Geophysical Research Abstracts
Vol. 14, EGU2012-2291, 2012
EGU General Assembly 2012

Five years of EURYI project on subduction and interplate seismicity: What have we learnt?

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Subduction zones are the site of the largest and most dangerous seismic events occurring on the Earth. The interface of converging plates is comprised of major fault zones where most of the total seismic moment is released due to the global seismicity. Despite first order similarities between convergent margins, the statistical distribution of interplate seismic activity on different subduction zones is considerably diverse: some regions are characterized by the occurrence of megathrust earthquakes while others show only minor seismic activity, with moderate-sized events. Determining the causes of this variability is challenging. While essential features characterizing the behavior of the subduction thrust faults are known, it is still difficult to merge them in a single, comprehensive picture. This is mainly related to the lack of direct observables (i.e. subduction thrust faults are not readily accessible developing in the deeper crust, in the offshore domain) and to a short (i.e. limited to the last century) instrumental seismic record.

Here we present the main results of an interdisciplinary study realized in the framework of the ESF (European Science Foundation) - EURYI project 'Convergent margins and seismogenesis: defining the risk of great earthquakes by using statistical data and modeling'. This project aims to improve the current understanding of the physics of subduction zone thrust fault earthquakes, analyzing and gathering a) a wide range of geometric, kinematic and seismological data on current subduction zones and related statistical analysis and b) results of innovative laboratory and numerical models.

In particular, our results allow us to identify interesting features characterizing interplate earthquakes, as; 1) seismogenic zone geometry; 2) seismogenic zone activity; 3) relationship between subduction thrust fault parameters and subduction parameters; 4) conditions for megaearthquake genesis; 5) where interplate earthauqkes are more likely to occur.

This multidisciplinary research has a two-fold outcome. From a scientific point of view, it improves our current knowledge on the thrust fault earthquakes along subduction zones, highlighting the influencing factors. From a social point of view, our results contribute to improve the interplate earthquake forecasting capability