

Guyana: The Lost Hadean crust of South America?

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U-Pb age dating of zircons was conducted on eighteen rocks from Southern Guyana (Guiana Shield). These were collected by geologists of the geological surveys of Guyana and Brazil during a joint geological and geo-diversity mapping project along their common border. A total of 447 U-Pb age determinations in zircons were obtained by Laser ICP-MS at the State Key Laboratory of Mineral Deposit Research, Nanjing, China.

The rocks were taken from the three main stratigraphic units present in Southern Guyana, where little age dating existed and will be presented south to north:

1) The zircons of granitic rocks of the Southern Guyana Granite Complex (most southerly) yielded the youngest age ca 1925-1984 Ma. These rocks contain only a few older zircon xenocrysts clustering at ca 2086 Ma, ca 2138 Ma, ca 2261 Ma and ca 2297 Ma.

2) The metamorphic age of zircons from the Kanuku Complex (centrally located) is estimated at ca 1956-1968 Ma and obtained from one S-type granite and one paragneiss sample. Moreover, several paragneiss samples contain significant proportions of detrital zircons with older age values clustering at ca 2200-2269 Ma, ca 2450 Ma, ca 2520 Ma, ca 2635 Ma and ca 2707-2721 Ma.

3) The rocks of the Iwokrama Formation (most northerly) display the largest range of age due to the presence of numerous zircon xenocrysts. Minimum age of crystallization of the volcanic and subvolcanic granitic rocks is ca 1981-1986 Ma. Older zircon xenocrysts cluster at ca 2196-2202 Ma, ca 2395-2417 Ma, ca 2487-2489 Ma, ca 2852-2882 Ma, ca 2949 Ma, ca 3701 Ma, ca 3778 Ma and ca 4218 Ma. The oldest age obtained is from a zircon core with a concordant age of 4219 Ma +/- 19 (1s). A second zircon core determination from the same crystal yielded a slightly discordant age of 4210 Ma +/- 19 (1s). The rim of the same zircon gave an age of 3733 Ma +/- 23 (1s).

The zircon xenocrysts in the range ca 2520-3811 Ma in the Iwokrama Formation overlap with Archean age of rocks of the Imataca Complex in Venezuela and of the Amapa Complex of northern Brazil dated between ca 2500 and 3700 Ma. The subvolcanic granite and felsic volcanic rocks of the Iwokrama Formation appear to contain zircons from a "Lost Hadean Crust" representing the oldest component of the Guiana Shield and of South America.

Hydrothermal magnetite from the Grasberg porphyry and Ertsberg East skarn Cu-Au deposits

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Recent years have seen an increased interest in the use of hydrothermal magnetite as a pathfinder mineral for exploration. Ongoing research puts further constraints on systematic compositional patterns in hydrothermal magnetite that can help to target deeply covered and remote deposits. We present preliminary data for hydrothermal magnetite from the Grasberg porphyry and the Ertsberg East Skarn System Cu-Au deposits. Both are among the biggest deposits of their types in the world and occur within the Ertsberg mineral district in Papua, Indonesia. Magnetite of igneous and hydrothermal origin is a widespread mineral phase in intrusive rocks and hydrothermal veins as well as in associated skarns. A total of 892 electron microprobe analyses of hydrothermal magnetite have been obtained. The main elements that can be used to characterize and discriminate hydrothermal skarn and porphyry magnetite are Mg, Al, V, Mn, and Zn. Titanium, Cr, Co, and Ni show little to no distinct variation between these two types of magnetite (Figure 1). Magnesium and Mn contents are comparable with concentrations found in hydrothermal magnetite from other skarn deposits. Titanium on the other hand appears to be characteristically enriched in hydrothermal skarn magnetite from the Grasberg deposit compared to skarn magnetite from other deposits.

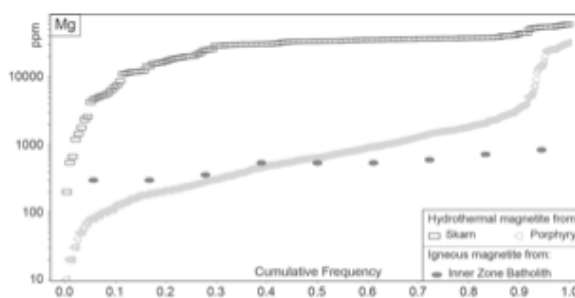


Figure 1 Probability plot for Mg concentrations in hydrothermal magnetite from the Grasberg deposit. Igneous magnetite from the Inner Zone Batholith, Japan is plotted as a reference.