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Forecasting earthquakes using the Pattern Informatics method ("hotspot maps"): current status

JB Rundle (1), J Holliday (1), KF Tiampo (2), DL Turcotte (3) and W Klein (4)

(1) Center for Computational Science and Engineering, University of California, Davis, CA 95616 (jbrundle@ucdavis.edu /Fax 530-754-4885), (2) Department of Earth Sciences, Biological & Geological Sciences, University of Western Ontario, London, ON N6A 5B7, Canada (ktiampo@uwo.ca), (3) Geology Department, University of California, Davis, CA 95616, (turcotte@geology.ucdavis.edu), (4) Department of Physics, Boston University, Boston MA, 02215 (klein@buphy.bu.edu)

The pattern informatics (PI) method of earthquake forecasting provides a systematic, quantitative measure of variations (both increases and decreases) in seismicity and uses these variations to forecast regions likely to experience a large earthquake in the future. This approach has been applied to California, Japan, and the world. For regional forecasts, the region under consideration is divided into 0.1 degree by 0.1 degree boxes, and for the world, 1 degree by 1 degree boxes. The data used is the number of earthquakes with magnitudes greater than or equal to 3.0 (5.0 for the world), the seismic intensity. The method quantifies the relative changes in seismicity during a change period 1990 to 2000 in order to forecast the locations of earthquakes with M>5.0 (M>7.0 worldwide) during a forecast period 2000 to 2010. A forecast for Southern California for the period 2000-2010 was published by Rundle et al. (PNAS 99, 2514, 2002). Subsequently 12 of the 14 earthquakes with M>5 in Southern California occurred on or within the margin of error of the forecast regions. The forecast for Japan was presented on 13-14 October 2004, at Kyoto and Tokyo, and the subsequent 23 October 2004 Niigata earthquake occurred in a forecast region. The worldwide forecast was presented at the Fall 2004 AGU meeting, and the subsequent M=9.0 Indonesian earthquake and M=8.1 Macquarie Island earthquakes occurred in forecast regions.