Excess Argon in contact aureoles

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K-Ar and other isotpic systems in a contact aureole have been believed to be reset by an intrusive event after the pioneering work by Hart [1] and the following works. Hyodo and York [2] clearly indicated that biotite has acquired excess argon originated from radiogenic component from other minerals in the country rock during the intrusive event between a Grenville dyke and the country gneiss. Hornblende also has acquired a little excess argon reflecting the hardness against argon diffusion.

We report a case of mafic dyke intrusion (c.a. 2.4 Ga) and surrounding gneiss (> 3.0 Ga) in Greenland. Biotite pleateau ages of 3.0 Ga was observed on the contact where total resetting was expected, and even at 55 m away from the contact. Hornblende at 1.4 m showed the intrusion age of the dyke and secondary excess argon in low temperature fractions. Biotite in the same specimen showed almost the same plateau age. However, the presence of excess component in the biotite indicates that the plateau may not possibly represent the cooling age. No systematic age distribution was found, but excess component was found both in biotite and hornblende.

It is very common to find excess argon in contact aureoles of old terrains particularly in Precambrian as well as high pressure metamorphic rocks. Acquisiton of excess argon depends on the conditions of argon partial pressure and temperature at the time of mineral closure. If permeability is high enough (*e.g.*, sediments) to clean up all the degassed radiogenic component by induced rapid flow due to a thermal gradient, excess argon would not take place. On the other hand, if permeability is low such as in crystalline rocks (*e.g.*, gneiss or granulite), the degassed radiogenic component remains in the contact aureole, resulting in excess argon. The pattern and intensity of the excess argon is controlled by the mineral composition. A qualitative model will be discussed on an argon acquisition process in a contact aureole.

[1] Hart (1964) *J. Geol.* **72**, 493-525. [2] Hyodo and York (1993) *Geophys. Res. Lett.* **20**, 61-64.