



## **Improving the quality of azimuth estimation in automatic polarization analysis at CTBTO/IDC**

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Azimuth values for seismic arrivals play a key role in network processing at the International Data Centre (IDC) of the Comprehensive Nuclear-Test-Ban Treaty Organization (CTBTO). Inaccurate estimates of azimuth degrade the performance of the automated processing, resulting in false associations, larger errors in event location and more false events. Improving the accuracy of automatic azimuth estimation will enhance the quality of automatic network processing at the IDC.

Azimuth is often poorly estimated for three-component stations used at the IDC, especially for weak signals. In the IDC automatic processing, polarization analysis is conducted in a fixed frequency band of 1 - 4 Hz for all three-component stations. For detected signals with energy only covering a narrow frequency band, this relatively broad band can result in sub-optimal polarization results, i.e. poor azimuth and slowness estimation. In addition, some regional signals are located in a higher frequency band (> 4 Hz). This fixed band can even cause azimuth and slowness to be estimated for the wrong signal or noise.

In this work, polarization analysis was performed in the frequency band, in which the signal was detected. Initial testing, for selected primary 3-component stations, shows positive results: the estimated azimuth is significantly improved, based on the comparison to analyst-reviewed values in the REB (Reviewed Event Bulletin).