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Analysis of the geomagnetic field transfer functions during the 2009 L'Aquila seismic sequence

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To understand the physical phenomena associated with L'Aquila seismic sequence, culminated with the 6 April 2009 M=6.3 earthquake, and to possibly identify any sign of precursors, we analyze the Cartesian components of the geomagnetic field measured at the Geomagnetic Observatory of L'Aquila in the period 2007-2009. On one hand, we see weak but peculiar anomalies in the transfer functions between the horizontal and vertical magnetic components in the frequency domain. In post data analysis these anomalies could be easily put in relation with some hypothetical variations of the lateral and in-depth geoelectric characteristics of the site of observation. However, their statistical significance can be discarded because their appearance could be happened just by chance. On the other hand, when we analyse the data in terms of the spectral entropy that precedes the main shock of the sequence, the most significant result is the presence of distinct temporal regimes that cannot be expected by external field contaminations. We find clear entropy anomalies that may be related to migration of fluids and / or changes in micro and mesofracturations that likely affected most of the lithosphere beneath the region of L'Aquila before the occurrence of the main significant shock. However, although the found indications are important to understand some of the physical processes preceding the main shock, they do not seem at the present to have any practical forecasting potential.