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# and Modeling of Timing Errors at Seismic Arrays

*Tuesday, 20 June 2023 17:40 (15 minutes)*

Accurate timing is both an essential requirement and a perennial problem for seismology. With the adoption of satellite based global positioning systems for the timestamping of data in the 1990s, this problem appeared to have been solved. I have applied multichannel cross-correlation (VanDecar & Crosson, 1990) to recordings of teleseisms across seismic arrays, to estimate the relative timing error between array elements. At the Yellowknife seismological array, timing errors are observed at some array elements, up to a maximum of 0.4 s, while others exhibit no apparent timing errors. The relative timing errors between 2014 and 2020 are quantized, with a base value of approximately 0.12 s. The time period can be divided into two eras; within each era the timing error only increases. The cause of the timing errors is unknown, but the quantization is inconsistent with what is expected for a free running clock, and no timing errors have been observed since a digitizer firmware upgrade on 8 April 2020. A model is developed for the absolute timing errors, one which can be applied to historical data. It is recommended that timing error checks be done at other International Monitoring System arrays.

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## Promotional text

If you thought GPS solved the problem of timing for seismograph networks, think again. In this talk I introduce a method for the detection of relative timing errors and use it to demonstrate and model persistent timing errors at IMS arrays.

## Oral preference format

in-person

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