



Mass transfer between serpentinites and metapelites in a paleo-subduction interface: a case study from the Yuli belt, eastern Taiwan

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The Yuli belt in eastern Taiwan attests to tectonic evolution involving subduction metamorphism because two metamélange units contain high-pressure (HP) blocks or layers of metaigneous rocks and serpentinites enclosed in metasedimentary schists. Metasomatic reaction zones occur locally along the contact between serpentinite (SP) and pelitic schist (PS). In the Tsunkuanshan area, we recognized five metasomatic zones. From PS to SP, the dominant minerals in each zone are: (I) albite, chlorite, phengite; (II) albite, amphibole, biotite, stilpnomelane; (III) chlorite, phengite, albite, epidote; (IV) epidote, chlorite, albite; and (V) talc, chlorite. Minor garnet and glaucophane are present in zone I and II, respectively. Field and petrographic observations combined with whole-rock major elements data suggest that this rock association was formed by diffusive exchanges between the PS and SP. Zones I - IV and PS samples show identical rare earth element (REE) patterns, indicating that these zones are of PS protolith. Hence, the original boundary between the PS and SP is likely in the zone IV and V. The isocon method was applied to quantify the mass balance among the metasomatic zones. The result shows mass changes in zones: I: +12%; II: -4%; III: +50%; IV: +56%. Enrichment of Ca is present in the entire reaction zones, especially the zone IV (up to 91%), whereas Na is only enriched within the zone I (~80%) and II (~89%). These enrichments are likely due to the involvement of external fluids. The formation of these metasomatic rocks was not only controlled by diffusive exchanges between PS and SP, but also by the Na and Ca rich fluid infiltrations. The existence of glaucophane within the zone II indicates that the metasomatism occurred under HP metamorphic conditions in a paleo-subduction interface.

Keywords: Fluid-rock interactions, isocon method, Na and Ca rich fluids, high-pressure, Yuli belt.