

South Atlantic Anomaly as a precursor of geomagnetic jerks in recent times

Saioa A. Campuzano (1), F. Javier Pavón-Carrasco (2,3), Angelo De Santis (1,4), and Enkelejda Qamili (5)

(1) Istituto Nazionale di Geofisica e Vulcanologia (INGV), Rome, Italy, (2) Universidad Complutense de Madrid, Department of Física de la Tierra, Astronomía y Astrofísica, Madrid, Spain, (3) Instituto de Geociencias (IGEO) CSIC, UCM, Madrid, Spain, (4) Dipartimento di Ingegneria e Geologia, Università degli Studi “G. D’Annunzio”, Chieti, Italy, (5) Serco spa. Frascati, Rome, Italy

Geomagnetic jerks are sudden and abrupt changes in the secular variation of the geomagnetic field related to significant variations in the flow patterns of the fluid outer core. Their origin, periodic or random occurrence, global or regional character, are still open questions in the scientific community. Finding geomagnetic or geophysical phenomena that provide a relation with the geomagnetic jerks, results a vital contribution to understand the geomagnetic field behaviour in the present and future. In this work, we link the occurrence of geomagnetic jerks with one of the most intriguing and relevant features of the geomagnetic field in the recent times, i.e. the South Atlantic Anomaly (SAA), where the field is characterized by anomalously low intensity values at surface and is likely due to geomagnetic reversal flux patches at core-mantle boundary (CMB). Our results show that the minima of secular acceleration of the SAA extent area anticipate by few months the occurrence of geomagnetic jerks registered in the last two decades. The found link between these two apparently different phenomena of the geomagnetic field would be a clear indicator that the physical processes that produce the reversal flux patches at the CMB, and in turn the evolution of SAA, involve also the core dynamic instability at the origin of the jerks. In addition, the analysis of the secular acceleration of the SAA extent area in the last months seems to reveal the possible occurrence of a new geomagnetic jerk in the next few years.