ID: Type: **Oral**

calibration for infrasound sensors

Complex frequency response is a critical function in understanding the impact of a transducer on a measurement. For an acoustic transducer, a single volts-per-pascal value is often cited as the response; however, the magnitude and phase of this ratio over the entire frequency range of interest is required to understand the effects of that transducer on broadband waveforms. While this ratio can be determined by comparison to a reference transducer, any reference must itself be calibrated. Reciprocity calibration is a well-established calibration technique that does not require a pre-calibrated acoustic reference. In its most general form, reciprocity requires two transducers in addition to the sensor being calibrated; however, the responses of these transducers do not need to be known. For the cases discussed in this paper, two moving-coil loudspeakers attached to a closed volume are used and the dominant sources of uncertainty are described. Furthermore, having two drivers makes possible two-tone tests of microbarometer linearity. This paper describes development, evaluation, and uncertainty analysis of a reciprocity-based calibration procedure designed expressly for measuring the complex frequency response of infrasound sensors in the International Monitoring System infrasound band.

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Track Classification: Station engineering and performance