DEHYDRATION DURING HP-METAMORPHISM: IMPLICATIONS FOR OCEANIC SLAB - MANTLE WEDGE TRANSFER

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Aqueous fluids which were released by the dehydration of subducted lithospheric mantle and / or oceanic crust are supposed to act as element carriers from the slab to the overlying mantle wedge They are widely believed to be responsible for trace element signatures of island arc magmas. This theoretical consideration concerning the dehydration of the oceanic crust is supported by recent findings in the Tianshan HP-belt (NW-China). Large eclogite-facies vein-networks in the Tianshan blueschist were found to be the product of hydrofracturing induced by fluids released by the breakdown of glaucophane, paragonite and epidote during blueschist-eclogite transition and, thus represent former fluid pathways within a Paleozoic subduction zone. The veins are predominantly composed of omphacite fibers with minor quartz and calcite. The transition from blueschist- to eclogite-facies parageneses occurs as "dehydration" halos around these veins. The fluids are interpreted to have been derived from the host blueschist as a result of dehydration reactions such as 13 Gln + 5 Czo = 9 Prp + 26 Jd + 12 Di + 19 Qtz + 15 H_2O and Gln + Pg = Prp + 3 Jd + 2 Otz + 2 H_2O at peak metamorphic conditions of 480 - 600 °C and 18 - 21 kbar. Both dehydration reactions have steep, negative P-T slopes, which corresponds with the release of large amounts of H_2O and a volume reduction. However, the vein-network consists of these dehydration veins and veins which cross the blueschist host foliation and display sharp interfaces towards the blueschist host. The latter ones show no evidence of dehydration reactions in the immediate blueschist host. These veins may represent high-pressure transport veins, which acted as channelways of fluid escape. The here presented geochemical results focus on such a transport-vein, its blueschist host and an eclogitised reaction zone (blueschist alteration zone), which is located in the central part of the vein. Textural evidence and the almost twice as high Li-concentration of the vein and the blueschist alteration zone in comparison to the blueschist host indicate the external origin of the vein forming fluid. This fluid triggered eclogitisation of the blueschist alteration zone. The low in trace element fluid caused a strong leaching of LILE, REE, and HFSE in those parts of the host rock with which the passing fluid reacted. The main difference between the blueschist host and the blueschist alteration zone is the replacement of glaucophane, dolomite and titanite by omphacite and rutile respectively. Therefore we regard the fluid-flow regime as the main control of the trace element mobility.