

Association of Geothermal Heat Flux with Seismic Structure

Shane Zhang, Michael H. Ritzwoller

Department of Physics, University of Colorado Boulder, Boulder, CO 80309, USA.

Geothermal heat flux results from heat transport and production inside the Earth. Heat flux informs geothermal exploration and controls multiple cryospheric processes. To understand the causes and effects of heat flux, we investigate the association of heat flux with high-resolution seismic structure, via a simple decision tree. Comparing predictions with observations across contiguous U.S. and Western Europe, we found that our model is robust and accurate in continental scales and tectonically active regions, where uppermost mantle structure dominates heat flux variations, but is challenged in tectonically stable regions where crustal structure plays a bigger role. Taking tectonic regimes into account is thus needed for heat flux prediction, which affects geothermal exploration and polar ice sheet modelling.

