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Use of CTBTO Teleseismic Data Analysis to Improve Moderate Earthquake's Depth Estimations: Examples of Application

The depth of moderate events (M<5.5) is difficult to estimate using regional datasets in poorly instrumented areas. Focal depths should be better constrained by teleseismic data but, in practice, for such small magnitude, the weak signal to noise ratio reduces the range of use; depth estimation remains challenging. However, nowadays, with access to the data of the CTBTO monitoring system, smaller events can be detected and analyzed. Hence, we have investigated here the possibility to estimate the depths for moderate magnitudes (M<5.5 and M>3.5) from teleseismic data. Facing new problems (high frequency contents, weak signal to noise ratios, few recordings), two methods have been developed. First, a depth-phase recognition method based on a new improved cepstral analysis is developed. In addition to this approach, we have developed a focal mechanism inversion which focuses on depth resolution through an envelope-fitting procedure, and adapted genetic algorithm. A selection of events has been treated which allows to validate the methodology. This study shows that these two methods developed here provide a complementary approach to constrain the depth for moderate magnitude events. This new vision of depth estimation based on CTBTO arrays will help to renew our vision of the seismo-tectonic.

Primary author: LETORT, Jean (CEA - Grenoble University)

Presenter: LETORT, Jean (CEA - Grenoble University)

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