

Anatexis of UHP eclogite and gneiss during exhumation in the North Qaidam UHP terrane: Constraints from petrology, zircon U-Pb dating and geochemistry

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Granitic leucosomes veins are widely distributed within retrogressed eclogite and felsic gneiss in the Xitieshan area of the North Qaidam UHP metamorphic terrane, western China. Whole-rock geochemistry suggests that the granitic leucosomes have lower contents of both REE and HFSE but higher LILE than the metabasite and felsic gneiss hosts. The granitic leucosomes may be divided into two subgroups according to their distinct REE patterns: (a) higher total REE content with/without weak negative Eu anomalies and (b) lower total REE content with conspicuous positive Eu anomalies. The Eu-rich group also show higher Sr content than those in the Eu-poor group. Granitic leucosome recorded an HP eclogite-facies age of 444-450 Ma and an anatexis age of 430-435 Ma for the anatexis rims. An integrated study of petrology, geochronology and geochemistry demonstrate that the the NQD UHP terrane metabasite and felsic gneiss likely experienced initial partial melting with granitic leucosome formation under eclogite-facies conditions and partial melt crystallized during the granulite-facies stage, triggered by dehydration melting involving zoisite and rare muscovite.