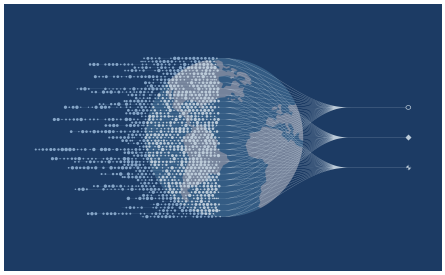

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and Quality Control in the Design and Manufacture of Seismic Instrumentation

Broadband seismometry is a foundational instrumentation technology enabling measurements of seismicity for test ban treaty verification. Seismic monitoring networks typically comprise many stations distributed geographically on the Earth's surface or seafloor. Seismic station data used for test ban treaty monitoring purposes must be trustworthy, meaningful and reliable. The seismic instruments employed must be sufficiently and confirmably accurate, precise and dependable. Calibration and verification of seismic instrumentation in the manufacturing process are key elements in establishing accuracy with sufficient precision. We discuss several related considerations that arise when designing and manufacturing the seismometers and digitizers that are at the heart of seismic stations: The distinct nature and value of accuracy and precision of seismic instrumentation. How accurate and precise is good enough, or too much? Accuracy vs precision in manufacturing. Alternative calibration methodologies and approaches in manufacturing. How uncertainties arise and their impact on accuracy and precision. Traceability to SI standards in factory certification processes. Metrics to consider: sensitivity, transfer function, timing, calibrator features, alignment, etc. Lastly, we discuss why instrument accuracy and precision are necessary but not sufficient, and some calibration techniques users may employ in the lab or in the field.

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