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STT055-P03 Room:Convention Hall Time:May 27 10:30-13:00

Automatic Hypocenter Determination in Swarms and Aftershocks

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It is very important to estimate the spatial and temporal hypocenter distributions in swarms and aftershocks quickly. We need the automatic determination to grasp seismic activities in real time, because the manual hypocenter determination takes a lot of times.

JMA can usually determine 90% or more hypocenters automatically compared with JMA catalog (M >= 2.0). However they fall to 20-30% in swarms and aftershocks due to the rise of a trigger level and wrong pickings. Therefore, we applied an efficient automatic hypocenter determination method (Sakai, 1998) in swarms and aftershocks.

The method is as follows. In a swarm, hypocenters are close to each other, so the differences of the arrival times between stations would be also close to each other. Therefore, he referred to some hypocenters (we named them the reference events) determined by manual picking, shifted the observed waves by the differences of the arrival times and stacked the waves to detect events efficiently.

We applied that method for some swarms and aftershocks, including the case off the east coast of Izu Peninsula in December, 2009, the case of western Fukushima Prefecture in September, 2010 and the case of the Iwate-Miyagi Nairiku Earthquake in 2008.

In the case off the east coast of Izu Peninsula, we could grasp that the seismic activity became shallower and the number of events was increased before the first large event. However, in the case of aftershocks of the Iwate-Miyagi Nairiku Earthquake in 2008, the aftershock area was estimated obscurely because it was so large and some aftershocks were far away from the reference event. In order to solve the problem, we set some reference events. It might perform well, but we don’t know where the reference events should be set in real time. We still have some problems, such as the parameter settings of the trigger and the picking.

References: Sakai, 1998, Abstr. of SSJ 1998 Fall Meeting, 140.