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Waveform Data Quality

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The Comprehensive Nuclear Test Ban Treaty Organization (CTBTO) is tasked with monitoring compliance with the CTBT. In order to fulfill this mission, the CTBTO is building the International Monitoring System (IMS), which includes seismic, hydroacoustic, and infrasound stations which must meet stringent data availability, timeliness, and quality requirements. Each station sends waveform data to the International Data Centre (IDC) in Vienna, where the data are processed and reviewed. In order to ensure high quality data and products, the quality of the waveform data from the IMS network must be measured and reported. Corrective actions are taken when quality deteriorates, so timely reporting is important.
The first step in assessing waveform data quality is to separate useless data from data which may contain useful information. Useless data are defined as periods when no data are reported (data gaps), periods when several adjacent data samples contain the same value (constant data), and periods when there is no sensor input. Useless data cannot be used for analysis, and consequently are excluded from data availability calculations.
The quality of waveform data can be assessed in many ways, including the following. The data stream from the station contains a status field which reports information on the waveform data, the equipment, and timing. The distribution of power spectral density can be assessed to determine when waveform data become abnormal. When a detection is declared at an array, the similarity of waveforms at each element of the array can be assessed to determine anomalous array elements. Ongoing activities in these areas will be presented.