Abstract Details

AOGS 1st Annual Meeting > Non-linear Geophysics > Unified Scaling Law for Earthquakes: Implications for Hazard Assessment and Prediction >

Corresponding Author : Prof. Vladimir Kossobokov (volodya@ipgp.jussieu.fr)

Organization: IEPT&MG RAS

Category: Non-linear Geophysics

Paper ID: 57-ONL-A1554

Title: Unified Scaling Law for Earthquakes: Implications for Hazard Assessr and Prediction

Abstract:

Unified Scaling Law for Earthquakes: Implications for Hazard Assessr and Prediction VLADIMIR G. KOSSOBOKOV1, 2 1International Institut Earthquake Prediction Theory and Mathematical Geophysics, Russian Academy of Sciences, 117556 Moscow, RUSSIAN FEDERATION 2 Insti Physique du Globe de Paris, 75252 Paris, Cedex 05, FRANCE The evid heterogeneity of patterns of seismic distribution and dynamics are ap scalable according to the generalized Gutenberg-Richter recurrence la accounts for the fractal nature of faulting. The results of our global ar regional analyses imply that the recurrence of earthquakes in a seism prone site, for a wide range of magnitudes and sizes, can be characte with the following law: log10N(M, L) = A + B • (5 • M) + C • log10 where N(M, L) is the average annual number of earthquakes of magn within an area of liner size L. The Global Seismic Hazard maps, which at scale of one by one degree, the A, B, and C for the recurrence of earthquakes, are plotted. The global distribution of local estimations c coefficients of the Unified scaling law A, B, and C are counted [1] in a places, where the NEIC/USGS Global Hypocenters• Data Base, 1964- enough for their reliable evaluation. The logarithmic estimate of seism activity A normalized to a unit area of 1••1• ranges mainly betweer -1.0 to more than 0.5 per year, which corresponds to recurrence of magnitude 5.0 earthquakes from under one per decade to above thre year. The recurrence graph slope B concentrates mainly between 0.6 while the fractal dimension of locus of earthquake epicenters C spreac under 1.0 to 1.4 and higher. The achieved distributions of error for th coefficients demonstrate a high level of worldwide agreement of the g seismic data and the Unified scaling law for earthquakes. The estimat based on more precise and complete regional and local catalogs of earthquakes permit to suggest applicability of the law in much wider r of magnitudes and sizes, e.g., a selective analysis of the 11 catalogs | indicates that scaling persists in magnitudes from 1.5 (regional data, northern California) to 7.5 (NEIC/USGS GHDB) and in dimensions fror km (regional data, Caucasus) to 20000 km (the Earth•s hemispheres Thus, an estimate of earthquake recurrence rate depends on the size territory that is used in the original averaging and may differ dramatic when rescaled to the area of interest in a long-established way. The confirmed multiplicative scaling of earthquakes changes the traditiona