

Application of major- and trace-element geochemistry to refine U-Pb zircon, and Sm/Nd or Lu/Hf sampling targets for geochronology of HP and UHP eclogites, Western Gneiss Region, Norway

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ABSTRACT

The geochemistry of kyanite and orthopyroxene eclogites (7 samples) indicate that they are gabbroic cumulates. Incompatible trace elements in these rocks occur at low concentrations compared to regionally associated eclogites that are compositionally similar to basaltic magmas (11 samples). Eclogites with cumulate protoliths commonly contain <10 ppm Zr, <1.2 ppm Sm, and <0.2 ppm Lu, compared to generally >100 ppm Zr, >4 ppm Sm, and >0.4 ppm Lu for basaltic eclogites. Because of low Zr concentrations, igneous and metamorphic zircons are rare or absent in these eclogites. Samarium and Lu concentrations are also low in the kyanite and orthopyroxene eclogites, but they have parent/daughter Sm/Nd ratios of 0.23–0.51 and Lu/Hf ratios of 0.22–0.60, higher than most associated basaltic eclogites at 0.22–0.38 and 0.11–0.18, respectively. These results suggest that kyanite and orthopyroxene eclogites are poor targets for zircon geochronologic work, but are good targets for Sm/Nd and Lu/Hf mineral/whole rock geochronology because of their high parent/daughter ratios.

Keywords: Norway, kyanite eclogite, geochronology, zircon, gabbro, cumulate, orthopyroxene eclogite, samarium-neodymium, lutetium-hafnium