

COMPARISONS BETWEEN LOCATION FEATURES OF ISC(USING JB & AK135 MODELS) AND IRSC FOR SEISMIC EVENTS IN IRAN



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Introduction

The location procedures of seismic events are influenced by two major classes of errors, the error in picking individual seismic phases and modeling error due to the departure of real earth from the reference model used in location.

Changing the network geometry and coverage quality of stations is very important in location procedures. Routine teleseismic locations are usually in error due to inadequate station coverage, systematic and random reading errors and bias due to difference between real earth and the Earth model used in the location.

These routine locations can be refined, using reliable input data, improved procedure and comparisons between local locations. In this study, we reassess the occurred earthquakes in Iran during 3 months from August through October 2004.

These earthquakes have also located by international agencies such as International Seismological Center (ISC) with different earth models (J-B and AK135). Our principle researches are about location discrepancy between ISC (AK135 & J-B) and Iranian Seismological Center (IRSC) locations (Figure 1).

In this paper, we re-read the arrival times of 44 earthquakes which is located by IRSC, then relocated them by DAN software. These locations have checked by HypoDD technique.

Our reassessments indicate that the picking errors are significantly smaller than the difference between the locations found from difference velocity-model errors.

In addition, for events in south of Iran, because of that we don't have enough stations to control this region, hypocenters or epicenters are extremely unstable and drawn toward north-west in comparison with ISC locations. Of the depths, we can say that our multiple local and regional arrivals of P give a relatively good estimation of depths; also the depths of earthquakes with regard to main characteristics of seismic province could be resolved accurately.

Discussion and Conclusions

In our opinions, because of the poor coverage and the concentration of many of our stations have little control on events occurred in south of Iran, we show systematic errors between IRSC and ISC locations. Epicenters located by local networks have moved toward north-west. This effect is only seen for south Iran earthquakes. In the other positions, we didn't show any systematic bias between ISC (AK135 & J-B) and IRSC locations but little discrepancy. On the other hand, our results show that correlations of the longitudes determined by ISC (AK135) and IRSC are better than those for latitudes. Also, correlations of the longitudes determined by ISC (J-B) and IRSC are better than those for latitudes. (Figure2 & Table 1)

The use of a 1D velocity model for the calculation of travel times can also lead to a magnitude dependence of hypocenters, significantly in regions where there are noticeable lateral velocity variations. Because the number of reading stations varies with the magnitude of events, our results showed that at high magnitudes the differences between IRSC and ISC locations reduced and there is a little discrepancy between them.

As a consequence, our findings showed no significant bias or systematic errors between IRSC and ISC locations except for south of Iran. Seemingly, it is necessary that we must have enough stations at almost all of azimuths to counteract systematic errors. On the other hand, we must assessed biases and systematic errors due to the Earth model with regard to the main characteristics of seismic provinces. Also, we proposed that the accuracy of 1D Earth model assessed by magnitude dependence.

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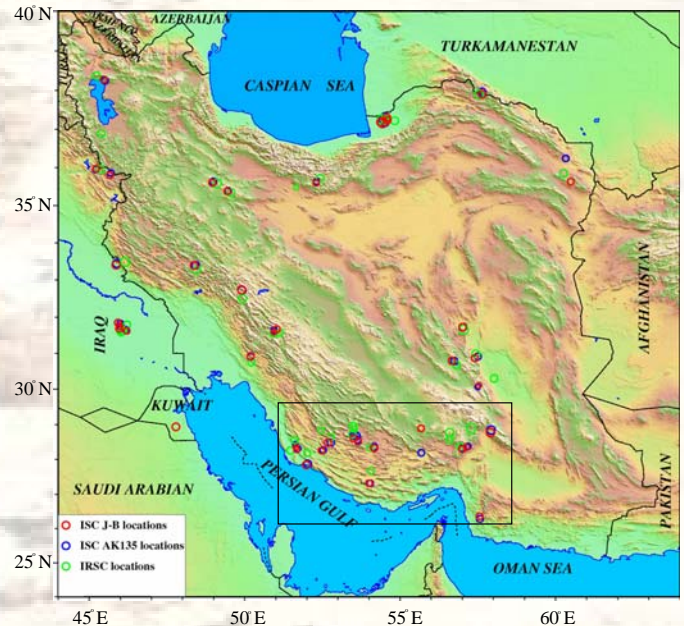


Figure1. Locations of 44 events occurred in Iran. Green, blue and red circles show locations determined by IRSC, ISC(AK135) and ISC(J-B), respectively.

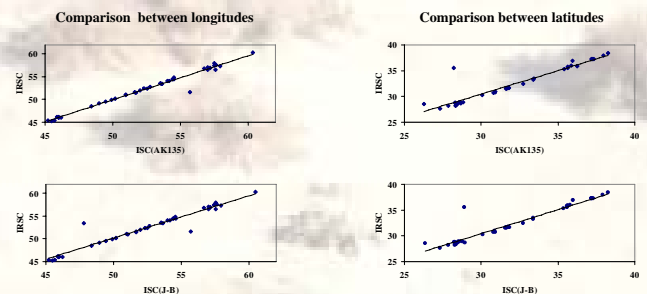


Figure2. Comparison between longitude and latitudes of IRSC & ISC locations.

Table1. Pearson coefficients for correlation of locations.

Pearson coefficients for correlation of latitudes

	ISC(AK135)	ISC(J-B)	IRSC
ISC(AK135)	1	0.999	0.942
ISC(J-B)	0.999	1	0.952
IRSC	0.942	0.952	1

Pearson coefficients for correlation of longitudes

	ISC(AK135)	ISC(J-B)	IRSC
ISC(AK135)	1	0.978	0.988
ISC(J-B)	0.978	1	0.965
IRSC	0.988	0.965	1

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