Geophysical Research Abstracts,
Vol. 10, EGU2008-A-02758, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-02758
EGU General Assembly 2008

On the relationship between reduced heat flow density and mean heat flow density for heat flow provinces of the continental Earth's crust

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It is well-known that in the HF-provinces of the continental Earth's crust the surface Heat Flow Density (Q) and Radiogenic Heat Generation (Ao) of crystalline ground are related by a linear relationship: Q = DAo + qr, where "parameter D" and qr (reduced HFD) are empirical constants. Nevertheless, the real configuration of empirical data (points) of the [Ao,Q]-diagram can be approximated by a non-linear relation of the form Q = [(a/b)Ao]ˆ(1/2), where "a" is the ratio of surface and subsurface geothermal gradients and "b" is the temperature coefficient of thermal resistivity of rock-ground. Both functions (linear and non-linear) have, in general, either two points of intersection or one point of osculation. In this second case, two essential formulae are suggested: qr = 0.5<Q> and D = 0.5<Q>/<Ao>, where <Q> and <Ao> denote mean HFD and mean RHG for given HF-province, respectively. A correlation between the reduced HFD and mean HFD for several HF-provinces has been firstly studied by H.N. Pollack and D.S. Chapman in 1977. Their statistical relation is of simple form: qr = 0.6<Q>. In next years, correlations qr\<Q> were analysed by many authors. One of interesting results is the expression of the following form: qr = 0.46<Q> + 5.105 [mW/mˆ2].