent $\approx$ 1.6 at timescales as short as 1 min. So, if one were to evaluate the Hurst exponents at such low time window resolutions, wouldn't it be prone to errors. Particularly because fluctuations corresponding to small window sizes are known to be affected in the DFA technique. So, this may deserve more careful attention.

Interactive comment on Nonlin. Processes Geophys. Discuss., 1, 895, 2014.