Discrepancy in Earthquake Location in Turkey between KOERI and ISC

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Kandilli Observatory and Earthquake Research Institute (KOERI) has been monitoring seismic activity in Turkey since 1926 and has about 60 seismic stations distributed throughout the country. KOERI is charged with detection and location of earthquakes as rapidly and accurately as possible to inform the government agencies and public information centres 24 hours a day.

The International Seismological Centre (ISC) is responsible for the maintaining a global bulletin of seismic events using data of many observatories and data centres. The ISC normally publishes the results of the analysis within two years after an event.

We have compared both KOERI and ISC bulletins for the last 5 complete years of ISC analysis, 1996-2001. We have first considered events which were located by both institutions. It appears that about 80 percent of the epicentres are within 20 km of each other and most of location discrepancies are within the limits of location uncertainties. The descrepacies generally become larger as we move from the Western part of the country to the East. This is because the majority of KOERI network is placed in the Western Turkey and data exchange with other institutions in the country is limited. The ISC has advantage of ocasional use of station reports from other institutions in Turkey. Also the ISC has an access to the station reports from neighbouring countries as far as larger magnitude events are concerned. As a result we have found a number of events in the area which were reported by the ISC but not by the KOERI. Both KOERI and ISC should be able to improve their location capabilities as a result of using additional data from observatories in Eastern Turkey. These may possibly come from Earthquake Research Department, Directorate of Disaster Affairs of the Ministry of Public Works and Settlement (ERD) and Erzurum Ataturk University.

Starting with year 2001 the ISC has considerably changed it's procedures by starting to use S-wave arrival times in location. We have studied the impact of this change on the quality of ISC locations in Turkey trying to use KOERI location as some kind of a ground truth. We have found that the scatter in the ISC depth determination was reduced for the first months of 2001 as compared to the last months of 2000. We have received a similar result relocating the aftershock secuence in Western Turkey following the event on 17 August 1999 using P and S arrival times. The KOERI hypocentres are always fixed at 5 or 10 km, so it is quite possible that in these circumstances the ISC depth became superior to the KOERI depth as a result of using secondary phase arrivals for location at the ISC.