

## **Perspectives on the past evolutions of the Totten-Vanderford-MUIS and Denman-Scott catchments from erosion reconstruction**

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### **Abstract**

The composite catchments of the Totten-Vanderford-MUIS (TVM) and Denman-Scott (DS) glacier groups represent two of the largest catchments of the East Antarctic Ice Sheet. Their main outlets are separated by a distance of ca. 400 km, and are at similar latitudes. Recent work inland with ICECAP geophysical data and around the coastal deposition zones is allowing the erosive history of these catchments to be better understood. Both catchments possess Paleozoic to Cenozoic sedimentary basins that overly a basement comprised of Precambrian igneous and metamorphic rocks. Modelling of the thickness of these basins provides an indication of the locations of past-erosion; further resolving isostatic considerations and the reconstruction of reasonable initial geometries provides additional constraint on this process.

Erosion within the TVM catchment extends across a wide area, with two regions where basement rocks are exposed, indicating deep erosion. One of these is consistent with the modern ice-sheet flow regime, while the other is consistent with a retreated ice sheet state that existed in times of warmer climate. Most detritus from the TVM catchment is likely deposited in the Budd Coast Basin, the volume of which is not inconsistent with the mass of the eroded material, although this region also provides a substantial component of ice-rafted detritus as far west at Prydz Bay.

Interpreted erosion within the DS catchment is strongly focused within the confines of the Knox Rift, suggesting that the topographic bounds of this rift have been a persistent influence on erosion. Modelling results indicate there are two regions: a coastal region with two distinct branches (Denman and Scott ice streams) and an inland region with a single broader zone of erosion. Modelled erosion is comparable in each of these regions, suggesting that the Denman and Scott ice streams have also experienced significant time-periods in a retreated state relative to the current margin. Numerical ice sheet models indicate that the retreated states of the TVM and DS catchments may occur under broadly similar climate conditions.

### ***Keywords:***

East Antarctic Ice Sheet, Denman Glacier, Totten Glacier, Erosion