

Crustal Deformation of 2005 Northern Pakistan Earthquake Detected by SAR (2) SAR Image Matching and 3D Deformation Map

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A subpixel level offset estimation technique was applied to synthetic aperture radar (SAR) images of Northern Pakistan. Using ENVISAT SAR amplitude images acquired from ascending and descending orbits, we generated a map of three-dimensional displacement vectors showing ground deformation associated with the Northern Pakistan earthquake of 8 October 2005. We found the observed area with more than 1-m crustal deformation running on approx. 90-km in a strip-shaped in the northwest-southeast. The north Muzaffarabad, a heavily-damaged area, has the maximum deformation – approx. 6-m uplift. There are known active faults stretching between northwest and southeast near the epicenter, which reveal some uplift (on the northeast side) and dextral strike-slip activities. We found that the detected crustal deformation was along these active faults and both were consistent in their displacement directions. The facts showed that these active faults had moved.

Related reference:

Tobita, M., Murakami Mak, Nakagawa H., Yarai H., Fujiwara S., Rosen P. A. (2001), 3-D surface deformation of the 2000 Ussu eruption measured by matching of SAR images, *Geophys. Res. Lett.* Vol. 28 , No. 22 , 4291-4294.

