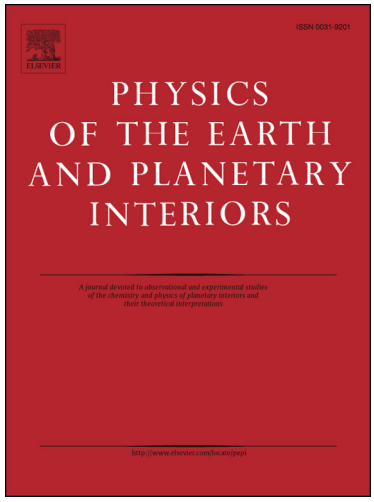
Accepted Manuscript



A new method for the estimation of the completeness magnitude

C. Godano

PII: S0031-9201(16)30144-3
DOI: http://dx.doi.org/10.1016/j.pepi.2016.12.003
Reference: PEPI 5992

To appear in: *Physics of the Earth and Planetary Interiors*

Please cite this article as: Godano, C., A new method for the estimation of the completeness magnitude, *Physics of the Earth and Planetary Interiors* (2016), doi: http://dx.doi.org/10.1016/j.pepi.2016.12.003

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

ACCEPTED MANUSCRIPT

A new method for the estimation of the completeness magnitude

C. Godano

Department of Mathematics and Physics, Second University of Naples, Caserta, Italy.

Abstract

The estimation of the magnitude of completeness m_c have strong consequences in any statistical analysis of seismic catalogue and in the evaluation of the seismic hazard. Here a new method for its estimation is presented. The goodness of the method has been tested using 10^4 simulated catalogues. Then the method has been applied to five experimental seismic catalogues: Greece, Italy, Japan, Northern California and Southern California.

Keywords: Completeness magnitude, Gutenberg-Richter distribution

1. Introduction

The magnitude of completeness m_c is defined as the lowest magnitude at which all the earthquakes, occurring in a certain region and in a given time window, are detected (Rydelek and Sacks 1989). The most important motivation to estimate this quantity is the direct impact on the evaluation of the Gutenberg-Richter (GR) distribution parameters: the scaling exponent b and the overall seismicity rate a. The GR parameters are, in general, the basis of the seismic hazard studies (e.g., Cornell 1968; Wiemer et al. 2009) and of the earthquake forecast models (e.g., Wiemer and Schorlemmer 2007). Moreover a correct estimate of a and b is crucial to better understand the physics of the earth's crust (e.g., Mignan 2011). In practice, a relatively high magnitude threshold may provide a conservative estimate of m_c but would deprive the dataset of potentially valuable information. On the contrary, a too small value of m_c will reflect in an incorrect estimate of the b value leading to wrong evaluations of the seismic hazard. Moreover, an incorrect estimate of m_c have strong consequences in any other further statistical analysis of the considered catalogue.

Download English Version:

https://daneshyari.com/en/article/5787351

Download Persian Version:

https://daneshyari.com/article/5787351

Daneshyari.com