Presentation information

[E] Oral

M (Multidisciplinary and Interdisciplinary) » M-IS Intersection

[M-IS08] Interdisciplinary studies on pre-earthquake processes

Sun. Jun 6, 2021 3:30 PM - 5:00 PM Ch.22 (Zoom Room 22)

convener:Katsumi Hattori(Department of Earth Sciences, Graduate School of Science, Chiba University), Dimitar Ouzounov(Center of Excellence in Earth Systems Modeling & Observations (CEESMO) , Schmid College of Science & Technology Chapman University, Orange, California, USA), Jann-Yenq LIU(Department of Space Science and Engineering, National Central University, Taiwan), Qinghua Huang(Peking University), Chairperson:Jann-Yenq LIU(Department of Space Science and Engineering, National Central University, Taiwan), Qinghua Huang(Peking University)

The year 2021 is the memorial year of the 2011 Tohoku Earthquake (M9.0). For the past decade, we have advanced our knowledge of precursors and earthquake preparation processes.
This session expands the interdisciplinary discussions on the preparation process of earthquake and earthquake predictability by presenting the latest progress in studying the physically based pre-earthquake phenomena. New observations from space and ground have provided evidence, enhancing a better understanding of the tectonic activity. The session anticipates talks that include but is not limited to observations and analyses of seismic, electrical, electromagnetic, electro-chemical, and thermodynamic processes related to stress changes in the lithosphere along with their statistical and physical validation. Presentations on the latest observational results associated with major earthquakes obtained by different methodologies are welcomed. The topics of the session are as follows but not limited.

-General discussion on earthquake preparation process and the physics of pre-earthquake signals
- Theory, modeling, laboratory experiments, computational simulation for generation and propagation of pre-earthquake signals and their connection with the seismic cycle
- Multi-parameter observations, detection, and validation of pre-earthquake signals
- Cross-disciplinary studies, practical and technical approaches for better understanding of earthquake preparation processes and their connection with seismicity.

3:50 PM - 4:10 PM

[MIS08-14] A focus on the capability of the RST-based satellite TIR anomalies for the short-term seismic hazard assessment in Japan

★Invited Papers

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Keywords:Earthquakes, Satellite thermal anomalies, Seismic hazard, Statistical analysis, Multi-parametric system, Japan

With the aim to evaluate the potentiality of the parameter "RST-based satellite TIR anomalies" in a space-time relation with large earthquakes (M>=6) occurred in Japan from 2005 to 2015, we have performed a long-term statistical correlation analysis (see Genzano et al., 2021).
To accomplish this purpose, we use the Robust Satellite Technique (RST; Tramutoli 1998, 2007), and the Robust Estimator TIR Anomalies (RETIRA; Tramutoli et al., 2005) index, to identify Significant Sequences of TIR Anomalies (SSTAs) over 11 years of night-time satellite images acquired by MTSAT satellites over Japan.
By applying empirical spatial-temporal rules, which are established also taking in account the physical models up to now proposed to explain seismic TIR anomalies appearances, the performed long-term correlation analysis put in relief that a non-casual relation exists between satellite TIR anomalies and the occurrence of the earthquakes.
Here, we summarize the achieved results and discuss them in the perspective of a multi-parameter system, which could improve our present knowledge on the earthquake-related processes and increase our capacity to assess the seismic hazard in the medium-short term (months to days).
Moreover, we will discuss the improvements to the RST approach, recently introduced, aimed to minimize the proliferation of the false positives (i.e. TIR anomalies independent to the seismic sources, but due to other causes, e.g. meteorological factors), as well as the exportation of the RST/RETIRA approach/index on the radiances collected by the next-generation satellite sensor Himawari-8/AHI.

Acknowledgments
This study was partly supported by joint research program of Center for Environmental Remote Sensing of Chiba University (Japan).

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