

## Improvement of the JMA's hypocenter determination program

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Seismic stations of the integrated seismic network of Japan are in the elevation range from -4000 to 2000m. However, station elevation is ignored in a calculating traveltimes and partial derivatives of travel time with respect to hypocentral coordinates in the Japan Meteorological Agency's (JMA's) hypocenter determination program. The traveltimes in the program is based on the condition that station elevation is fixed to 0m. Further, sedimentary layer with extremely low seismic velocity under OBS station affects a traveltimes at OBS station. But the effects of it on OBS stations are neglected. Therefore, hypocenters in the JMA's seismic catalogue (the JMA's catalogue) have an absolute error which is caused by station elevation and sedimentary layer under OBS stations.

Considering station elevation and station correction for OBS, we have improved the JMA's hypocenter determination program without significantly changing algorithm. In the new program, traveltimes tables of each station elevation are used. Each traveltimes in these tables was calculated by Pseudo-bending method [Um and Thurber (1987)] and seismic velocity structure of JMA2001 [Ueno et al. (2002)]. In order to shorten the processing time of calculation, these tables are stored in the memory of a server in advance. The values of station correction at each OBS station were estimated from one-dimensional seismic velocity model and arrival time differences between P and PS wave converted from P wave at the base of sedimentary layer. These values are stored in the memory, too.

We calculated hypocenters listed in the JMA's catalogue using the new program. One in the border region of Nagano and Gifu Prefecture where stations are at higher area above sea level, new hypocenters became shallower, the other in the Kanto Plain where most of stations are at around and below sea level, new hypocenters became deeper than that of the JMA's catalogue. Around the Sanriku-oki OBS stations, hypocenters became shallower than that of the JMA's catalogue.

The absolute error caused by station elevation and sedimentary layer can be reduced by using the new program. Further, it is expected that hypocenters around offshore region under OBS stations are made more accurate, too.