

# The oldest continental flood basalt at 2.7Ga, the Mount Roe Basalt and related basalts in Pilbara Craton, Western Australia

# Naoki Enomoto[1]; Shigenori Maruyama[2]; Tsuyoshi Komiya[3]

[1] Earth and Planetary Sci., Titech; [2] Earth and Planetary Sci., Tokyo Institute of Technology; [3] Earth & Planet. Sci., Tokyo Inst. Tech.

A late Archaean (2.7Ga) continental flood basalt and extensional basin succession have been divided into three groups in the Pilbara Craton of Western Australia. The Mount Roe Basalt (Kriewaldt, 1964b) occurs in discontinuous outcrops throughout most of the Pilbara Craton, and it is the lowest formation in the Fortescue Group. The study of the Mount Roe Basalt helps us understand relations between large-scale igneous activity and its source material in the mantle at 2.7Ga.

We have investigated Mount Roe Basalt and upper basalt Formations in the Fortescue Group (the Kylena Basalt, the Nymerina Basalt, and the Maddina Basalt) in the whole Pilbara Craton, based on geological mapping, and comprehensive collection of about 2,000 rocks from 1994 to 2003. We measured total thickness of the Mount Roe Basalt at five sections, and the result indicates that total thickness of the Mount Roe Basalt reaches over 1700m in the northwest Pilbara.

Petrographic observation of these samples indicates that most samples are fine-grained, and their groundmass textures are glomeroporphyritic, intergranular, intersertal, or hyaloophitic. Some samples contain igneous original minerals like clinopyroxene and plagioclase. However most are partially replaced by secondary minerals such as chlorite, prehnite, pumpellyite, epidote, actinolite, quartz, and calcite. We selected samples that apparently avoided post-magmatic alterations. We analyzed major and trace element compositions of samples. In addition, relict igneous clinopyroxenes in these samples estimate the original composition of the host magmas. This work presents geochemistry of major elements of relict igneous clinopyroxenes of the Mount Roe Basalt and, we compared it with these of modern MORB, OIB, and CFB, and whole-rock composition of the Mount Roe Basalt. The whole-rock composition indicate that the Mount Roe Basalt has high SiO<sub>2</sub> content, basaltic andesitic to andesitic composition, and is similar to the Columbia River basalt province.

Relict igneous clinopyroxenes are Wo<sub>30-40</sub> En<sub>35-55</sub> Fs<sub>10-30</sub> in composition. Although the estimated temperatures are minimum, the Di-En-Fs-Hd quadrilateral diagram indicates that the clinopyroxenes precipitated at over 1200 degrees, and became enriched in Wo component with magma cooling, followed by enrichment of the Hd + Fs component at ca.1100 degrees and subsequent increase of the Hd component. In addition, relict igneous clinopyroxenes suggest that the source mantle of the Mount Roe Basalt was heterogeneous contrast to previous work.