Geophysical Research Abstracts
Vol. 21, EGU2019-5922, 2019
EGU General Assembly 2019

Modelling of the inter-seismic stage of the "Mountain Front Fault", Zagros thrust belt, Iran

Matteo Basilici (1), Stefano Mazzoli (2), Antonella Megna (3), Stefano Santini (1), and Stefano Tavani (2)

(1) Dipartimento di Scienze di Base e Fondamenti (DiSBeF), Università di Urbino "Carlo Bo", Urbino, Italy, (2) Dipartimento di Scienze della Terra, dell'Ambiente e delle Risorse (DiSTAR), Università di Napoli "Federico II", Napoli, Italy , (3) Sezione di Sismologia e Tettonofisica, Istituto Nazionale di Geofisica e Vulcanologia (INGV), Roma, Italy.

During the last years, new modelling methods and software have been developed, allowing us to investigate complex fault systems never studied before. One of these geologically complex structures is the "Mountain Front Fault" of the Lurestan region of the Zagros thrust belt (Iran). The Zagros thrust belt formed due to the convergence between the Arabian and Eurasian plates during the closure of the Neo-Tethys Ocean. The process involved three domains: the Arabian passive margin to the SW, the southwestern margin of the Eurasian plate to the NE, and the Central Iranian microplates (Iran block) located in between. GPS measurements show that the northward relative motion of the Arabian Plate is still active today, with oblique convergence occurring at a rate of ca. 2 cm/yr with respect to fixed Eurasia. This active drift produces high-magnitude earthquakes along the Zagros thrust belt, such as the Iran-Iraq border seismic event of November 12, 2017 (Mw = 7.3). The aim of this work is to study the inter-seismic stage that eventually led to the nucleation of this important seismic event. A 2-D finite element model has been performed starting from published geological sections and relevant seismological datasets, integrated with geo-mechanical parameters of the rocks. Using the Marc software (MSC Software Corporation), model parameters including gravity load, boundary conditions and fault planes friction have been set up in order to obtain the best simulation of the inter-seismic behaviour of the "Mountain Front Fault" (MFF), a large reverse fault responsible for the seismic event of November 2017. This type of modelling allows one constraining a given fault as being locked or alternatively free to move (in order to simulate stable sliding). Results from several tests allowed us to shed light on the seismogenic structure of the November 12, 2017 (Mw = 7.3) earthquake, and to unravel the most reliable tectonic scenario for seismic activity in the study area.