

Automatic Association at the ISC

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Each year, the ISC receives two million readings from more than 2000 stations and nearly 200,000 preliminary event locations from dozens of agencies. The number of data in the Bulletin has increased many-fold since the ISC began operations, and programs now in use produce at least one misassociation in most events. The common causes for misassociations include readings from unreported events, gross errors in preliminary hypocentres, large lateral velocity variations, and readings with initial phases excluded from the Jeffreys-Bullen tables. Sometimes a reading simply fits the expected arrival time from a small distant earthquake better than the expected time from an approximately located nearby hypocentre.

We plan to change the association process used at the ISC. We want to reduce the number of misassociations, use more data reported to the ISC, be flexible, rank alternative associations, and not associate a reading when no fit is good. We will define misassociations as departures from associations made by ISC seismologists preparing past Bulletins. Additional data to consider include reported associations and phase identifications, reporting patterns (e.g., some stations report readings only from local earthquakes), and measurements such as S-P time, slowness and azimuth. Flexibility will allow us to improve the performance of the association algorithm, for example by changing the weight given to each type of data, perhaps on a station-by-station basis. When a seismologist finds a misassociation, ranked alternatives could be used to suggest other possibilities.