HOW TO CORRELATE MIDDLE AND LOWER CRUST OF AN INVERTED PASSIVE MARGIN WITH DETACHED SEDIMENTARY UNITS IN AN OROGEN?

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The middle and lower crust (MLC) of passive continental margins is often preserved in thick-skinned tectonic wedges of mountain belts and is generally separated from sedimentary units. Recently, reflection seismic lines from the South American passive margin revealed boudinaged lower crust (Clerc et al., 2014, EPSL); crustal-scale normal shear zones may, therefore, potentially allow correlation with coeval sedimentary basins. In order to test this hypothesis, we studied the Permian to early Norian Meliata Ocean-related rift-characteristics of MLC and detached upper crust (UC) of the Austroalpine nappes of Eastern Alps. Further aims are to assess rift models, composition and temporal and spatial distribution of magmatism and correlation with sedimentary basins. In Austroalpine basement units, MLC includes metagabbro, mafic dykes, internally undeformed relics of high-temperature/low-pressure metamorphic complexes (ca. 0.46 GPa, 540 °C) here interpreted to represent relics of the MLC boudins. Furthermore, Permian and Triassic low-grade ductile shear zones with Ar-Ar sericite ages of 239 and 267 Ma were detected, too.

In Austroalpine units, the poorly dated rift-onset unconformity formed in Early/Middle Permian and resulted in ca. NE-SW striking halfgrabens filled with up to 1.5 km thick terrestrial clastics. In contrast to other units with thick clastic sediments, no or only thin Permian sediments on some „Middle Austroalpine“ units potentially reflects a Permian rift shoulder. First marine transgression occurred during latest Permian, carbonate deposition dominated starting with Anisian (loss of the clastic hinterland). We recently detected a break-up angular unconformity in central Northern Calcareous Alps (NCA) on top of tilted Lower Anisian Gutenstein Limestone and wedge-shaped Middle Triassic carbonates covered by Norian Dachstein Reef Limestone indicating the break-off and spreading in the Meliata oceanic tract. Rapid middle Triassic subsidence of Austroalpine sedimentary units is associated with stages of intense fluid flow and is evidenced by (1) early Anisian sedimentary iron mineralization, (2) recrystallization of evaporites (polyhalite Ar-Ar ages between 235 and 225 Ma and at ca. 210 Ma) and (3) abundant partly fault-controlled Ladinian-Carnian Pb-Zn-Ba-F mineralizations. Similar evaporitic brines also affected also the basement and formed magnesite and siderite deposits. Consequently, these peculiar features allow correlation of basemen with detached cover units.