



Do dynamic subglacial lakes impact temporal behavior of fast-flowing ice streams? GPS and radar investigations on two West Antarctic ice streams

S. Tulaczyk (1), R. Pettersson (2), N. Quintana Krupinski (1), H. Fricker (3), I. Joughin (4), and B. Smith (4)

(1) Department of Earth and Planetary Sciences, University of California, Santa Cruz, California, USA, (2) Department of Earth Sciences, Uppsala University, 752 36 Uppsala, Sweden, (3) Scripps Institution of Oceanography, La Jolla, California, USA, (4) Applied Physics Laboratory, University of Washington, Seattle, Washington, USA (contact email: tulaczyk@pmc.ucsc.edu)

In November 2007 we initiated field investigations on Mercer and Whillans ice streams of several subglacial lakes recently discovered by analysis of ICESat laser altimetry data. The primary objective of this project is to constrain the temporal dynamics of these lakes and their impact on ice stream flow variability. During the first of three field seasons, we installed 10 continuously recording GPS stations, including one with near real-time satellite data uplink. The stations are located over two medium-size subglacial lakes ('Lake Mercer' and 'Lake Whillans' of Fricker et al., 2007), two small subglacial lakes ('Lake 7' and 'Lake 14' of Fricker et al., 2007) and in several topographic lows, which may correspond to subglacial drainage conduits. In addition, we collected nearly 100 km of ice-penetrating radar data. The latter indicate that lakes Mercer and Whillans still contain no less than 8-9 meters of water, even after recent drainage events detected by ICESat. The radar data also show that the horizontal extent of lake Mercer and Whillans subglacial water bodies appears to be smaller than the horizontal extent of ice-surface elevation anomalies revealed by ICESat data. This phenomenon may reflect the fact that viscous ice deformation during lake drainage/filling events is likely to create ice surface deformation anomalies with spatial footprint larger than the lake itself. Alternatively, the horizontal extent of

these subglacial lakes may decrease as they drain.