

Active Seismic Measurements on the Totten Glacier

Active source measurement were made on the Totten Glacier and the Totten Ice Shelf to better constrain water column thickness and ice column properties as part of a project supported by the University of Tasmania, the Antarctic Gateway Partnership, and the Australian Antarctic Division.

Field Work and Location:

The active source seismic component of the project took place on the Totten Glacier during two field seasons conducted between December and February of 2017/18 and 2018/19 (Figure 1 and table 1).

Field Equipment and Procedures:

Datalogger: All data during both field seasons was acquired with one or two Geometrics Geodes supplied by Central Washington University.

Geophones and Cables: 40 Hz geophones from Central Washington University were used for all surveys. Geophones were typically planted in holes ~1 meter below the surface and then covered with snow. We utilized 4 120-meter cables that had takeouts every 10 provided by the Central Washington University. For far offset hammer sources (~230 meter) during the first season we used a Seismic Source Company Wireless Trigger Box provided by the IRIS PASSCAL Instrument center.

Source:

2017/18 Season: We utilized a hammer and steel plate. To generate shear sources we dug a small hole and placed the steel plate approximately vertical (Figure 2).

2018/19 Season: The sources were 6 150g RioBoosters detonated with an electric detonator using a Geometrics HVB-1 seismic timer connected to the Geode. Explosives were placed in shallow holes (~1.5 meters)

Geometry: All data was collected in linear profiles.

2017/18: A 24 channel spread was laid out at the survey location. For each experiment the cable remained stationary while the source was moved away relative to the first geophone. Far offset source were made using the wireless trigger box. At several location measurements were made with the cable laid out both perpendicular as well as parallel to ice flow. **PLEASE NOTE** that due to constraints on time and logistics the distance to all far offset shots is approximate and will need to be adjusted using travel times from the near offset (i.e. < 10meters) shots.

2018/19: A 24 channel spread was laid out at the survey location (typically parallel to flow) and a single shot was recorded. At site S02 measurements were made in both orientations.

Additionally, a short reflection profile was made at site TI08. The geometry is attached in the logbook as well as in the segy header files.

Files Descriptions:

ti01_1718.segy-all data for ti01 in 2017/18 season.

ti02_1718.segy-all data for ti02 in 2017/18 season.

ti03_1718.segy-all data for ti03 in 2017/18 season.

ti04_1718.segy-all data for ti04 in 2017/18 season.

ti05_1718.segy-all data for ti05 in 2017/18 season.

totten_1819.segy-all data for all locations in 2018/19 season.

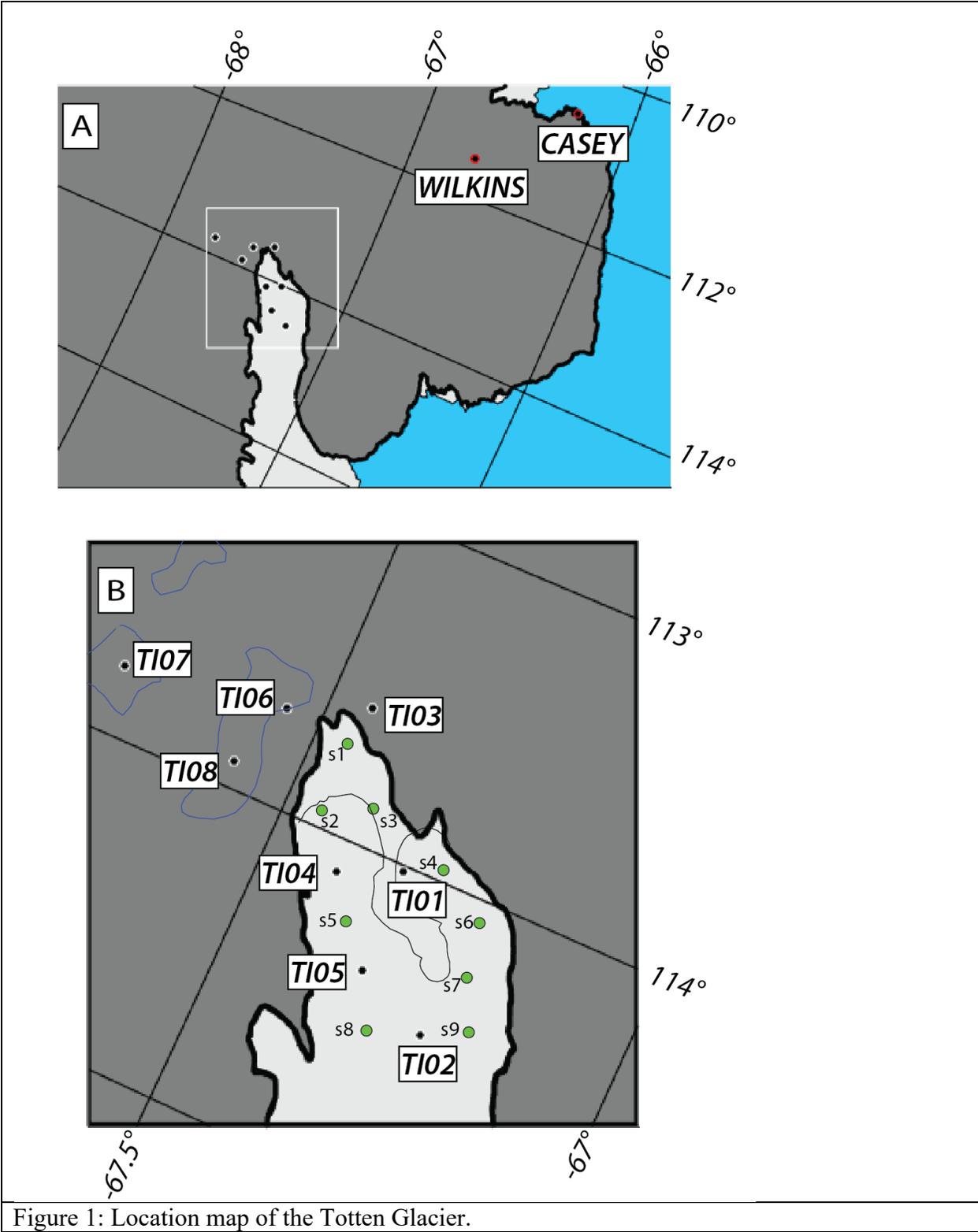


Figure 1: Location map of the Totten Glacier.



Generation of shear waves. Metal plate is oriented ~vertical in a small hole.

	Lat	Long
TI01	-67.3242	114.0453
TI02	-67.2272	114.5076
TI03	-67.4429	113.6126
TI04	-67.3972	114.1347
TI05	-67.3229	114.3885
TI06	-67.5336	113.7069
TI07	-67.7445	113.7793
TI08	-67.5759	113.9152
S01	-67.453	113.9484
S02	-67.3969	113.8789
S03	-67.4536	113.9494
S04	-67.2891	113.9659
S05	-67.3715	114.2381
S06	-67.2233	114.0709
S07	-67.1981	114.2299
S08	-67.2941	114.5243
S09	-67.1728	114.3875

Table 1: Station Coordinates