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Parameter sensitivity in satellite-gravity-constrained geothermal modelling

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The use of satellite gravity data in thermal structure estimates require identifying the factors that affect the gravity field and are related to the thermal characteristics of the lithosphere.
We propose a set of forward-modelled synthetics, investigating the model response in terms of heat flow, temperature, and gravity effect at satellite altitude. The sensitivity analysis concerns the parameters involved, as heat production, thermal conductivity, density and their temperature dependence.
We discuss the effect of the horizontal smoothing due to heat conduction, the superposition of the bulk thermal effect of near-surface processes (e.g. advection in ground-water and permeable faults, paleoclimatic effects, blanketing by sediments), and the out-of equilibrium conditions due to tectonic transients. All of them have the potential to distort the gravity-derived estimates.We find that the temperature-conductivity relationship has a small effect with respect to other parameter uncertainties on the modelled temperature depth variation, surface heat flow, thermal lithosphere thickness.
We conclude that the global gravity is useful for geothermal studies.