Geophysical Research Abstracts
Vol. 15, EGU2013-6324, 2013
EGU General Assembly 2013

Multiscale mapping of completeness magnitude of earthquake catalogs

Inessa Vorobieva (1,2), Clement Narteau (2), Peter Shebalin (1,2), François Beauducel (2), Alexandre Nercessian (2), Valérie Clouard (2,3), Marie-Paule Bouin (2,4)

(1) Institute of Earthquake Prediction Theory and Mathematical Geophysics, Russian Academy of Sciences, 84/32 Profsouznaya, Moscow 117997, Russia., (2) Institut de Physique du Globe de Paris, Sorbonne Paris Cité, Univ. Paris Diderot, UMR 7154 CNRS, 1 rue Jussieu, 75238 Paris, Cedex 05, France., (3) Observatoire Volcanologique et Sismologique de Martinique, Institut de Physique du Globe de Paris, Morne des Cadets, 97250 Fonds Saint Denis, La Martinique, French West Indies., (4) Observatoire Volcanologique et Sismologique de Guadeloupe, Institut de Physique du Globe de Paris, Le Houëlmont, 97113 Gourbeyre, La Guadeloupe, French West Indies.

We propose a multiscale method to map spatial variations in completeness magnitude M_c of earthquake catalogs. The M_c value may significantly vary in space due to the change of the seismic network density. Here we suggest a way to use only earthquake catalogs to separate small areas of higher network density (lower M_c) and larger areas of smaller network density (higher M_c). We reduce the analysis of the FMDs to the limited magnitude ranges, thus allowing deviation of the FMD from the log-linearity outside the range. We associate ranges of larger magnitudes with increasing areas for data selection based on constant in average number of completely recorded earthquakes. Then, for each point in space, we document the earthquake frequency-magnitude distribution at all length scales within the corresponding earthquake magnitude ranges. High resolution of the M_c-value is achieved through the determination of the smallest space-magnitude scale in which the Gutenberg-Richter law (i. e. an exponential decay) is verified. The multiscale procedure isolates the magnitude range that meets the best local seismicity and local record capacity. Using artificial catalogs and earthquake catalogs of the Lesser Antilles arc, this M_c mapping method is shown to be efficient in regions with mixed types of seismicity, a variable density of epicenters and various levels of registration.