

## Characterizing surface deformation in the 1990 Rudbar earthquake (Iran) using optical image processing

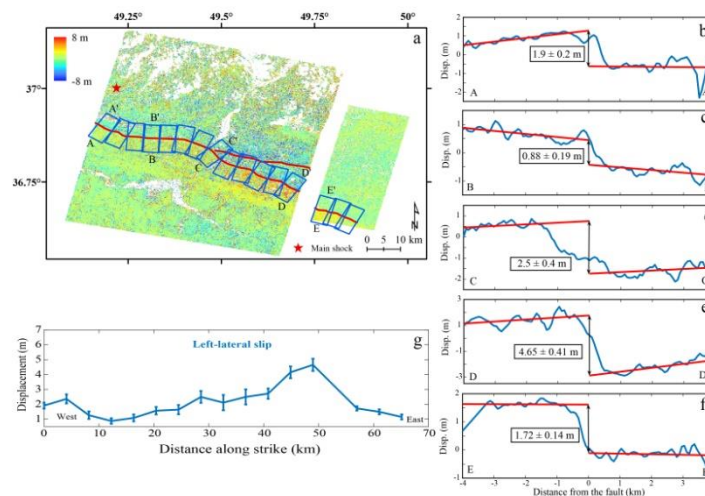
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The 1990 June 20th Rudbar earthquake (Mw 7.3) was a catastrophic event with ~15000 mortality, in Northern Iran. The event occurred before InSAR and GNSS eras. Moreover, due to dense vegetation and rough topography along the rupture plane, it was difficult to study the surface displacement along fault rupture. In this work, accessibility to the great archive of optical images (satellite imagery and aerial photo) motivated us to use Optical Image correlation technique to map variation of surface rupture and width of the accommodating shear zone along the Rudbar fault. Our results help to improve our Knowledge of variation of surface displacement along the Rudbar rupture plane and can provide critical information required to understand the variability of the recorded macroseismic damage in the earthquake-stricken region and also estimate the width of the shear zone along the rupture place required for seismic hazard map.



**Figure 1.** Ground displacement field obtained from SPOT images. (a) East-west displacement map. Red solid lines are the rupture traces extracted from OIC of SPOT images. The red star indicates the epicenter of the mainshock and the blue rectangles are stacked profiles illustrating offset in fault parallel direction. (b)-(f) show east-west displacements within four km wide swaths along profiles AA', BB', CC', DD', and EE'. (g) shows slip distribution along Rudbar rupture trace obtained from OIC of SPOT images. Vertical bars represent error in displacement measurement for each swath profile.

### Related Publications to the project: (Harvard format)

Ajorlou, N., Hollingsworth, J., Mousavi, Z., Ghods, A., Masoumi, Z., in preparation. Characterizing surface deformation in the 1990 Rudbar earthquake (Iran) using optical image processing.

### Conferences:

- Ajorlou, N., Hollingsworth, J., Mousavi, Z., Ghods, A., Masoumi, Z., (2019) Characterizing surface deformation in the 1990 Rudbar earthquake (Iran) using optical image correlation. Zanjan, Iran: 3<sup>rd</sup> TRIGGER International conference.
- Ajorlou, N., Hollingsworth, J., Mousavi, Z., Ghods, A., Masoumi, Z., (2019) Characterizing surface deformation in the 1990 Rudbar earthquake (Iran) using optical image correlation. Tehran, Iran: 8<sup>th</sup> International Conference on Seismology & Earthquake Engineering.