

## Sub-Ice Thermal Regime, Volcanogenic Processes and Terrane Assembly in Antarctica Using Magnetotellurics

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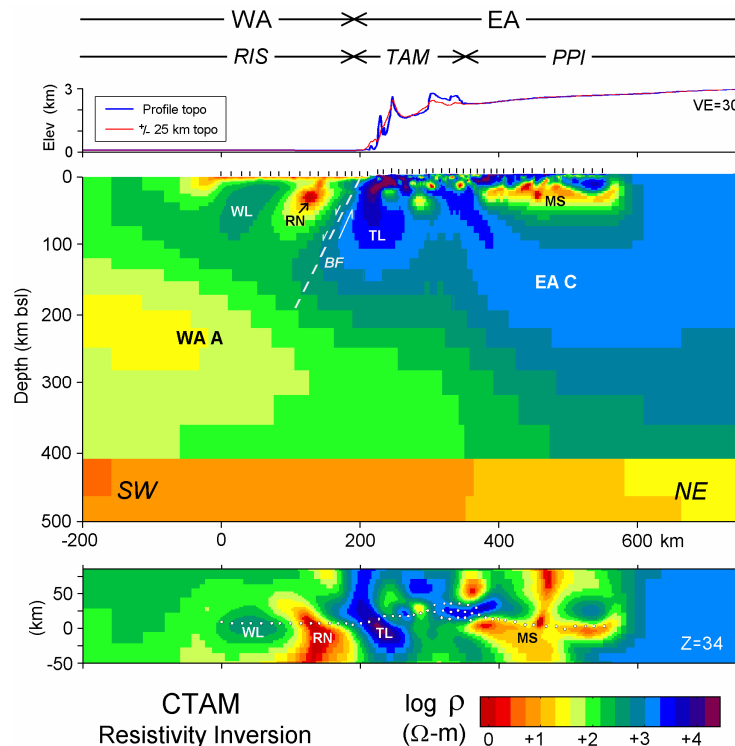
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Bedrock heat flux of Marie Byrd Land and much of the West Antarctic Ice Sheet has been conjectured to significantly exceed the global average of  $\sim 85 \text{ mWm}^{-2}$ , e.g.  $100\text{-}200 \text{ mWm}^{-2}$  or more, with implications for ice sheet stability. Advective effects may complicate shallow heat flow measurements, motivating deeper-seeking geophysics. In the U.S. Great Basin, magnetotelluric (MT) resistivity has imaged zones of crustal magmatic underplating and fluid release over broad areas which correlate with surface heat flow and volcanic occurrences. Spatially concentrated low-resistivity upwellings imply local upward convection and commonly connect into known high-temperature geothermal resource areas exhibiting magmatic-origin fluid fluxes. Similar low-resistivity structure correlating with analogous magmatic and convective processes in West Antarctica has been revealed in recent MT field campaigning there. Appropriately designed surveys have potential to constrain the magnitude and spatial variation of crustal geotherms including local hotter zones that could provide particularly high thermal input to the overlying ice sheets. Focused MT campaigns exemplified by Mount Erebus/Ross Island coverage have revealed deep volcanic plumbing where passive seismology has been challenged by scarce crustal earthquakes. Deeply underthrust graphitized or sulfidized metasediments along former continental margins can be tracers for terrane boundary mapping in East Antarctica. Support has been from U.S. DOE DE-0005514 and NSF OPP-1443532, and numerous prior.



*MT resistivity cross section through the central Transantarctic Mountains from rifted West Antarctica into cratonic East Antarctica. Shown are West Antarctic hydrated asthenosphere (WA A), rift necking near the range front (RN), resistive cratonic East Antarctica (EA C) and deep crustal graphitized metasedimentary distributions in Proterozoic East Antarctic terranes. After Wannamaker et al (2017, Nat. Comms).*