

Preliminary analysis of surface temperature anomalies that preceded the two major Emilia 2012 earthquakes (Italy)

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Abstract

In the 1980's, from an analysis of satellite images, Russian scientists reported on a short-term thermal infrared radiation enhancement that occurred before some medium-to-large earthquakes in central Asia [Gorniy et al. 1988]. Since then, many researchers have been studying earthquake thermal anomalies with satellite remote sensing data [Qiang et al. 1991, Tronin 1996, Tramutoli et al. 2001, Ouzounov and Freund 2004, Saraf and Choudhury 2004, Aiiano et al. 2008, Blackett et al. 2011]. Recently, abnormal surface latent heat flux [Dey and Singh 2003, Cervone et al. 2005, Qin et al. 2009, Qin et al. 2011, Qin et al. 2012], outgoing long-wave radiation [Ouzounov et al. 2007] and microwave radiation [Takashi and Tadashi 2010] have also been shown to precede earthquakes. To investigate the possible physical mechanisms of such satellite thermal anomalies, some studies conducted a series of detecting experiments on rock loaded to fracturing [Wu et al. 2000, Freund 2002, Wu et al. 2002, Wu et al. 2006a, Wu et al. 2006b, Freund et al. 2007], and some hypotheses have been proposed. These have included: leaking of pore-gas, and hence the resulting greenhouse effect [Qiang et al. 1995]; activating and recombining of p-holes during rock deformation [Freund 2002]; release of latent heat due to near-surface air ionization [Pulinets et al. 2006], and stress-induced thermal effects due to friction and fluids [Wu and Liu 2009]. [...] In this study, the long-term temperature data from both satellite and ground (with greater emphasis on the satellite data) have been used to determine whether there were thermal anomalies associated with this Emilia 2012 seismic sequence. In particular, the next section will be dedicated to describing both the data and the method of analysis. In Section 3, we provide the more significant results, which we discuss in Section 4, together with the main conclusions. [...]

Keywords

Earthquake geology and paleoseismology; Seismology; Surveys, measurements, and monitoring; Earthquake interactions and probability

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References

DOI: <https://doi.org/10.4401/ag-6123>

Published by INGV, Istituto Nazionale di Geofisica e Vulcanologia - ISSN: 2037-416X

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
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