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The zonal flow acceleration signature of geomagnetic jerks

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Geomagnetic jerks, as sudden changes in the rate of change of the secular variation of the geomagnetic field, have traditionally been associated with changes in the core surface flow acceleration. Changes in Length-of-Day variations too, after corrections from atmospheric and oceanic contributions are believed to result from the interactions between the core and the mantle and therefore, be associated with some core-surface flow accelerations. Coupling these two phenomena, if the fact that only zonal changes in core-surface flow accelerations could take part in core-mantle interactions and therefore carry any signature that could relate geomagnetic jerks and changes in Length-of-Day variations.

By making use of recent models of the geomagnetic field and its first and second time derivatives, we here estimate the changes in core surface flow accelerations across recent geomagnetic jerks. We show that only the zonal component of these flow acceleration changes carries the jerk signature cleanly. From there we carry on showing that there are some features of the zonal component of the changes in core-surface flow accelerations that are independent of the geometric assumptions used to perform the inversion. That pattern seems to be consistent across recent geomagnetic jerks.