Zonal signature of Jerks:

I first look at the equatorially and axially symmetric azimuthal (toroidal zonal) changes in flow acceleration. These changes in flow acceleration explain only a very small part of the jerk signal but are the ones capable of relating geomagnetic jerks to changes in $\delta$LOD/dt. I start by analysing times where a geomagnetic jerk is known to occur (2003 and 2006). A pattern emerges that seems to be common to the two events.

**Starting from 2002.5**

- Tangentially geostrophic
- Unconstrained

**Starting from 2005.5**

- Tangentially geostrophic
- Unconstrained

Conclusions:

The particular shape of the equatorially symmetric changes in toroidal-zonal flow acceleration for the 2003 event and the fact that it anti-correlates with the 2006 event is suggestive that an oscillation of period around 6 years may be present in the flow acceleration.

The same 6 year period seems to be present in the correlations of CM4.

However, not all jerks seem to generate the same pattern of zonal changes in flow acceleration.

1969 and 1978 jerks seem to be correlated to the large downwelling of the giant excentric columnar gyre proposed by Pais & Jault (2008). The most recent jerks seem to have a non-zonal signature which correlates well with the upwelling in that gyre (Silva & Hulot, 2012).

Periodicity of the correlation may be indicative that the toroidal zonal signature associated with geomagnetic jerks may be the signature of a torsionnal wave with a period of 6 years instead.

The non-zonal part of the jerk of the flow is correlated to the large downwelling of the giant excentric columnar gyre proposed by Pais & Jault (2008). The most recent jerks seem to have a non-zonal signature which correlates well with the upwelling in that gyre (Silva & Hulot, 2012).

**Search in CHAOS-3:**

Correlation between profiles with evolving initial times provide a good indication of whether similar events happened during the CHAOS-3 time span. Red line indicates correlations with profile starting from 2002.5. Green circle indicates peaks/troughs of correlation.

**Search in CM4:**

Changes over 1.5 years

Non-zonal changes over 1.5 years since 1968.5

Non-zonal changes over 1.5 years since 1977.5

References:


References:
