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calibration of seismic instruments

Initial calibration can be done in a laboratory using specialized test equipment, but to check calibration of instruments over their lifetime in the field requires different processes. We discuss two particular challenges: site response and temperature sensitivity.

A method for field calibration with respect to a portable reference sensor has been demonstrated by Michaela Schwaradt. This works well when sensors can be co-located. However for borehole stations where the reference is at the surface, the difference in site response with depth must be taken into account. One solution is to install a permanent reference sensor downhole, co-located with the primary sensor. This has already been done (although for a different reason) in borehole networks that include both strong and weak-motion sensors downhole. We present data from the Taiwan DSO Network showing high coherence for pairs of downhole instruments.

Temperature dependence of instrument sensitivity was recently highlighted in two presentations at AGU 2024 (Slad; Shimoda). This is attributable to temperature dependence of permanent magnets used in force-feedback seismic sensors. This small effect can be characterized, and corrected if desired by periodically updating sensitivity metadata, using modern seismic sensors that include an internal temperature reporting capability.

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