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Late Paleozoic of the Carnic Alps: Stratigraphy, Paleogeography and Geodynamic Evolution from Variscan to Alpine cycles

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The talk will summarize recent advances in our understanding of the geodynamic evolution since the Variscan Orogeny, facies relationships of Upper Carboniferous/Lower Permian sediments within the Southern Alps and its implications for Late Paleozoic paleogeography and Neogene tectonics.

During the last years, several geodynamic concepts have been developed for the Variscan orogeny in the Carnic Alps and Karavanke Mts. Based on the geological data, the Variscan orogeny between the Eastern and Southern Alps can be summarized as follows:

- During the Lower Carboniferous a former passive margin was transformed into an active margin setting of a collisional zone. North directed subduction led to a slab pull effect leading to an extensional regime S of the subduction zone and uplifting of a peripheral bulge where locally karstification and erosion take place. Extensional tectonics are probably connected with the volcanic activity in the Dimon Formation.
- The transformation also affected shelf areas with fossiliferous peritidal carbonates surrounding the northern active margin (fore-arc basin?) which were incorporated into an accretionary wedge, completely destroyed, and reworked.
- In the Middle Visean to the south of the collision zone the deep-water trough was supplied from a northern source area with more than 1500 m thick flysch-type sediments of the Hochwipfel Formation.
- Due to ongoing collision and subduction, the basin completely closed during the Upper Bashkirian or Lower Moscovian stages. This event was succeeded by uplifting.
- For the main deformation of the pre-Variscan basement sequences a rather short duration is envisaged which may correspond to less than the duration of the Bashkirian and Moscovian. Depending on the timescale this means less than 11 and 15 Ma, respectively.
- Marine deposits of the Auernig Formation started close to the Moscovian/Kasimovian boundary.

Paleogeographic relationships of the Late Paleozoic successions in the Carnic Alps and Karavanke Mts. were for a long time obscured by the problems of lithologic characterization, terminology, and correlation of the sedimentary successions along the Austrian/Italian/Slovenian border triangle.

Investigation in both areas led to a revised lithostratigraphic scheme, a sedimentologic reinterpretation, and an updated biostratigraphic correlation of Upper Carboniferous/Lower Permian deposits. Facies relationships reveal an inner shelf, lagoonal setting (Goggau Limestone) during the late Early Permian present in the area from Tarvis, Kranjska Gora to Jesenice. Contemporaneous outer shelf/slope environments (Troglkofel Limestone) are found about 30-40 km towards WNW in the Troglkofel/Gartnerkofel area of the Carnic Alps.

According to other authors, Upper Carboniferous/Lower Permian sediments in the Southern Alps have been deposited in several narrow, fault-bounded pull-apart basins. The herein proposed considerations, however, suggest a wider, contiguous, (south?)eastward opening basin, which has been strongly modified and disintegrated during the Alpine orogeny.

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It is proposed that this present-day geographical setting of the two facies belts is a result of dextral slip along the Schwarzwipfel/Fella/Sava Fault (SFSF). The 30-40 km of separation matches with independent slip estimates obtained from the displacement of exhumed Oligocene tectonometamorphic units (Eder Unit, Mauthner Klamm Unit) and several other lithostratigraphic units (Devonian Feldkogel Limestone, Oligocene vulcanogenic complexes in Slovenia). The dextral displacement along the SFSF is regarded to be related to continuous northward drift and counterclockwise rotation of the Adriatic microplate in late Neogene.

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