

REASSESSING THE INPUT-OUTPUT MASS BUDGET OF EAST ANTARCTICA BETWEEN 50°E AND 140°E

R C Warner

¹*Antarctic Climate and Ecosystems Cooperative Research Centre, Hobart, Tasmania, Australia,* ²*Department of Environment and Heritage, Australian Antarctic Division, Kingston, Tasmania, Australia*

Using satellite altimeter measurements of Antarctic surface elevation changes Davis and others (Science, 2005) reported that the interior of the East Antarctic ice sheet is thickening slightly, contributing 0.12 mm/a towards lowering global sea-level. While such direct estimates of regional ice sheet change are useful in establishing the present state, in terms of the physical inputs and outputs they only constrain the difference between the current rate of ice deposition and its export by ice dynamics from the region surveyed.

Accurate assessments of the past, present and future mass budgets of the polar ice sheets are essential for elucidating the origins of past sea-level rise and for projecting future responses to climate change. Both require that ice accumulation and ice flow are each accurately described, and that differing changes in interior and coastal margins are integrated.

As a step towards testing how well current accumulation estimates from models and field compilations correlate with the presently observed pattern of ice flow and elevation changes and how the East Antarctic interior might be presently contributing to sea-level change, historical local measurements of ice flow rates in the East Antarctic ice sheet from Enderby Land to Wilkes Land (50°E to 140°E) are compared with estimates of ice accumulation and the state of balance using predicted "balance" ice fluxes.

The measured ice fluxes are drawn from the available ANARE field surveys of ice motion and ice sheet thickness, while the balance fluxes are computed using a range of ice accumulation datasets and a satellite derived digital elevation model. The comparisons enable some inferences regarding differing regional states of imbalance of the ice sheet and regarding the fidelity with which the available accumulation fields reflect the long-term ice input.