COLORED MAGNETIC MAP OF JAPANESE ISLANDS

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We created the 1:1 000 000 colored aeromagnetic map of the Japanese Islands and the colored aeromagnetic map of the northern part of Japan superimposed on bird-viewed topography. The existing data were merged to make a completely continued map through upward continuation and trend removal. Overall, the magnetic maps contain a wealth of information which will be useful as a significant tool in helping to unravel the complex geological history of Japan. The magnetics clearly delineate the volcanic chains of the active islands arcs. The lateral and regional variation of magnetic properties of granitic rocks can be identified in the map. Pre-Neogene tectonic divisions below alluvial plain are defined in some places. Some weak lineations correspond to tectonic lines. High magnetic belts reveal deep seated cretaceous ultramafic intrusions(Ogawa and Suyama, 1975). Marine magnetic lineations crossing the Japan trench are clear on the map on bird-viewed topography. The lineations disappear at a distance of about 100 km from the Japan trench to the Japanese Islands side because they were memorized on the subducted oceanic plate and the records are subducting below the continental plate(Makino and Okubo, in press).

Using the magnetic data, we calculated Curie depth which describes the depth to the inferred Curie point transition of magnetite(Okubo et al., 1985a). The map delineates regional thermal structure of the Japanese Islands(Okubo et al., 1985b). As we do not know the exact value of the Curie point and cannot calculate the value by our algorithm, we compare the Curie depth with the borehole temperature data which indicate conductive temperature in order to estimate the Curie point(Okubo et al., in press). The comparison results that the temperature gradients in the shallow zone(top 4 kilometers or so) are (435 °C)/(Curie depth) on the backarc side and (250 °C)/(Curie depth) on the forarc side. If we assume constant heat flow with increasing depth, we can easily estimate heat flow by the temperature gradients and thermal conductivity of shallow zone. Thermal conductivity may laterally change, but 2-3 W/m·K is reasonable average value of granitic rocks of the shallow zone(Matsubayashi, personal communication). Figure 1 shows the heat flow map calculated from the Curie depth map when temperature gradient is (435 °C)/(Curie depth) and thermal conductivity is 2 W/m·K on the whole area. The map reveals approximate total heat quantity from deep sources, energy of radioactive substances, and energy discharged from subducting oceanic plates.

REFERENCES

Makino,M. and Okubo,Y.(in press): Spectral Analysis of Marine Magnetic Anomalies(in Japanese with English abstract), Butsuri-Tansa.

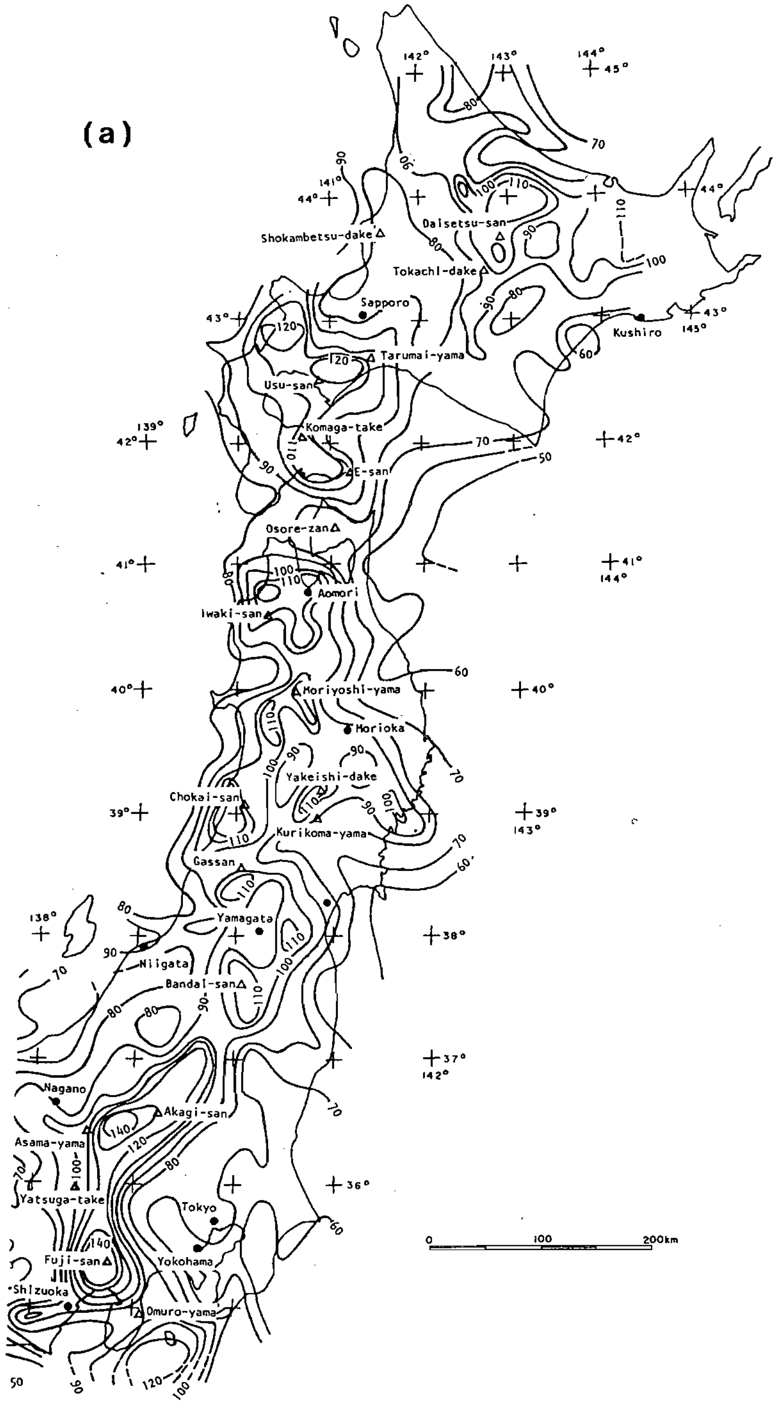
Ogawa,K. and Suyama,J.(1975): Distribution of Aeromagnetic Anomalies. Tokai Univ. Press, Volcanoes and Tectonosphere, 207-215.

Okubo,Y., Graf,R.J., Hansen,R.O., Ogawa,K., and Tsu,H.(1985a): Curie Point Depths of the Island of Kyushu and Surrounding Areas, Japan, Geophys., 50, 481-494.

Okubo,Y., Tsu,H., and Ogawa,K.(1985b): Curie Depths of Japan, Geothermal Resources Council, Transactions, 9-PartII, 35-39.

Okubo,Y., Tsu,H., and Ogawa,K.(in press): Estimation of Curie Point Temperature and Geothermal Structure of Island Arcs of Japan, Tectonophysics.

(a)


Shokambetsu-dake
Daisetsu-san
Tokachi-dake
Sapporo
Kushiro
Tarumai-yama
Usu-san
Komaga-take
E-san
Osore-zan
Aomori
Iwaki-san
Moriyoshi-yama
Morioka
Yakeishi-dake
Chokai-san
Kurikoma-yama
Gassan
Yamagata
Niigata
Bandai-san
Nagano
Akagi-san
Asama-yama
Yatsuga-take
Tokyo
Fuji-san
Yokohama
Shizuoka
Omuro-yama
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