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A joint analysis of GPS and PS-InSAR to infer the fault segmentation and interseismic strain accumulation for the North Tabriz fault, NW Iran

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The accommodation of deformation due to the collision of between Arabian and Eurasian plates dominates in shortening along the Greater and Lesser Caucasus to the north and conjugated strike-slip fault in Turkish and Armenia plateau. Several discontinuous strike-slip faults are distributed all over the NW Iran to the south, which control the lateral motion of micro-blocks. The North Tabriz fault (NTF) in one of them. Furthermore, the area of NW Iran is suggested as a possible southward termination of the 2000-km long North Anatolian Fault into and northward termination of the 600-km long Zagros Main Recent fault. The reason why such a large-scale strike-slip fault system disappears in the NW Iran and the interaction with the other small fault systems is unclear right now. After the 1780 earthquake (M ∼7.4), no big earthquake (Mw > 7.0) has occurred along the NTF for almost three centuries. Thus the GPS data and small-baselines PS-InSAR technique are used to study the interseismic strain accumulation and slip deficit distribution along the NTF. We also calculate the maximum and minimum principal strain rates, rotational and dextral shear strain rates across the NTF. Based on the 6 profiles of deformation rate along line of sight (LOS) towards to satellite, we find that the northern and central segment of the NTF is more active than the southern one. In addition, the extensional deformation dominates in the southern segment of the NTF. We also use the Okada's code to inverse the inter-seismic slip on the fault patches. The locking depth of the northern and central segments is ∼10 km while the southern one demonstrates a deeper locking depth of ∼15-20 km. We estimate recurrence interval is ∼1500 years for a big earthquake M > 7.0. If the Gailatu-Siak-Khoy and North Mishu faults are the segments of the NTF, this recurrence interval might be underestimated in terms of our numerical simulation.