



Strong motion analysis of the recent strong earthquakes in Iran: A case study for the 2002 Avaj, the 2003 Bam and the 2003 Firozabad Kojor earthquakes

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Three strong earthquakes occurred in Iran, which killed more than 35000 people and caused widespread damage. These earthquakes are the 2002 Avaj earthquake with magnitude MW 6.5, the 2003 Firozabad Kojor earthquake with magnitude MW 6.3 and the 2003 Bam earthquake with magnitude MW 6.5, which occurred in west, north of Tehran and SE of Kerman, respectively. The causative fault parameters of these earthquakes have been estimated using SH wave acceleration data. Maximum acceleration of 429 cm/sec² and 455 cm/sec² for the two horizontal components and 292 cm/sec² for vertical component were recorded at Avaj station for the 2002 Avaj earthquake. The fault plane solution for the Avaj earthquake shows reverse mechanism with left-lateral components dipping toward the southwest similar to the 1962 Buin Zahra earthquake and the solution given by HRV for the Avaj earthquake. It is observed that the peak ground acceleration decay with increasing distance up to 40 km. This observation indicates that at close distances, peak horizontal ground motions are controlled by direct upgoing shear waves. At distances 50 km to 60 km the peak ground acceleration is increased. As distance increases, the reflections of the shear wave from interfaces in the lower crust reach the critical angle and undergo total reflection.

The peak ground acceleration at Bam station were recorded as 775 and 623 cm/sec² for the east-west and north-south horizontal components, respectively, and 992 cm/sec² for the vertical component. Two strong phases of energy are seen on the accelerograms for the 2003 Bam earthquake. The first comprises of a starting sub-event with right-lateral strike slip mechanism and located south of Bam. The asperity corresponding to the second release of energy is interpreted to be released 8 sec after first sub-event. The mechanism of the second sub-event is reverse mechanism. A fast

attenuation of peak ground acceleration is observed for the Bam earthquake in this region. Maximum recorded acceleration for the 2003 Firozabad Kojor of 296 cm/sec² and 271 cm/sec² for the two horizontal components and 78 cm/sec² for vertical component were recorded at Poul station. This earthquake was strongly felt at Tehran. The focal mechanism of the 2003 Firozabad Kojor shows reverse mechanism with left-lateral component from analysis of SH wave acceleration data. This earthquake caused a lot of landslide.