

# Tidally controlled vertical ice motion generate seismicity near a terminus of a floating tongue, East Antarctica

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Glacier microseismicity is providing new insights into the glacial dynamics. However, physical mechanisms generating icequakes are not well understood, especially near the terminus of ice shelves and floating ice tongues. We observed ice speed and icequakes at the floating tongue of Langhovde Glacier in East Antarctica. We installed four GPS stations on the ~3-km long floating tongue at 0.3–2.5 km from the ice front to the grounding line. A seismic array formed of three seismometers was installed at 0.5 km from the terminus. Diurnal and semidiurnal variations in the ice speed were observed at all the GPS and seismic stations. A linear correlation was found between the vertical ice motion and occurrence of icequakes. A larger number of icequakes was observed during rising and high tide. The correlation coefficient increased as tidal amplitude increased. The tidally controlled vertical ice motion was 7.6 times larger than the horizontal motion at the lowermost GPS. These results suggest that events of basal origin, such as basal crevassing, are the likely source of the icequakes. Further detection and monitoring of the seismicity near the terminus may help to understand how the tidally controlled ice motion fractures the ice shelf near the ice front.

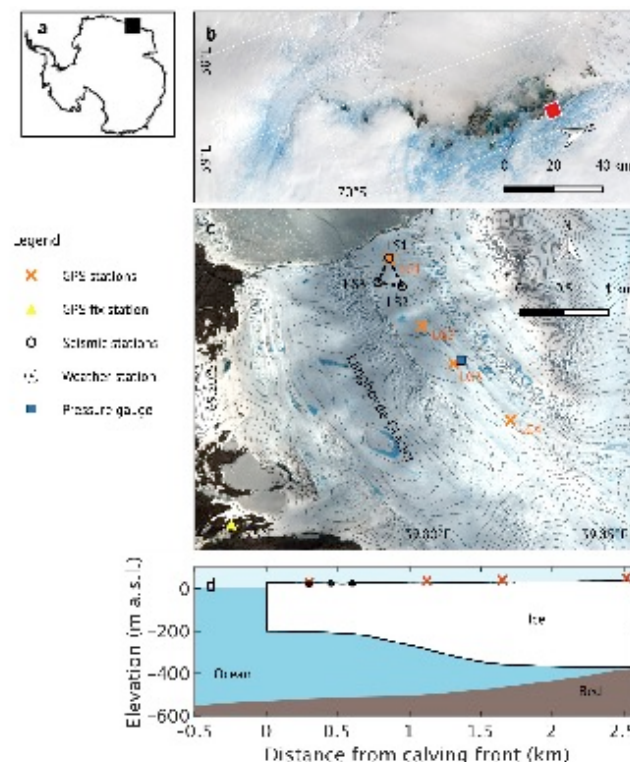


Figure 1. (a) and (b) the study area in East Antarctica. (c) Enlarged image of the glacier with instrument sites. (d) Cross-sectional profile of the floating tongue.