The polyphase tectonic history along the eastern Periadriatic Lineament south of Maria Elend in the Karavank Mountains

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According to the geological maps of the Austrian Geological Survey the east-west trending Periadriatic Lineament (PL) separate the Eastern Alps (Northern Karavank Mountains) and the Southern Alps (Southern Karavank Mountains) in the study area. Former structural investigations showed a laterally far less continuance due to strong segmentation along high-angle faults of limited displacement, numerous of them displacing the lineament also. The geological structures of the Karavanks south of Maria Elend are dominated by E-W- to SE-NW-striking high-angle faults, separating from each other in so far 23 imbricates, crosscuted by faults stiking in NW-SE direction. They are of variable size, stratigraphic range, facies, paleogeographic origin and diagenetic/thermal overprint, which are tested by biostratigraphy, microfacies analysis and measurements of the Conodont Colour Alteration Index (CAI). These individual segments, who derived from different paleogeographic positions of Triassic-Europe by far tectonic transportation of crustal fragments, can be clearly distinguish by 1) stratigraphic range, facies and paleogeographic origin, and 2) diagenetic/thermal overprint, and 3) a specific structural inventory, which strike not in the neighbouring units. These particular sets of structures restricted to individual tectonic entities were created before the amalgamation, and are thus transported structures. Paleozoic and Mesozoic slices are mixed. However, there are successions with affinities to most Triassic(-Jurassic) facies zones of the Northern Calcareous Alps (NCA), the Southern Alps, and the Slovenian Trough, as already indicated by Krystyn *et al.* (1994). All these stratigraphic and structural features indicate that enormous amounts of horizontal movements must exist between at least some of these tectonic slices. For example, small-scale segments of Paleozoic sediments, which are located a) west of Mt. Kapellenberg (segment I), or b) west of Mt. Großer Muschenig or east of Mt. Kleiner Muschenig (segment VII), are marked by a complexity in both sedimentary successions and transported tectonic processes, bordered by a complex interplay of boundary conditions. Beside the metamorphic (CAI ~6.0), hemipelagic Devonian limestones of segment I, comprise segment VII Trogkofel limestones with Permian shallow water organism in partly crinoidal-rich grainstone-onkoids. Another geological complex segment with transported tectonics is located between the upper course of the Haidenzabach to the Großen Dürrenbach to the north and to Markljev rovt to the south, respectively from the base of Mt. Kahlkogel to the west and the Kotschnasattel to the east (segment XXIII). Late Triassic

carbonates representing a shallowing upward sequence from reef near Tuvalian limestones to ?Norian lagoonal dolomites, are overlain by sequences of Late Triassic to Middle/Late Jurassic hemipelagic to pelagic sediments. In these marly limestones to turbiditic radiolarian-wackestones the occurrence of Jurassic radiolarians is reported for the first time. These mostly poor preserved radiolarians occur near the Austrian/Slovenian border, indicate clearly a stratigraphic range from the Late Bathonian to Middle Oxfordian. Another interesting fact is the diagenetic/metamorphic overprint of different segments in this area. To the very north and northeast (e. g., segment II) Late Carnian reef near sediments reach CAI 5.5 to 6.0, corresponding to low grade metamorphism. In addition to the stratigraphical and facies constraints also the CAI datas prove the mega-imbricate shear zone of the study area. These high values of CAI 5.5 to 6.0 are comparable with the faciesequivalent thermally overprinted rocks of the Ultratirolic unit of the NCA or some individual slide blocks in the Hallstatt Mélange. The thermal overprint of different tectonic slices in this region is therefore transported. Summarising the main structural events of the Karavank Mountains south of Maria Elend, the amalgamation of these imbricates can have occurred during a long history of deformation in a variety of geodynamic frameworks, significantly changing in place and time. Despite some knowledge about general trends in deformation within the study area, e. g. the fact that the amalgamation of imbricates progressed from south to north and the imbricate zone is often displaced by approximately NE-SW-striking and even younger NW-SE-oriented high-angle faults of limited displacement. The youngest movements are comparable with the lateral tectonic extrusion. This is also kinematically in a good correlation with data obtained from outcrops in Slovenia. In Oligocene extensive magmatism (Periadriatic tonalites) occurred, followed by dextral strike slip movements, and major rotations of the terranes. Mid Cretacous lateral movements transported the Drau Range and the Transdanubian Range towards east. Gawlick *et al.* (1999) regard the initiation of the later strike-slip fault system to be caused by the Jurassic opening of the Central Atlantic Ocean with its continuation into the Penninic Ocean. According to these authors, the eastern parts of the Southern Alps are equivalents to the eroded Juvavic system of the NCA. Along eastward movements since the Mid-Cretaceous period they come to their present position. But in fact, the history of the polyphase geodynamic „PL“, and the paleogeographic origin of the isolated slices is still far of understanding. After separation of the single stratigraphic-tectonic units from each other, the next aim must be to understand which structures formed when and – in case of transported tectonics – where in which tectonic framework.

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