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Analysis of magnetic noise during the last 50 years before the 2009 L'Aquila earthquake

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In this paper we analyze the time evolution of the magnetic noise at L'Aquila geomagnetic observatory during the last one-half of the century, these 50 years represent the preparatory phase of the 2009 L'Aquila earthquake. The nucleation point of this earthquake is situated practically under the observatory at a depth of about 9 km. This is a very favorable condition for detecting anomalies in the background magnetic noise in the area of the earthquake epicenter.
The discrimination of the magnetic noise from the magnetic signal is based on the assumption that the noise is due to the superposition of a very large number of sources while the signal is generated by very few sources. Under these conditions the signal can be represented as a linear combination of a few orthogonal functions, instead the noise can be expanded in a series of eigenfunctions.
The analysis of the data used in this study has highlighted some statistical aspects of the magnetic noise recorded at L'Aquila in the last 50 years. Among these there is a clear decrease of the noise after the earthquake.