Supplementary material

The modeled traverse along the Prydz Bay coastline is shown in the main text in Figure 2. Information on the crustal structure of Prydz Bay is sparse, however based on the available information from Reading (2006) and Ravich *et al.* (1978), we conclude that the depth to Moho is assumed to be 36 km below the Vestfold Hills and Rauer Islands and 30 km elsewhere along Prydz Bay.

The thermal parameters for various crustal and mantle lithosphere segments are shown in Figure A1. All the high-heat-producing granites and crustal units are assumed to have a thermal conductivity (k) of 2.5 $Wm^{-1}K^{-1}$ whereas the mantle lithosphere is assumed to be 3.0 $Wm^{-1}K^{-1}$. Thermal conductivities are taken from Clauser & Huenges (1995) and Zoth & Haenel (1988). The heat flow contribution from the convective mantle is 18 mWm^{-2} (e.g. Jaupart & Mareschal, 2004).

The estimated surface coverage and depth of the HHP granitoids is shown in Fig. A1, along with the corresponding heat production values for those granites and the heat production values of the host rocks of Vestfold Hills, Rauer Islands and southern Prydz Bay are taken from the data tables from Carson & Pittard (2012). The depth of the granites is speculative (Fig. A1), there are no geological or geophysical data available to provide robust constraint on the depth profile of the granites. The 2-D crustal model of Prydz Bay used for the thermal model is summarized in Figure A1.

The heat transport in this simple model is assumed to be purely conductive, no influence from the migration or circulation of groundwater, meteoritic or metamorphic waters/fluids is considered. No advective heat transport, for example, from magmatic activity, is considered.

Heat Production is defined as the heat generated by the radioactive decay of, primarily, the naturally occurring isotopes of ^{40}K, ^{238}U, ^{237}U and ^{232}Th

per unit volume. The unit used in this paper is microwatts per cubic metre (μW/m³). The reader is directed to Turcotte & Schubert (2002, p. 136-137) and Carson & Pittard (2012) for further information.

Heat Flow or Flux is defined as the amount of heat conductively transported across or through a unit area. The unit used in this paper is milliwatts per square metre (mW/m²). For further information the reader is directed to Turcotte & Schubert (2002, p. 132-133).

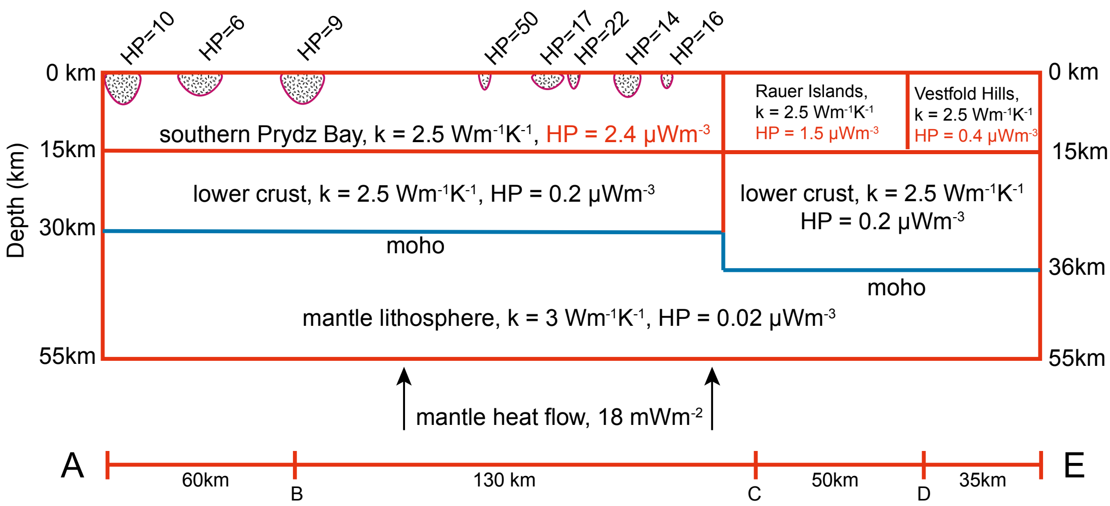

Figure A1. Model thermal parameters for 2-D heat flow modeling transect along Prydz Bay coast as shown in Fig. 2. The traverse is 275 km from A to E.

Table A1. Average heat production for igneous rocks (from Rybach 1976)

Lithology	*U (ppm)*	*Th (ppm)*	*K (wt%)*	*μWm⁻³*
Granite/Rhyolite	3.9	16.0	3.6	2.45
Granodiorite/Dacite	2.3	9.0	2.6	1.48
Diorite, Quartzdiorite/Andesite	1.7	7.0	1.1	1.08
Gabbro/Basalt	0.5	1.6	0.4	0.309
Peridotite	0.02	0.06	0.006	0.0117
Dunite	0.003	0.01	0.0009	0.00188

Note: Heat production is that of the modern day, based on present abundances of the heat producing elements.

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