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Heat flow, Heat Production, and Mantle Heat Flow in Korea

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A total of 365 heat flow values have been estimated in Korea. The mean heat flow is 60 ± 11 mW/m^2; the mean geothermal gradient is 25.1°C/km. In the tectonic provinces, the mean heat flow is 69 mW/m^2 for Gyeonggi Massif, 65 mW/m^2 for Okcheon Fold Belt, 60 mW/m^2 for Yeongnam Massif, 72 mW/m^2 for Gyeongsang Basin, and 75 mW/m^2 for Yeonil Basin. Heat production measurements were made on basement rocks (132 granite and 48 gneiss samples). The mean heat production values for granite and gneiss are 2.040 μW/m^3, and 2.041 μW/m^3, respectively. The mean heat production is 2.06 μW/m^3 for Gyeonggi Massif, 2.01 μW/m^3 for Okcheon Fold Belt, 2.14 μW/m^3 for Yeongnam Massif, 1.66 μW/m^3 for Gyeongsang Basin, and 1.96 μW/m^3 for Yeonil Basin. The tectonic provinces with high mean heat flow tend to have low mean heat production. Therefore, heat production is unlikely to have a first-order importance in determining surface heat flow distribution in Korea. A linear relationship between heat production and surface heat flow was estimated using 12 heat flow and heat production data sets from granite area in Gyeongsang Basin. We found that q=47.06+12.29A for Gyeongsang Basin, where q is surface heat flow, and A is heat production. To understand deep source contributions on surface heat flow, we estimate the mean mantle heat flow for tectonic provinces using surface heat production data, surface heat flow, and Moho depth. The mean mantle heat flow is 45.5 mW/m^2 for Gyeonggi Massif, 42.1 mW/m^2 for Okcheon Fold Belt, 35.6 mW/m^2 for Youngnam Massif, 53.3 mW/m^2 for Gyeongsang Basin, and 54.1 mW/m^2 for Yeonil Basin. The result shows that high heat flow in Gyeongsang Basin and Yeonil Basin is probably due to the high mantle heat flow in those provinces. In addition, we found that Gyeongsang Basin and Yeonil Basin have higher geotherm than other provinces

in Korea.