

Evidence: The Non-Use of Non-Detections in IDC Seismic Data Processing

The location of a seismic event using globally recorded P-wave signals presupposes that the signals have been correctly associated to each event in a multi-event environment. Incorrect association of signals is a major cause of mislocated events and of 'invalid' event hypotheses comprising a mixture of signals from different real events. In this context negative evidence includes the non-observation of a signal where one is expected according to the event location hypothesis. Although IDC network processing utilizes the probability of detection at each station as one criterion for acceptance or rejection of an event hypothesis, negative evidence is not used optimally. Reliable differentiation between the absence of a signal, the absence of data, or a malfunctioning acquisition system at the onset time of interest is one problem, although developments in the continuous measurement of data quality provide a way to address this. It is argued that negative evidence could and should be used to greater effect, and possibilities are presented. One approach, not currently envisaged in the IDC re-engineering project, is to use non-detections (identified either automatically or by an analyst) as additional 'signals' in the event building process. Another is to assign 'expected stations' based on historical data.

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