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Inferring Geothermal Heat Fluxes from Depth-To-The-Bottom of the Magnetic Source Estimates in West Antarctica, Amundsen Sea Sector

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The West Antarctic Rift System is one of the least understood rift systems on earth, but displays a unique coupled relationship between tectonic processes and ice sheet dynamics. Geothermal heat flux (GHF) is a poorly constrained parameter in Antarctica and suspected to affect basal conditions of ice sheets, i.e. basal melting and subglacial hydrology. Thermomechanical models demonstrate the influential boundary condition of geothermal heat flux for (paleo) ice sheet stability. Young, continental rift systems are regions with significantly elevated geothermal heat flux (GHF), because the transient thermal perturbation to the lithosphere caused by rifting requires $\sim$100 Ma to reach long-term thermal equilibrium. We discuss airborne, high-resolution magnetic anomaly data from the Amundsen Sea Sector, to provide additional insight into deeper crustal structures related to the West Antarctic Rift System in the Amundsen/Bellingshausen sector. With the depth-to-the-bottom of the magnetic source (DBMS) estimates we reveal spatial changes at the bottom of the igneous crust and the thickness of the magnetic layer, which can be further incorporated into tectonic interpretations. The DBMS also marks an important temperature transition zone of approximately 580°C and therefore serves as a boundary condition for our numerical FEM thermal models in 2D and 3D.