PROTOLITH AGES AND TIME OF HIGH-PRESSURE METAMORPHISM IN THE CYCLADIC BLUESCHIST BELT, GREECE

BRÖCKER, M. [1], KEASLING, A. [1] & PIDGEON, B.[2]

[1]Institut für Mineralogie, Zentrallabor für Geochronologie, Corrensstraße 24, 48149 Münster, Germany
[2]School of Applied Geology, Curtin University of Technology, GPO Box U1987, Perth, W.A. 6001, Australia
e-mail:. brocker@nwz.uni-muenster.de

The Cycladic blueschist belt belongs to the Alpine-type Hellenic orogen in the Aegean region. A lower group of tectonic units comprises a pre-Alpidic crystalline basement, which is overlain by thrust sheets of a metamorphosed volcano-sedimentary sequence. Protolith ages of the cover rocks are broadly constrained by sporadic findings of Mesozoic fossils, but details are unknown. White mica geochronology (Rb-Sr, K-Ar, ^{40}Ar - ^{39}Ar) has established time constraints for at least two metamorphic events, which affected both basement and cover rocks: eclogite- to epidote-blueschist facies rocks yielded Eocene ages (~50 - 40 Ma); samples representing a greenschist-facies overprint provided Oligocene-Miocene dates (~25 - 20 Ma). Unresolved issues concern the protolith ages of the major rock types in the thrust sheets and the duration of HP metamorphism. These aspects are addressed in a SHRIMP U-Pb zircon study, focussing on the islands of Andros, Sifnos and Syros. The results obtained so far indicate a regional consistent pattern of Triassic ages (~233 - 245 Ma) for the magmatic precursors of acid metavolcanites. Such ages were not only observed for samples collected from structurally coherent sequences (e.g. Sifnos), but also for a tectonic slab from the mélange on Syros. The geological significance of Cretaceous U-Pb zircon ages (~80 Ma) previously reported for other blocks from this mélange is controversial and was either related to metamorphic or magmatic processes (e.g. BRÖCKER & ENDERS, 1999; TOMASCHEK et al., 2003). We have studied zircons from a metasomatic alteration profile, which developed around a jadeitite block enclosed in a serpentinite matrix. From the outside in, distinct blackwall alteration zones (~5 30 cm in thickness) can be distinguished, which predominantly consist either of actinolite- chlorite, glaucophane or omphacite. Zircon from the unaltered jadeitite and all reaction zones yielded $^{206}Pb/^{238}U$ ages of ~80 Ma. Across this profile, systematic changes are observed in zircon morphology and CL patterns. U- and Th-concentrations in zircon decrease towards the peripheral rinds. These observations are difficult to reconcile with a magmatic origin of the zircons and instead we suggest a relationship of zircon formation/recrystallization to block-matrix interaction during subduction zone processes at ~80 Ma. A superimposed characteristic is the recrystallization of U- and Th-rich zircons in the jadeitite and the omphacitite rind, indicated by complex cauliflower-like CL patterns. This process is associated with incomplete age resetting, leading to variable < 80 Ma dates. Most likely this recrystallization occurred in the Eocene.

References

BRÖCKER, M. & ENDERS, M. (1999): Geol. Mag., 136, 111-118.

TOMASCHEK, F:, KENNEDY, A.K., VILLA, I., LAGOS, M. & BALLHAUS, C. (2003): J. Petrol., 44, 1977-2002.