

**NEGATIVE MASS BUDGET OF TOTTEN GLACIER, EAST ANTARCTICA**NW Young*Australian Antarctic Division and ACE CRC, Hobart, Australia*

Comparison of surface elevations measured by terrestrial survey in 1987 over the grounded part of Totten Glacier with elevations measured by the Geophysical Laser Altimeter System on NASA's ICESat in 2003 shows that there has been substantial lowering of the surface of around 10 m over 16 years. The terrestrial observations are part of a larger network of over-snow traverse routes in Wilkes Land surveyed between 1973 and 1987. Surface elevations were measured by barometric levelling between control points where precise coordinates were determined using satellite doppler survey. The point elevations have a nominal vertical accuracy of 1 to 3 metres, and horizontal position accuracy between 2 and 100 metres. The GLAS elevations have a nominal vertical resolution of 0.15 m. These GLAS elevations are spaced at 170 m intervals along satellite ground tracks, with a laser footprint of several tens of metres diameter, and spacing between adjacent tracks of about 40 km.

The elevations are compared at crossovers of the ground tracks with the terrestrial survey lines. One issue that complicates analysis is the need to transform data from the variety of different reference systems used in the early terrestrial surveys to a common system for linking with the modern satellite altimeter observations. The observed lowering rate is 0.6 m/yr over the Totten alone, which equates to about 7 Gt/yr in net loss from the grounded ice cover or a contribution of 0.02 mm/yr in SLR. This is considerably larger than the lowering rate inferred from analysis of a 9 year time series of radar altimeter observations. The point elevations used in this work provide the first direct observation of strong surface lowering found in East Antarctica. Extension of this analysis to the larger network of survey lines gives the spatial extent of the lowering in the immediate catchment area.