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Geochemistry of gabbros and gabbroic cumulates in the Ghasht-Masuleh area, Alborz Mts.,north Iran

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The Alpine-Himalayan orogen is the result of consumption of the Tethys Ocean and subsequent collisions that comprised the Paleozoic Palaeotethys and the mainly Mesozoic Neotethys oceans. Their subduction left two main sutures in Iran: the Palaeotethys suture along the Alborz Mountains in the north and the Neotethys suture along the Zagros orogen. The Ghasht-Masuleh area is situated in the Alborz Mountains (south of the Caspian Sea, North Iran) which is considered to be part of the Palaeotethys suture. The present study focuses on the geochemistry of the mafic rocks in this area, mainly gabbro, olivine gabbro and biotite gabbro and their cumulates. The parent melts intruded Palezoic metasediments and Mesozoic sediments forming small gabbroic bodies consisting of olivine, orthopyroxene, clinopyroxene, plagioclase, biotite and secondary amphiboles. Some melts fractionated in situ as is clear from magmatic layering in the Zudel intrusion, and olivine and clinopyroxene are cumulus phases while plagioclase mainly forms the intercumulus phase. Modal mineralogy and high whole rock Sc concentrations indicate accumulation of mainly clinopyroxene. Clinopyroxene low $Al2O_3$ and high SiO_2 concentrations indicate crystallization from a sub-alkaline mafic parent melts. Whole rock samples have Mg numbers between 36.2 and 79.7, and are enriched in large ionic lithophile elements such as Rb, Ba and Th. Chondrite normalized REE patterns indicate LREE enrichment and HREE depletion (concave HREE patterns) with total REE concentrations varying between 31.8 and 146.0 ppm. Nb and Ta negative anomalies in N-MORB normalized multi-element diagrams, elevated (La/Sm)N (1.20 to 2.66) and (La/Yb)N ratios (3.48 to 9.32), in combination with a tentative negative correlation between Ba/La and (La/Sm)N suggest contributions by slab-derived fluids and/or sediments to the parent melts. Such geochemical features indicate that the Ghasht-Masuleh gabbroic cumulates probably formed in an arc setting. Preliminary melting models suggest derivation from a garnet-bearing mantle source.