Comparison of hypocenters determined using Jeffreys-Bullen and AK135 velocity models for Earthquakes in Japan

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Conclusions: The comparison shows that the AK135 velocity model will provide us with more accurate hypocenters than JB model in and around Japan because the former generally provides hypocenters closer to those of JMA obtained from local dense Seismometers Network and local velocity model that is preferable for the area in and around Japan; the difference between AK135 and JB is very slight, though.

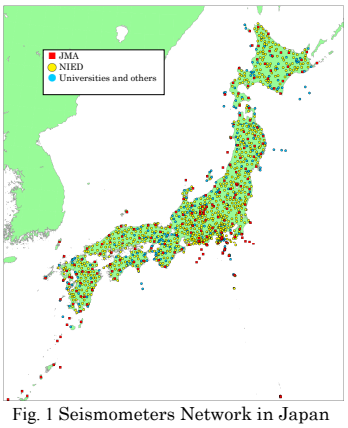

Fig. 1 Seismometers Network in Japan

Local dense seismic observation networks in Japan

In Japan, routine locations of seismic events are conducted by JMA with its local JMA velocity model, using waveform data coming not only from the JMA seismic network but also from the network, called Hi-net, managed by NIED** and the one done by universities and others. Data coming from around 1200 stations (See Fig.1) are used for the locations; as the results, average distance between the stations in Japan is around 20 km. The hypocenters, called "JMA hypocenters***", obtained from the routine locations are used for the comparison here.

We compare hypocenters calculated by ISC using Jeffreys-Bullen (JB) and AK135 velocity models with JMA hypocenters of the events from 01Jan until 31Oct, 2004, in and around Japanese main islands area; the number of events used in the present study is around 1200 (See Fig. 2.1) and around 450 (See Fig. 2.2) for "those shallower than and equal to 100km" and "those deeper than 50km (until 700km depth) respectively. We will be able to assume that JMA hypocenters should be a sort of ground truth because the hypocenters must be the best ones for the area in and around Japan; particularly those of events occurring in inland area should be actual ground truth.

We find followings through the comparison: (1) The differences of focal depths between JMA and AK135 or JB are generally less than several km (See Fig 3.1 and 3.2, and Fig 4), (2) Regarding events located in and around Hokkaido through Kanto (northern and central regions in the Japanese main islands area including Tohoku area), although the difference is slight, JMA hypocenters are generally closer to those obtained from AK135 than those from JB (See Fig 4), (3) Focal depths calculated from AK135 are generally shallower than those from JB (See Fig 4).

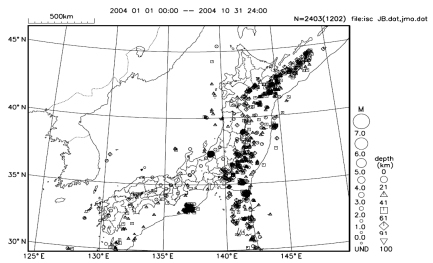

Fig. 2.1 Events (depth 0km-100km) comparison between JB (symbol-mark) and JMA (tip of arrow)

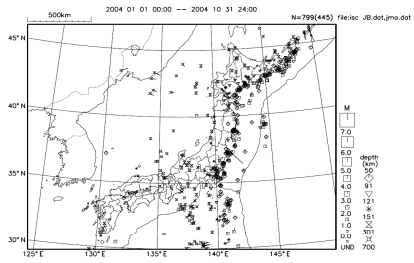

Fig. 2.2 Events (depth 50km-700km) comparison between JB (symbol-mark) and JMA (tip of arrow)

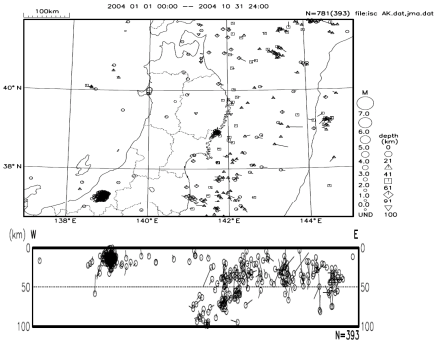

Fig 3.1 Events (Tohoku area; depth 0km-100km) comparison between AK135 (symbol-mark) and JMA (tip of arrow). Bottom shows transection.

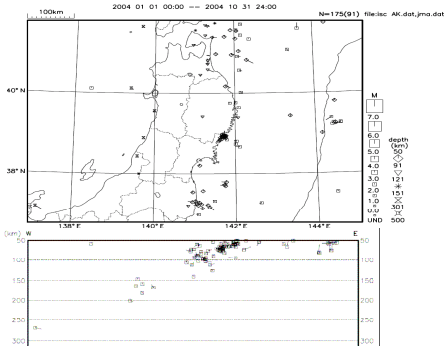

Fig 3.2 Events (Tohoku area; depth 50km-700km) comparison between AK135 (symbol-mark) and JMA (tip of arrow). Bottom shows transection.

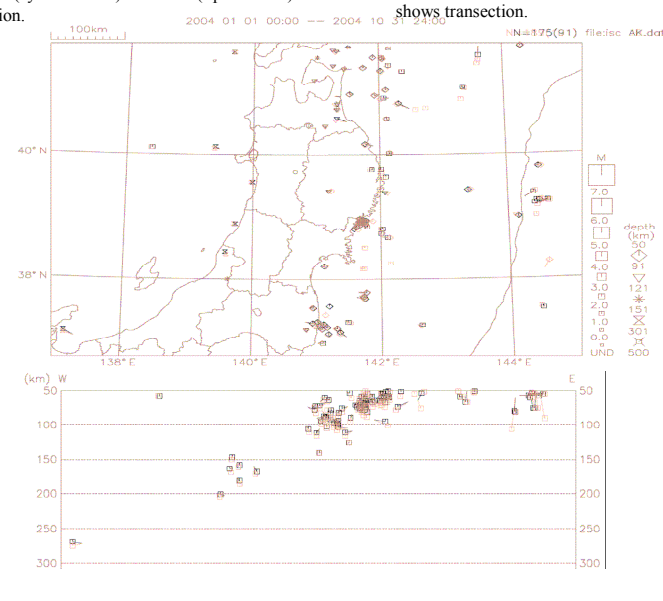

Fig. 4 Events (Tohoku area; depth 50km-500km) comparison between JB (red symbol mark), AK135 (black symbol mark) and JMA(tip of arrow) . Bottom shows transection.

N.B.*:The author should give the presentation; hence any inquiries about the contents in this poster should be sent to him, smori@mri-jma.go.jp.

N.B.**:NIED stands for National Research Institute of Earth Science and Disaster Prevention.

N.B.***:In Japan the "JMA hypocenters" are especially called Ichigenka-Shingen according to a contributors' agreement.