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Effect of Coulomb stress changes on the time-dependent model

Abstract

Coulomb stress changes due to an earthquake can affect surrounding faults and cause future events on them. Previous studies in some regions of Iran had investigated qualitatively relationships between the Coulomb stress changes due to large earthquakes and occurrence of future events. The aim of this thesis is determining the effect of the Coulomb stress change on the probability of the occurrence of future events in East (Dasht e Byaz- Ferdows) and North-West of Iran. So we calculated the Coulomb stress changes due to Qaen-Birjand earthquake (10 May 1997), and Ahar–Varzaghan Doublet Earthquakes (11 August 2012) on the surrounding faults. Also by using the physical basis of BPT (Brownian passage time) statistical model and considering both permanent and transient effects of Coulomb stress change, the recurrence of earthquake conditional probability for 10, 30 and 50 years later, is estimated on the regional faults. Our results showed that the Coulomb stress changes due to 10 May 1997 Qaen-Birjand earthquake change the probability of occurrence of earthquakes on the east Dasht-e-Bayaz fault. But, it hasn't any effects on the probability of occurrence of future event on the Tabas and West- Ferdows faults. Also our results in North-west of Iran showed that the Coulomb stress changes due to 11 August 2012 Ahar–Varzaghan doublet earthquakes does not change the earthquakes occurrence probability on the North Bozghoush, South Bozghoush and North Tabriz faults. However, by considering a hypothetical earthquake on one of the north Tabriz fault segments, significantly the occurrence probability of an earthquake on another segment increased.