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Accurate or Fuzzy Arrival Onset Time Determination – Which Is More Adequate?

Event location is one of the main products of the CTBT verification regime. The first analysis step is to scan the time series at each station for the existence of relevant information and to determine when it arrived. The location and time of the generating event are estimated by solving an inverse problem based on the set of arrival times at the different stations. The location accuracy depends on the accuracy of the onset times, which in turn depends on the signal to noise ratio and the nature of the arrival: emergent or implosive. In this work we suggest that the analyst should declare the earliest and latest possible arrival time and then sample the onset time using a distribution on that time segment. With each new sample, the solution is computed to the inverse problem. This generates a collection of solutions that can be used to compute the error region associated with the location. The advantages of this method are that it simplifies the analysis, it finds the error region as a neutral outcome of the method and it more faithfully represents what analysts believe about their ability to pick the true arrival time.

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