Geophysical Research Abstracts
Vol. 13, EGU2011-10379, 2011
EGU General Assembly 2011

Two types of eclogite from the Zermatt-Saas unit (Swiss Alps)

Sebastian Weber and Kurt Bucher
University of Freiburg, Germany

The Zermatt-Saas unit (ZSU) represents an ophiolitic high pressure (HP) to ultra high pressure (UHP) unit, which has been the subject of research in a high number of publications. All previous studies concluded that all eclogite rocks in the Zermatt-Saas Unit are derived from mid oceanic ridge basalts (MORB) of the Piemont Liguria ocean. In this work we present a new occurrence of eclogites in the area of "Trockener Steg" called upper Theodul glacier unit (UTG), which differ from the previously described eclogites in the Zermatt-Saas area. The UTG eclogites reported here are the first eclogites with an alkaline affinity associated to rifting of the Piemonte Liguria Ocean in the Zermatt area.

In this study we document that the eclogite rocks of both units can be clearly distinguished by their lithological association in the field. We present mineral and bulk rock composition data to constrain P-T conditions from thermobarometry and assemblage stability diagrams. In the field UTG eclogite occur as bands between biotite schist and garnet-phengite schist. Notably, the highly variable mica schist occurs in direct contact to the UTG eclogites while comparable lithological associations are absent in the ZSU. Chemically, the UTG eclogites share characteristics with within plate basalts. Published P-T estimates for the ZSU eclogites are 550-600°C and 25 kbar.

Grt-Omph-Phg geobarometry on the UTG eclogites revealed P-T values of 20-22 kbar and 350-450 °C. These P-T conditions are not consistent with the computed stability of observed assemblages, which suggest higher temperatures. Isopleths for end-member components of omphacite, garnet and phengite solutions computed from THERIAK/DOMINO suggest similar pressures but higher temperatures of > 500 °C.

Thus subduction depths for the UTG unit of 60 - 70 km are clearly outside the critical depth for UHP metamorphism, which is in contrast to the ZSU that contains UHP assemblages. The rock assemblage of the UTG unit and the within plate signature of the mafic rocks may suggest that the UTG unit represents a fragment from the overriding plate.