Accurate Location Of Hypocenters Using Double Difference And Active Fault Structures In Gökova Bay

Figen Eskiköy and Mustafa Aktar

Bogazici University, Kandilli Observatory and Earthquake Research Institute, Department of Geophysics, İstanbul, Turkey (figen.eskikoy@boun.edu.tr)

Double Difference Algorithm, HYPODD, is used for relocating the earthquakes in the Gökova Bay. The aim of this study is two folds: first we look for the best choice of inversion parameters which determine the performance of HYPODD at local scale, and second, as a by product of the test data used in the study, we determined the active faults in the Gökova Bay. We used four year (April 2006-December 2009) seismic earthquake recordings and relocated 972 events with magnitudes between 1.5 and 4.5.

The inversion part of HYPODD package can be run by using both catalog and cross-correlation data. In this study both methods were used. We have observed that correlation based inversion gives a better picture only if the events in the cluster are very close to each other (<3km). When stations are sufficiently high in number (>4 stations) and well scattered around the seismic zone at moderate distances (i.e. <60 km), we observed that the performance is high, and do not critically depends on the control parameters. The improvement in using hypoDD and in particular correlation based applications is mostly apparent when depth sections are analyzed. The other important observation is that the choice parameters and therefore the final performance entirely depend on the geometry and the distance of event pairs. The parameters MAXSEP, MINLNK, MINOBS are very critical and a conservative selection of these parameters will lead to a drastic reduction of the data set. Separating the data into clusters or not is a matter which entirely depends on the data. If data shows isolated clusters with distinct character each, it would be unrealistic to use a single set of control parameters for all of them, and clustering is recommended.

In term of active fault geometry of the faults in Gökova, it is clear that an offshore fault parallel to the northern boundary is well confirmed. The fault extends from midway between Ören and Çökertme to land close to Akyazı, roughly 27°45'W to 28°20'W. The depth section of this fault is vertical in the central part, but shows a possible south dipping in the east. At the western end the fault shows a change in strike and turns south with a strike direction of roughly 36°. This fault continues to 36°45'N, midway between Cos Islands and Datça Peninsula.