Geophysical Research Abstracts
Vol. 15, EGU2013-6552, 2013
EGU General Assembly 2013

Integrated observation and analysis of pre-earthquake related signals over major geohazard sites

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We are conducting an integrated study involving multi-parameter observations in our investigation of phenomena proceeding major earthquakes. Our approach is based on a systematic analysis of several parameters namely: foreshock seismic activities; gas discharge; thermal infrared radiation; outgoing radiation flux; ionospheric electron density; VLF sub-ionospheric propagation anomalies; and atmospheric temperature and humidity which we propose are associated with earthquakes, For the first time we intend to have a similar set of integrated geophysical measurements (in-situ and satellite) over regions of active earthquakes and volcanoes. We are in the process of establishing an iSITES (Integrated sites) framework for coordinate measurements, data sharing and validation. So far we include six regions: Southern California (USA), Eastern Honshu (Japan), Central and Southern Italy, Taiwan (ROC), Corinth rift (Greece), Kamchatka and Sakhalin (Russia). We are continuing the same approach of near real-time information sharing established under the EU-FP7 PRE-EARTHQUAKE project. In the future we may well coordinate this effort with GEOSS supersite site project. This provides a new opportunity to cross validate our results with the dense networks of in-situ and space measurements.
Initially we tested the iSITES observational data in two different tectonic regions, first with recent large earthquakes, viz.- Tohoku-oki (M9, 2011, Japan) and Emilia (M5.9, 2012, N. Italy), and L'Aquia (2009, Central Italy) regions. Our retrospective analyses of these satellite data have shown the presence of anomalies in the atmosphere. Second, we did a retrospective analysis to check the re-occurrence of similar anomalous behavior over Taiwan, Japan and Kamchatka, which include 40 major earthquakes (M>5.9) for the period of 2005-2009. We found anomalous behavior before all of these events with no false negatives; false positives were less then 20%.
Our initial results suggest that iSITES observational data may well become a platform for observation and systematic validation of pre-earthquake anomalies, which could be explained by a coupling between the observed physical parameters and earthquake preparation processes.