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The Thermal Transport Properties of Geomaterials: On the Relationship to Curie Temperatures (from MAGSAT data)

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The effective thermal conductivity (ETC) or "virtual thermal conductivity" of the Precambrian subcontinental crust model (Indian Craton)is calculated from geothermal/geochemical data on the average natural radiogenic heat generation (RHG) and real thermal conductivity (RTC) of geomaterials (various magmatic and metamorphic rocks). This ETC amounting to about 3.45 W/m K, is 1.4 time greater than the mean RTC value (about 2.5 W/m K) of crystalline geomaterials. Our consideration suggests also, on the other hand, that the ETC is a hyperbolic function of the Curie temperatures (Tc, in K). It has a very simple form, namely: <k>[Tc - To] = 1837 W/m, where To denotes the surface temperature in K, and <k> (ETC) is in W/m K. These results are in good agreement with the correlation between the surface heat flow densities (HFD) and the lithosphere thicknesses for the Craton of India. The Curie depth map of India was compiled (by different authors) from MAGSAT data and has been used for preparing the lithosphere thickness and the surface HFD maps (of Indian Craton), utilizing the concept of "magnetothermometry".