



Hydration of eclogite at the slab-wedge interface: an example of fluid infiltration into a swelling system

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A fundamentally important feature observed in the Tianshan mountains (NW China) is that eclogites can become hydrated and transform into blueschists (e.g., van der Straaten *et al.* in review). This transformation expresses the general problem of how fluids infiltrate into a system that is expected to swell by the fluid uptake of the newly formed hydrous minerals. We found eclogitic pillow lavas that are partly transformed to blueschists along their rims due to blueschist-facies overprint during retrograde metamorphism. Field observations and petrological data indicate two different fluid flow regimes during retrogression, one major fluid pathway system between the pillows characterized by high fluid fluxes and a second one related to fluid migration into the pillow interiors. We found that the inwards-propagating reaction front is always associated with a reaction zone usually about 2 cm wide. Mass-balance calculations for this reaction front and zone display an overall mass loss and a calculated volume loss during eclogite-blueschist transformation. Thus, fluid infiltration resulted in shrinkage rather than expansion.

We hypothesize that the propagation of the blueschist-front is controlled by fluid migration driven by the volume loss at the reaction front. This volume loss is caused by element transport driven by chemical gradients in the connected fluid system. This indicates that for such a dynamic system the flux of elements out of the system must be high enough to keep up with the rate of mineral formation at the reaction front. We provide models that evaluate reaction rates and element fluxes during blueschist

formation from the pre-existing eclogite.

van der Straaten F, John T, Schenk V, Gao J, Garbe-Schönberg C-D. (in review)
Blueschist-facies rehydration of eclogites: implications for subduction channel fluid-rock interaction from the Tianshan, NW China. *Chemical Geology*.