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PREDICTING PREDICTABLE ABOUT SEISMIC EXTREMES

By definition, an extreme event is rare one in a series of kindred phenomena. Usually (e.g. in Geophysics), it implies investigating a small sample of case-histories with a help of delicate statistical methods and data of different quality, collected in various conditions. Many extreme events are clustered (far from independent) and follow fractal or some other “strange” distribution (far from uniform). Evidently, such an “unusual” situation complicates search and definition of reliable precursory behaviors to be used for forecast/prediction purposes. Making forecast/prediction claims reliable and quantitatively probabilistic in the frames of the most popular objectivists’ viewpoint on probability requires a long series of "yes/no" forecast/prediction outcomes, which cannot be obtained without an extended rigorous test of the candidate method. The set of errors (“success/failure” scores and space-time measure of alarms) and other information obtained in such a control test supplies us with data necessary to judge the candidate’s potential as a forecast/prediction tool and, eventually, to find its improvements. This is to be done first in comparison against random guessing, which results confidence (measured in terms of statistical significance). Note that an application of the forecast/prediction tools could be very different in cases of different natural hazards, costs and benefits that determine risks, and, therefore, requires determination of different optimal strategies minimizing reliable estimates of realistic levels of accepted losses. In their turn case specific costs and benefits may suggest a modification of the forecast/prediction tools for a more adequate “optimal” application. Fortunately, the situation is not hopeless due to the state-of-the-art understanding of the complexity and non-linear dynamics of the Earth as a Physical System and pattern recognition approaches applied to available geophysical evidences, specifically, when intending to predict predictable, but not the exact size, site, date, and probability of an extreme catastrophe. This, apparently natural concept, is illustrated by application to seismic extremes that show how understanding by modeling the complexity of non-linear dynamics of hierarchically organized systems of blocks-and-faults has led to reliable methodologies of neo-deterministic seismic hazard analysis and intermediate-term middle- to narrow-range earthquake prediction algorithms tested in real-time applications over the last decades. Contemporary Science can do a better job in disclosing Natural Hazards, assessing Risks, and delivering such info in advance extreme catastrophes, which are *low probability events that happen with certainty* (i.e. 100%). Geoscientists must initiate shifting the minds of community from pessimistic disbelieve to optimistic challenging issues of neo-deterministic predictability of hazards and risks.