GSA Data Repository 2017117

Jae II Lee, Robert M. McKay, Nicholas R. Golledge, Ho II Yoon, Kyu-Cheul Yoo, Hyoung Jun Kim, and Jong Kuk Hong, 2017, Widespread persistence of expanded East Antarctic glaciers in the southwest Ross Sea during the last deglaciation: Geology, doi:10.1130/G38715.1.

Figure DR1. Multibeam swath bathymetry map of the southwestern Ross Sea based on depths from R/V ARAON data (rainbow color ramp) overlain on the archived regional multibeam datasets (dark blue to light green color ramp) obtained from the Marine Geoscience Data System. Note the increased coverage tracing flow lines into the Mawson Glacier mouth and Granite Harbour.

Figure DR2. Top) Inferred LGM glacial flowlines (dashed black lines) in the McMurdo Sound region as hypothesized by Denton and Marchant (2000). In this model, the kenyte erratics (red circles) are inferred to be sourced solely from an outcrop at Cape Barnes (red square). Surface elevation contours of the ice sheet (green lines) are constrained by detailed mapping of glacial drift limits. Bottom right) A revised interpretation, that incorporates the Denton and Marchant (2000) kenyte erratic distributions (but with a wider source region around Ross Island) and drift elevation limits, and the multibeam flowline indicators presented in this study. Inferred lines (dotted lines) are based on the provenance and moraine mapping and may not represent a unique solution. Multibeam flowlines are unambiguous (solid black lines). Ice sheet elevations are also inferred, based on the constraints presented in Denton and Marchant (2000) although a caveat is that some these potentially represent a earlier phase of ice flow during the last glacial than the multibeam flowlines. Kenyte erratics not presented in the Denton and Marchant (2000) reconstruction are also noted in this reconstruction. These include erratics in the AND-1B drill core (Figure DR3) and on Black Island (Vella et al., 1969). Rare kenyte clasts are also noted at Cape Bird in Cape Bird in Denton and Marchant (2000) are more easily reconcilable with this revised flowline reconstruction, but could also be ice-rafted debris. Bottom right) Lineations and moraine ridges in western McMurdo Sound (Figure DR4) indicate expansion of the Ferrar Glacier occurred during the late deglacial, after ice had retreated from the deeper sections of McMurdo Sound.

Figure DR3: Kenyte clasts in AND-1B (core ALN 17.16-18.23 meters below sea floor). Anorthoclase phonolitic (kenyte) clasts are present in the upper 18 m of AND-1B. Distinctive anorthoclase phenocrysts are present in clasts at 3cm-14cm, 18-29cm, and 38-45cm in this core.

Figure DR4. Enlarged and annotated version of Figure 2E back-stepping undifferentiated ridges (black arrows) interpreted as proglacial moraines of an expanded Ferrar Glacier system during the last phase of grounded ice during the deglacial (Figure DR2).



Fig. DR1





Revised marine multibeam model using terrestrial moraine constraints (this study)



(modelled grounding line - Mckay et al. 2016)



