

THREE-DIMENSIONAL SURFACE DISPLACEMENT FIELD OF THE MW 7.6, 8 OCTOBER 2005, KASHMIR EARTHQUAKE INFERRED FROM ENVISAT SAR AMPLITUDE MEASUREMENTS

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Abstract: The 8 October 2005 Kashmir earthquake (Mw 7.6) occurred on the Muzaffarabad Fault, 95 km NNE of Islamabad, Pakistan. More than 79,000 people were killed, 83,000 injured, and 2.5 million left homeless. It is the largest event in the area over the past 100 years.

We use synthetic aperture radar (SAR) amplitude images acquired by the ASAR sensor aboard the European Space Agency's ENVISAT satellite to measure offset in the range and azimuth directions. The exact location of the earthquake fault can be clearly identified from the offset maps with an accuracy of a few hundred meters. The fault location is also consistent with the result of field investigations. With the offset maps derived from both ascending and descending pairs of SAR images, we create a complete 3-D surface displacement field of the Kashmir Earthquake.

With more SAR satellites to be launched in the next few years, especially constellations of these satellites, near real-time delivery of SAR-based results of epicenter location will be made possible. Such results can be effectively used to aid rescue and disaster mitigation operations. The current approach to locate the earthquake's epicenter is based on the difference of travel times between the P- and S-waves from seismograms of a network of seismic stations which is inaccurate due to uncertainties of three-dimensional velocity structure of the crust and hence travel speeds of the seismic waves.