EGU21-6547
https://doi.org/10.5194/egusphere-egu21-6547
EGU General Assembly 2021

Late Carboniferous Schlingen in the Gotthard nappe (Central Alps) and their relation to the Variscan evolution

Mario Buehler, Roger Zurbriggen, Alfons Berger, Marco Herwegh, and Daniela Rubatto
University of Bern, Institute of Geological Science, Bern, Switzerland (buehlermario@gmail.com)

Many pre‐Mesozoic basements of the Alpine belt contain kilometre‐scaled folds with steeply inclined axial planes and fold axes. Those structures are referred to as Schlingen folds. They deform polymetamorphic gneisses, often Late‐Ordovician metagranitoids and are cross‐cut themselves by Permian intrusions. However, the structural evolution of such Schlingen is still not completely understood and their geodynamic significance for the Variscan evolution is not clear. To close this gap, this study investigates in detail a well-preserved Schlingen structure in the Gotthard nappe (Central Swiss Alps). This Schlingen fold evolved by a combination of shearing and folding under amphibolite facies conditions. Detailed digital field mapping coupled with petrological and structural investigations reveal local synkinematic migmatisation in the fold hinges parallel to axial planes. U‐Pb dating of zircons separated from associated leucosomes reveal cores that record a detrital country rock age of 450 ± 3 Ma, and rims with a range of dates from 270 to 330 Ma. The main cluster defines an age of 316 ± 4 Ma. We ascribe this Late‐Carboniferous age to peak metamorphic conditions of the late‐Variscan Schlingen phase.

The pre-Schlingen structures are subdivided into three older deformation events, which are connected to the Cenerian and post-Cenerian deformations. In addition, until now unknown, post Schlingen-, but pre-Alpine transpressional deformation have been detected and described. This superimposed deformation produced locally a low-grade foliation and minor undulation of the Schlingen structures.

The detail data of the investigated fold structures are linked with already described Schlingen folds in the wider Alpine realm, which all are concentrated in the most southern parts of the Variscides. From a geodynamic point of view and based on the new tectono-metamorphic constraints, we propose Schlingen formation preceded and concurred the crustal-scale transpressional tectonics of the East Variscan Shear Zone. This scenario separates, at least in a structural sense, the Southern Variscides from more northern parts (also Gondwana derived) inside Pangea, where Schlingen folds are absent.