

## Chemical and mechanical controls on metasomatic assimilation of eclogite blocks in high-pressure host gneiss

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Mica- and garnet-rich selvages are often developed around eclogitized mafic blocks within felsic gneiss in HP to UHP metamorphic terranes. The development of these metasomatic features ranges from readily identified reaction zones between the eclogite and host gneiss to shear zones where the spatial relationships between eclogite blocks and host gneiss are completely obscured. Block-selvage relationships within the Luliang Shan HP/UHP belt (North Qaidam, China) and the Tso Moriri UHP terrane (NW Himalaya, India) approximate end members of the selvage preservation process. Here we apply whole-rock and incompatible trace element compositions coupled with B and O isotopic data in white mica to constrain the relationship of metasomatism vs. deformation during selvage formation. Within the Luliang Shan, extensive fluid flow formed thick, compositionally hybridized phengite- and garnet-bearing selvages between eclogite ( $\text{SiO}_2 \sim 50\%$ ) and quartzofeldspathic gneiss ( $\text{SiO}_2 \sim 80\%$ ). The Luliang Shan HP selvages have intermediate  $\text{SiO}_2$  and range from 5-10 m in thickness as "halos" around spheroidal eclogite blocks. Volatile enrichment at near-UHP conditions in the selvage is indicated by enrichment of Li, Cs, Ba, Ar, and  $\delta_{18}\text{O}$  and very light  $\delta_{11}\text{B}$  values in phengite. The retrograde muscovite from the host gneiss is low in Li, Cs, Rb, and Sr but possess remarkably high B concentrations (up to 3000 ppm) and positive  $\delta_{11}\text{B}$  values that are best explained by interaction with fluids devolatilized from accreted sediments within cooler regions of the subduction zone. Alternatively, the Tso Moriri UHP terrane features boudinaged discoids of eclogite encased within highly strained quartzofeldspathic gneiss. Whole rock major element sampling performed normal to the foliation reveal consistently high  $\text{SiO}_2$  (78-80%). Highly variable degrees of metasomatic recrystallization occur within the phengite-rich rocks spatially associated with eclogite. The selvage rocks exhibit heterogeneous degrees of enrichment in Li, Be, B, and Ba and yield  $\delta_{11}\text{B}$  values of -4 to -6‰ typical of undevolatilized oceanic and continental crust. We conclude that fluid-mediated metasomatic reaction between eclogite and gneiss at Tso Moriri is sheared out into lenses that are incorporated into, and heterogeneously distributed throughout, the host gneiss.