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Extreme variability of Tibetan thermal lithosphere

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We present a thermal model for the lithosphere in Tibet and adjacent regions based on the new thermal isostasy method and our compilation of the Moho depth based on published seismic models. The predicted surface heat flow is in agreement with the few available, reliable borehole measurements. Cratonic-type cold and thick lithosphere (200-240 km) with a surface heat flow of 40-50 mW/m^2 typifies the Tarim craton, the north-western Yangtze craton, and most of the Lhasa Block that is possibly refrigerated by underthrusting Indian lithosphere. The thick lithosphere of the Lhasa block extends further north in its western and eastern segments than in its central section. We identify a North Tibet anomaly with a thin (<80 km) lithosphere and high surface heat flow (>80-100 mW/m^2), possibly associated with the removal of lithospheric mantle and asthenospheric upwelling. Other parts of Tibet have an intermediate lithosphere thickness of 120-160 km and a surface heat flow of 45-60 mW/m^2, with a patchy style in eastern Tibet. In the Qaidam deep sedimentary basin the lithosphere is about 100-120 km thick. The heterogeneous thermal lithosphere beneath Tibet suggests an interplay of several mechanisms as the driver of the observed uplift.