

EGU21-495

<https://doi.org/10.5194/egusphere-egu21-495>

EGU General Assembly 2021

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## **Triggering of the 2012 Ahar-Varzaghan earthquake doublet (Mw6.5&6.3) by the Sahand Volcano and North Tabriz fault (NW-Iran); Implications on the seismic hazard of Tabriz city**

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Seismic history of the North Tabriz fault (NTF), the main active fault of Northwestern Iran near Tabriz city, and its relation to the Sahand active Volcano (SND), the second high mountain of the NW Iran, and to the 11 August 2012 Ahar-Varzaghan earthquake doublet (Mw6.5&6.3) (AVD), is investigated. I infer that before AVD seismicity of the central segment of NTF close to SND was very low compared to its neighbor segments. Magmatic activities and thermal springs near central NTF close to Bostan-Abad city and low-velocity anomalies reported beneath SND toward NTF in tomography studies suggest that the existing heat due to SND magma chamber has increased the pore-fluid pressure that overcomes the effective normal stress on the central NTF, resulting in its creep behaviour. Two peaks of cumulative scalar seismic moments of earthquakes observed on both lobes of the creeping segment, confirming the strong difference in the deformation rate between these segments. On 2012, AVD struck in the 50 km North of NTF, in the same longitude range to SND and with the same right-lateral strike-slip mechanism to NTF, as a result of partial transfer of the right-lateral deformation of NW Iran toward the North of NTF on the Ahar-Varzaghan fault system. A cumulative aseismic slip equal to an Mw6.8 event is estimated for the creeping segment of NTF, posing half of the 7mm<sup>y</sup>-1 geodetic deformation has happened in the creep mode. This event has transferred a positive Coulomb stress field of >1 bar on the AVD and triggered them. Also, the western and eastern NTF segments received >4 bar of positive Coulomb stresses from the creeping segment and are probable nucleation locations for future earthquakes on NTF. The observed creep may be the reason for the NTF segmentation during the 1721AD M7.6 and 1780 AD M7.4 historical earthquakes.