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SEISMOTECTONIC AND CRUSTAL STRUCTURE IN THE CENTRAL IRAN

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Central Iran is one of the active seismotectonic provinces in the form of a triangle in the center of Iran. The northern border is the Alborz mountain range and the main Zagros fault in the southern border. For this reason, there are a large number of seismic networks in operation, and data from these networks can provide details of the crustal structure of the region. Local seismic activity has been monitored in the Central Iran. An earthquake recording network consisting of 31 stations seismic, 11 short periods and 20 broadband stations, was operated for 11 years from December 2006 to December 2017. During this period, the Central Iran area proved to be seismically active. Approximately five events per day were detected and found to be equally distributed over the upper crust. The hypocenter depth distribution shows surprisingly large depths of up to 60 km in the Southeast (Kerman) of the area. The epicenters are clustered and trace a linear structure lying N-S over a length of 20 km East of Central Iran. Hypocenters in the region of the earthquake cluster are shallow and exhibit a sharp cut-off at 10 km depth. A surface crack that occurred during the recording period is connected to the large earthquake.

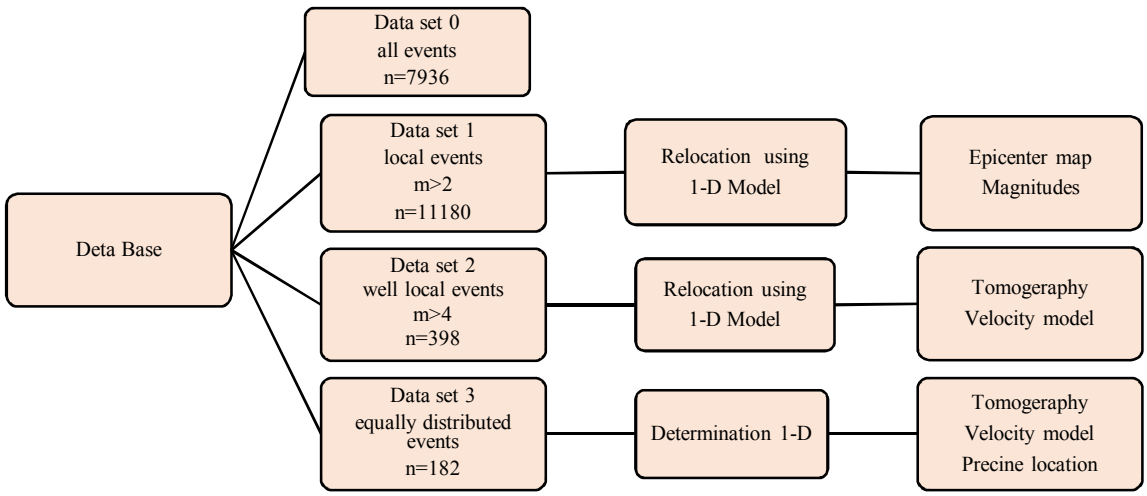

Figure 1. Flowchart showing data selection and processing steps. Data sets contain n events, recorded by m stations.

Location routines and tomography were performed using different subsets of the earthquake data, as shown in Figure 1. All events that were recorded by the network are represented in data set 0. Most of these 7936 events were not strong enough to be recorded by more than one or two of the nearest stations and are therefore not suitable for being located. 11180 local events that were recorded by more than two stations are contained in data set 1. Both P and S phases were picked for these events, followed by preliminary location. Events that were recorded by more than for stations and where the epicenters lie within the network were selected for data set 2. For these 398 events the azimuthal gap is mostly less than 180 and therefore they were regarded as well-located events. Approximately 60 percent of the events of data set 2 turned out to from a spatially concentrated earthquake cluster. Since, as is described later, the determination of an initial velocity model for the tomography requires an equally distributed set of earthquakes, another subset of events was selected in data set 3. Most of the cluster events were removed and 182 events of uniform distribution remained.

Analysis of the focal mechanisms of selected earthquake indicates predominantly strike-slip and trust faulting in response to an N-S directed shear stress filed. This direction corresponds to the general alignment of the northern most part of Central Iran and to the surface faulting pattern in east. The crustal structure of the area has been investigated using local earthquake two stations and tomography, the spatial distribution of hypocenters. The main result of the methods is a linear positive velocity anomaly following the ak135. The high velocities can be explained by material that has intruded into the upper crust. The negative anomaly is attributed to highly fractured rocks. Maximum hypocenter depths indicate a body of low shear strength central and a general deepening of the brittle-ductile shearition from east to west.

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