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Interactive comment on "Geomagnetic field declination: from decadal to centennial scales" *by* Venera Dobrica et al.

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This paper analyses various long series of declination data with the view to finding periodic signals and better revealing geomagnetic jerks. The techniques applied are Fast Fourier Transforms and visual viewing of traces after application of different filters whose pass bands are, in part, established from the FFT (Hodrick-Prescott, box-car, Butterworth).

There are some novel ideas about separating signals in geomagnetic data here and they have been applied to a new collection of geomagnetic data. However separating sources of the signals is not explored at all. The Hodrick-Prescott (H-D) filter is widely applied in business data where trends are being isolated in data with seasonal and

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annual signals.

The conclusion “The generally accepted geomagnetic jerks occur around extrema in the time derivative of the trend” is hardly surprising as this is practically the definition of a geomagnetic jerk, insofar as we have one.

It is not clear to me that the conclusion “The generally accepted geomagnetic jerks. . .coincide with extrema in the time derivative of the 11-year constituent” can be obtained from Figures 6 and 7. These Figures show a coincidence of the jerk dates with extrema in various cyclic constituents, not just the 11-year cycle, of the time derivative. Your comment at the end about a definition for a jerk essentially says this though, viz “. . .the geomagnetic jerk concept should be considered as a more general notion, namely the evolution of the secular variation as a result of superposition of two (or more) constituents describing effects of processes in the Earth’s core at two (or more) time-scales.”

More detail is needed on how the 30-year and 73-year spectral lines are identified in Figure 2 because these values are then used (at least initially) in some of the subsequent filter design. Does the length of the series, which you comment is important, somehow weight the times of the observatory peaks in the averaging process?

In your description of the H-D filter are the expected periodicities part of the filter design? What are the advantages of the H-D filter over fitting a cubic spline then doing a spectral analysis to the residuals?

What is the reason for the split in the 3rd panel of Figure 3? NGK runs continuously through this time.

Please clarify how you get a $\sim$22-year oscillation over the past $\sim$40 years from Figure 3. It looks more like 16-17 years and in any case must be related to the 2 periods used in the “two-waves” sinusoidal fit.

An analysis of the sunspot series (a completely independent series) would be useful to

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illustrate the significant departures from the 11-year cycle. This would also lend weight to the assertion that the high frequency cyclic signal is external in origin.

How can you be sure that the big jerks are not influencing the results of the filtering in Figure 6? This is crucial as your main conclusion seems to be along the lines of "geomagnetic jerks are not random features but a cyclical feature of Earth's magnetic field". An important conclusion potentially.

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