Priddis experiment

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Abstract

A 3C seismic experiment was conducted at the Priddis test site in June of 2016. 3C geophones down test hole Number One were used for recording along with surface receivers. Two receiver lines (Lines 1 and 3) were laid out with one towards the North and one towards the East with a receiver spacing of five metres. A grid of nodal seismic receivers was laid out between the two lines. All nodal receivers had a spacing of twenty metres.

Several source lines were used with this experiment. Two lines coincided with the two receiver lines that were laid out to the North and East from the test hole while a third was shot in between these two, all with a spacing of five metres. There were also three source lines laid out in a quarter circle between receiver lines one and three with radii of ten metres, twenty metres and thirty metres.

Data

We binned the data as a 3D survey and processed the data through to stack even though the survey was designed for instrument tests rather than seismic imaging. We picked first breaks and performed refraction static analysis. Keeping a constant near-surface low velocity of 600 m/s, the solution produced a depth to the refractor and a refractor velocity at each shot point and receiver location. Figure 10 shows the velocities overlain on the contoured refractor depths.

The stacked line is shown in Figure 11. Dipping events can be seen in the top 200 ms (indicated by the yellow oval), and flat events at 1.0 s. This relates well to the structure observed on other data from this study area. The line is too short to be migrated.

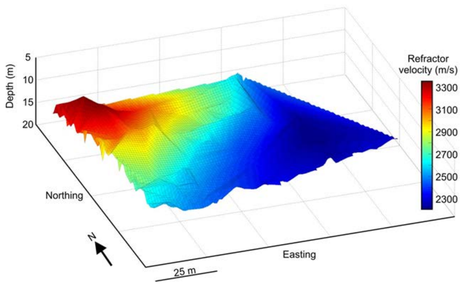

FIG. 10. Binned data.

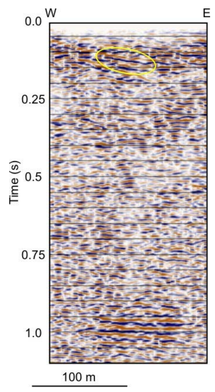

FIG. 11. Stacked data.

Receivers

The test hole that we were using for this experiment has Weir-Jones 3C geophones permanently installed around the outside of the casing. These geophones can be recorded using a 1C Aries system by means of adapter boards built by Malcolm Bertram.

The cabled surface spread consisted of the newly acquired 3C Aries RAMs.

The Hawk nodal system was set up by Inova Geophysical as they wanted to test new firmware and software. As such the Hawk units that were used belong to Inova. However the batteries and geophones belong to the Seismic Group. Inova brought a recorder with the Hawk control system for this survey.

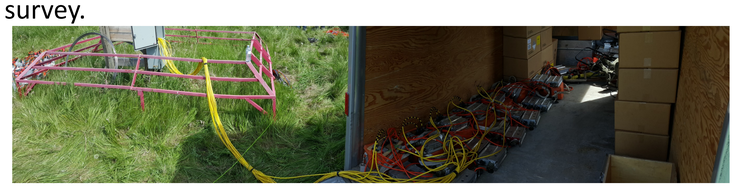

FIG. 1. Weir-Jones to Aries 1C adapters.

FIG. 2. Students planting Aries 3C.

FIG. 3. 3C Geophone.

FIG. 4. Inova Geophysical Hawk nodal system.

Sources

FIG. 5. IVI Envirovibe (sweep 10-200Hz over 16 seconds, two sweeps per source point).

FIG. 6. Shear wave thumper.

New thumper controller

A new wireless thumper controller was custom built to control the shear wave thumper. The proof of concept was tested successfully here. There are many improvements that need to be made regarding control and safety.

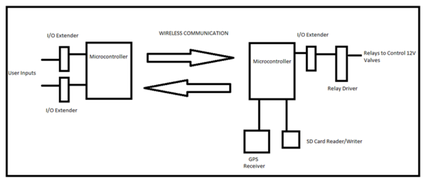

FIG. 7. Wireless thumper controller concept.

FIG. 8. Prototype control box.

FIG. 9. Operating thumper from a distance.

Acknowledgements

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