The thermal properties, temperature structure and thermal evolution of the Eastern Ghats, India.

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I Abstract

The role of the portable gamma ray spectrometer has become a fundamental addition for gathering heat production data to constrain stochastic thermal modelling of the crust. Numerous sensitivity and calibration analyses have been undertaken to verify the validity of the output, and to aid in more efficient and effective use for future users. When applied to a heat flow study of the Eastern Ghats, it was established that the predominantly granulite-facies rocks such as khondalites, K-feldspar megacrystic granites and quartzo-feldspathic gneisses have high average heat production values of 3.76 ± 0.53μWm^{-3}, 2.79 ± 0.53μWm^{-3} and 5.49 ± 0.69μWm^{-3} respectively, whereas the UHT granulites have a low heat production of 0.69 ±0.23 μWm^{-3}. The contribution of uranium to the total heat production was considered low when compared to the input from thorium, which was almost four times higher. The average concentrations of thorium were also approximately fifteen times more than the concentrations of uranium. In this research, thermal conductivity testing was conducted to better constrain parameters for stochastic thermal modelling. Coupled with previous seismic studies, four crustal sections were analysed by one-dimensional steady-state finite difference models using the results of this project. Conclusions drawn from this study indicate that there is a possibility the Eastern Ghats is currently a UHT region, whereas burial of these high heat-producing rocks during orogenesis could have readily heated the crust to produce UHT granulite-facies metamorphism.

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