The November 22, 1995, Mw = 7.2 Gulf of Elat (Aqaba) earthquake cycle revisited

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Abstract

The November 22, 1995, Mw=7.2 Nuweiba earthquake occurred along one of the left−stepping segments of the Dead Sea Transform (DST) in the Gulf of Elat (Aqaba). It was the largest earthquake along the DST in the last few centuries. The mainshock was preceded by earthquake swarms near both ends of its fault rupture and was followed by intense aftershock activity, concentrated mainly northwest and southeast of the NE−striking main rupture. Because the entire rupture was under the waters of the Gulf, surface observations related to the earthquake are limited to distances greater than 5 km away from the rupture zone. In this study we reanalyzed ERS−1 and ERS−2 data for the period spanning the earthquake and 5 postseismic years. Coseismic interferograms were made for intervals spanning the earthquake + 4 months, + 6 months, and earthquake + 5 years. Non−linear inversions were carried out for fault geometry and linear inversions were made for slip distribution using an ascending−descending 2−frame dataset. Error analysis shows tradeoffs among several fault parameters. The calculated moment of our best−fit model is in agreement with the seismological moment. The present model improves previous InSAR models of the Nuweiba earthquake, but differs significantly from recent teleseismic waveform inversion results. Future joint InSAR−seismology inversions may reduce the tradeoffs in the InSAR inversions and the discrepancy between InSAR and seismology. The magnitude of postseismic deformation in the first 2 years after the Nuweiba earthquake is about 15% of the coseismic deformation. Our models suggest that slip occurs along the lower part of the coseismic rupture. Localised deformation along the Gulf shores NW of the main rupture in the first 6 months after the earthquake is correlated with shallow M>4, D