

GPSを活用したリュツォ・ホルム湾沿岸の氷河・氷床流動の高精度計測

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Precise monitoring with GPS for ice flows of ice sheet and ice stream around Lützow-Holmbukta

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The Antarctic ice sheet is a huge heat sink acting as a feedback controller for adjusting global warming, so a loss of its mass would cause a great impact on the global climate change. Therefore, it is valuable to evaluate an Antarctic ice mass balance, which is a consequence of competition between an ice discharge and a snow accumulation. With objective of estimating the ice discharge around Lützow-Holmbukta, East Antarctica, we have measured three-dimensional (3D) ice flow velocity at 19 sites (Fig. 1) with dual-frequency GPS during phase VIII of the six-year Japanese Antarctic Research Project.

We first performed one-month GPS measurement near the calving front of Shirase Glacier in 2011/2012 austral summer. The three-dimensional position of this site was determined by the kinematic precise point positioning (kPPP) method at every 30 seconds with a 4-5-cm precision for 25 days. From the 30-s interval position, we estimated the ice flow velocity vector, the basal melting rate of iceberg, and ocean tidal variations (see Aoyama et al. 2016, for a detail). Subsequently, a year-round GPS measurement system installed six kilometers downstream from the grounding line of Shirase Glacier in Jan. 2015. We have already obtained a continuous data from Jan. to Dec. 2015. We discuss the seasonal variation in the ice flow velocity and tidal variations near the grounding line based on the 30-s interval kPPP position.

One-month GPS measurements were carried out in Honnør, Skallen, Vågs glaciers besides Shirase Glacier in 2013, 2014, 2015, and 2016 austral summer seasons. We show ice flow velocity vectors and tidal deformations derived from these GPS data.

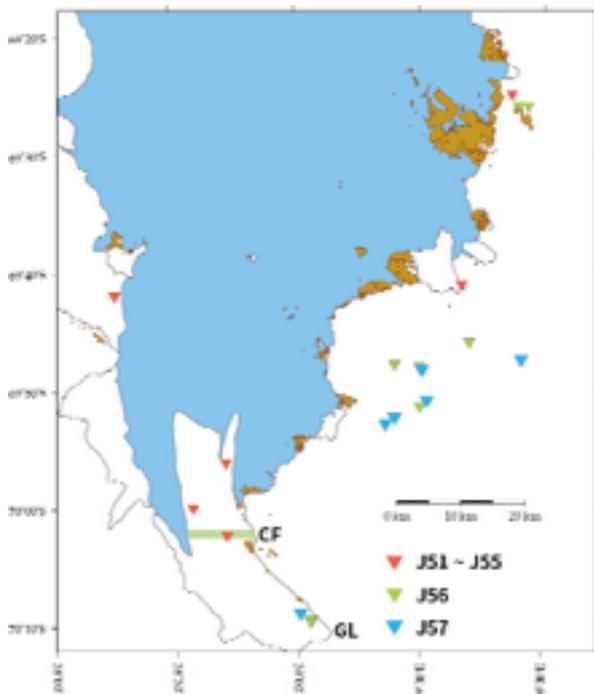


Figure 1. Locations of ice flow measurement sites around Lützow-Holmbukta, East Antarctica. CF and GL are calving front and grounding line of Shirase Glacier, respectively.

References

Aoyama et al., Observations of vertical tidal motions of a floating iceberg in front of Shirase Glacier, East Antarctica, using a geodetic-mode GPS buoy, *Polar Science*, 10, 132-139, 2016.