

Interactive comment on “Pre-seismic Thermal Anomalies from Satellite Observations: A Review” by Zhong-Hu Jiao et al.

M. F. Buongiorno (Referee)

fabrizia.buongiorno@ingv.it

Received and published: 28 October 2017

The paper is well constructed and gives to readers a full view of the current status of studies regarding the use of temperature anomalies for earthquake prediction Chapter 3,4 and 5. Nevertheless the chapter 2 need to be reviewed in order to give a full description of different parameters used to detect thermal anomalies related to seismic activity. Is misleading in this Chapter that the author indicates that satellite measurements have already proven to be able to detect thermal anomalies as precursors of seismic events (pag. 4, line 95-100) when this thesis is then refuted in Chapters 4 and 5 considering that the mechanism that produced the possible anomalies is not well understood and the measurements of temperature, gas and aerosol anomalies could not be related with enough confidence to seismic activity due also to instrumental lim-

C1

itation. Chapter 2 should remain the description of the possible usable parameters retrieved by satellite and used in the algorithms and approaches described in chapter 3.

The author refers to a list of parameters which could be derived by satellite measurements but due to the large number of satellite data used to extract the presented parameters, I would suggest to add a table that shows the satellite missions, the possible retrieved parameter, parameter dimension, estimated accuracy and error, spatial and temporal resolution in order to permit the reader to understand the difficulties that those studies are encountering to extract significant measurements for the earthquake precursor analysis. Chapter 2 needs to be more coherent with the following Chapters that are giving a correct critical review of this fascinating research aimed to the understanding the complex interaction between Earth interior and surface phenomena. The author may consider focusing only on temperature anomalies excluding satellite retrievals of columnar gas content anomalies due to the emissions in the fault zones. I strongly believe that this is not a suitable parameter if satellite measurements are considered since current satellites measure CO₂/CO columnar concentrations with very coarse spatial resolution and therefore with very low chance to detect appreciable variations on localized areas. Volcanic emitted CO₂ which shows high concentrations and is continuously emitted is mostly not detected by current satellite missions due to the high concentration in the atmosphere and the quick dispersion. Fault areas could discharge gases but the direct measurement of an anomalous concentration in the atmospheric column over the possible earthquake area by current satellites missions is not credible.

A final comment which may be added to the Chapter 5 is to strengthen the consideration that the studies on the analysis of thermal anomalies are of high scientific interest but at the moment this study could not bring any practical use for the earthquake risk reduction or alert. I appreciate the very clear statement on fact that we need to improve satellite instruments capabilities in terms of accuracy and spatial/temporal resolution. This review may stimulate the development of specific experiments which will help the

C2

understand more about the interactions between faults movements and the variation of surface parameters which could be detected by satellites observations.

Interactive comment on Nat. Hazards Earth Syst. Sci. Discuss., <https://doi.org/10.5194/nhess-2017-211>, 2017.