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Quantitative Assessment of the Detection Performance of Global Association Algorithms

The seismic network of the International Monitoring System (IMS) operated by CTBTO detects signals that may originate from natural or anthropogenic sources. These signals are processed in the International Data Centre (IDC) of CTBTO to produce bulletins that provide lists of events hypothesised as being the sources of the signals. To do this, observations of signal properties such as arrival time, seismic phase, azimuth and slowness must be converted into the latitudes, longitudes, depths and times of generating events. This process is referred to as "global association". As part of its remit, the Provisional Technical Secretariat (PTS) of CTBTO carries out studies to assess the performance of global association algorithms. This involves consideration both of the level of detection and the number of false associations produced by algorithms. A method is demonstrated by which algorithm performance is quantified and displayed in a format that allows algorithm strengths and weaknesses to be illustrated. This method has application both to the assessment of current methods and to the quantification of benefits that might be obtained by the adoption of new association algorithms. The views expressed are those of the authors and do not necessarily reflect the view of CTBTO Preparatory Commission.

Primary author: PRIOR, Mark Kevan (Comprehensive Nuclear-Test-Ban Treaty Organization)

Presenter: PRIOR, Mark Kevan (Comprehensive Nuclear-Test-Ban Treaty Organization)

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