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Earthquake forecast models based on the RI algorithm for Italy

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This paper gives an overview of the RI-based earthquake forecast models that have been submitted to the 5- and 10-year testing classes and 3-month class of the Italian experiment within CSEP (Collaboratory for the Study of Earthquake Predictability). The RI algorithm is originally a binary-forecast system based on the working assumption that future large earthquakes are considered likely to occur at sites of higher seismic activity in the past. A measure of RI is simply to count the number of past earthquakes, which is so-called Relative Intensity (RI) of seismicity. To improve the RI forecast performance, we first expand the RI algorithm to belong to a general class of smoothed seismicity models. We then convert RI representation from a binary system to a testable CSEP model that defines the forecast numbers of earthquakes for the predefined magnitudes. Our parameter tuning for the CSEP models is based on past seismicity. The final submittal is a set of two numerical data files created by the tuned 5- and 10-year models and an executable computer code of the tuned 3-month model to examine which testing class is more meaningful for the RI hypothesis. Main purpose of our participation is to better understand the importance (or unimportance) of relative intensity of seismicity for earthquake forecastability. It is of interest to consider application of simple RI-based models to seismically active regions as a reference for forecast model development. We thus discuss future application to Japan, especially the Tokyo Metropolitan Area, in collaboration with the Special Project for Earthquake Disaster Mitigation in Tokyo Metropolitan Area.

Keywords: earthquake, forecasting, seismicity, Italy, patterns, statistics