Nat. Hazards Earth Syst. Sci. Discuss., 1, C466–C468, 2013
www.nat-hazards-earth-syst-sci-discuss.net/1/C466/2013/

Natural Hazards and Earth System Sciences
Discussions

Interactive comment on "A statistical feature of anomalous seismic activities prior to large shallow earthquakes in Japan revealed by the Pattern Informatics method" *by* M. Kawamura et al.

R. Console (Referee)

console@ingv.it

Received and published: 6 July 2013

Review of the paper "A statistical feature of anomalous seismic activities prior to large shallow earthquakes in Japan..." by M. Kawamura et al. (Discussion paper NHESSD 1, 721-745, 2013).

This paper describes an application of the "Pattern Informatics" method to forecast large (M>=6.4) Japan inland earthquakes. The statistical analysis of the results, carried out by means of the Molchan's error diagram, shows that the hypothesis of Japan inland earthquakes preceded by changes in seismic activity cannot be rejected with a 95%

confidence level.

General comments

Although the subject of the paper appears quite interesting to me, I find that this paper contains several flaws that reduce its value for publication on NHESSD. The "Pattern Informatics" method and its application are poorly described, as described more in detail in the section with specific comments. As additional remark, I find that the English grammar of the paper is rather poor. It needs a careful revision for improvement. I have a personal suggestion for the use of the words "seismic activity" rather than "seismic activities" in the title and throughout the text. I conclude that this paper needs more refinement before it deserves publication on NHESSD, and suggest that the Authors improve their work paying more attention to the clarity and the completeness of the presentation. For my own curiosity: I wonder why this paper includes the analysis of earthquakes until the date of 28 February 2011 (11 days before the great Tohoku Earthquake of 11 march 2011) and considers a rectangular area that leaves the epicentre of this great earthquake just outside, although it includes wide offshore seismic zones.

Specific comments

- The paper introduces the term of "probability of earthquake occurrence in the prediction period" at line 14 of page 725 and makes use of it throughout the text. However the quantity defined in the paper is not a probability (its normalized value is negative). I would strongly recommend avoiding the use of the word "probability" in this context. - The size of the total spatiotemporal area occupied by prediction periods depends on the length of the time interval t3-t2. t3 is mentioned only twice (lines 14 of page 725 and line 21 of page 726), but the paper never gives information on the size of t3-t2. This is a critical aspect of the forecast method and its evaluation. - Figures 3 to 5 are of difficult interpretation. It is difficult to appreciate the size of the target areas. I can't find the reason of many red stars appearing in completely blue areas, unless they are

included among success even when a strong earthquake occurs many years after the occurrence of a hot spot. Again, the duration of the prediction periods is critical for evaluating the results of the method. The reader would like to see figures where the relation between alarm areas and strong earthquakes is clearly shown. - Lines 13-17 of page 727 state that “Even if target events are included in grid cells with low earthquake occurrence probabilities in change intervals, as long as they are located next to grid cells 15 with high earthquake occurrence probabilities in the same intervals, they are shown by using read color stars and are regarded as the events accompanied by anomalous seismic activity.” This is a critical concept for evaluation of the test and should be very clearly explained. Does it mean that a success is declared when a strong earthquake occurs in any of the eight cells surrounding a hot spot cell? This would mean that the alarm area is nine times larger and it should be taken into account in the preparation of the Molchan’s error diagrams both for the x-axis (fraction of the total alarm volume) and for the y-axis (number of missed events). Without a clarification on this issue I must consider the results meaningless. - Figures 6 to 8 are poorly described both in the text and in the captions. What is the difference between open and solid circles and that of the unique larger solid circle in each plot? The captions should also describe the meaning of the curve lines.

(Rodolfo Console)

Interactive comment on Nat. Hazards Earth Syst. Sci. Discuss., 1, 721, 2013.