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Absolute and Relative Location at the IDC: Five DPRK Events

The International Data Centre (IDC) estimates absolute location of seismic events in routine processing. The final solution is obtained in interactive analysis and includes geographical coordinates of the epicenter and depth estimate. All estimated values are characterized by uncertainties, which correspond to measurement and modelling errors of arrival times at associated seismic stations of the International Monitoring System (IMS). In the IDC, the final position of an event hypothesis depends on modelling errors and is less sensitive to measurement errors. Both errors can be significantly decreased for relative estimation of arrival and travel time. Waveform cross correlation can improve the accuracy of arrival time estimate to a fraction time step. Spatial closeness of several events allows replacement of theoretical travel times with empirical ones. Therefore, one can accurately estimate their relative location. The procedure of relative location has been applied to five DPRK tests. Using various combinations of stations (e.g. all associated IMS stations, only regional, only teleseismic stations) we have studied the change in relative locations and selected best station subsets for pairwise and joint determination of relative coordinates. The IDC absolute solutions with their confidence ellipses are compared with relative location.

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