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Multiple, Concurrent GPR Data Acquisition - The WARR Machine

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Summary

GPR WARR (wide angle reflection and refraction) and the closely related CMP (common-mid-point) soundings have been a standard survey method since GPR first existed. Earliest efforts demonstrated the variation in ice sheet velocity versus depth. While a valuable survey method, the technique has seen little adoption.

Unlike seismic, commercial GPR systems with multiple concurrent data acquisition receivers have not existed. Multiple offset GPR data had to be acquired using a single transmitting and receiving antenna pair moved to the desired offset sequentially. With the recent advances in GPR timing and control technology, modern instrumentation with multiple concurrent sampling receivers enables continuous, rapid acquisition of WARR data. Two dimensional reflection surveys (i.e., simple, common offset profiles in the past) can now rapidly yield a multi-offset sounding at each recording station, providing WARR profiling at the same speed as a standard, single fold GPR sounding.

We have recently developed the first embodiment of a GPR WARR system called the WARR machine. We have dealt with design and implementation challenges as well as the concomitant issues of dealing with large volumes of WARR data. The key conclusions derived from the initial in-field deployments are that the approach is now viable, timing stability in distributed units is sufficiently reliable for multi-channel data to be merged, and that standardized work flow coupled to data processing is essential for the method to see broad adoption.

Multiple, concurrent GPR data acquisition: The WARR Machine

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