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Geothermal estimates from GOCE data alone: assessment of feasibility and first results.

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The characteristics of the available global gravity models derived from satellite gravity suggest that they could be applied in modelling the downward continuation of the temperature field at a continental scale.
To obtain this, we quantified how and to which extent the mass distribution that we can obtain from inverse modelling of gravity can be linked to the factors affecting the temperature field, such as the radiogenic heat production and the thermal conductivity of rocks.
Since there is no direct physical law linking the two fields, we resort to a reference lithosphere, built up on a set of lithological parameters –including their associated uncertainties.
A central and most critical assumption is that the crustal heat production can be tied to crustal thickness, a relationship which strength shows extreme variability in different geodynamic domains. We take this into account, including it as a parameter uncertainty and propagating it to the results.
Pursuing the search for a reliable method to isolate the component of the heat flow due to the crustal heat production from the available measurements, we test this framework on the go_cons_gcf_2_tim_r5 release of the GOCE-derived field.
We so obtain a satisfactory distinction between different heat transport domains (dominated by heat production, conduction from the mantle, or shallow plays), which proved helpful in interpolating regional heat flow maps at the resolution of the gravity data (about 140 km).