Upper Triassic lithofacies at Lokve section, Gorski Kotar area – indicators of palaeoenvironmental and palaeoclimatic changes

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GORNJOTRIJASKI LITOFACIJESI NA LOKALITETU LOKVE U GORSKOM KOTARU – INDIKATORI PALEOOKOLIŠNIH I PALEOKLIMATSKIH PROMJENA

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The Upper Triassic deposits in the entire Western Tethys realm are widely recognized in the form of the Main Dolomite (Hauptdolomit/Dolomia Principale). However, the lower part of the Upper Triassic is lithologically more diverse, and of variable thicknesses, sometimes even missing in the External Dinarides. It is represented by different lithofacies ranging from fine to coarse grained clastics, marls, limestones, dolomites as well as coal and bauxite occurrences. This heterogeneous lithology archives several palaeoclimatic events that punctuated the otherwise predominantly arid monsoonal regime of the Late Triassic. On such climatic episode in the lower part of the Carnian (Julian 2–Tuvalian 2), is the Carnian Pluvial/Humid Episode (CPE, SIMMS & RUFFELL 1989; RUFFELL *et al.*, 2016); a rather short episode of climatic change, indicated by a shift from arid to relatively more humid conditions, an enhanced hydrological cycling, and increased weathering intensity linked to global carbon cycle perturbations triggered by large-scale volcanism (e.g., DAL CORSO *et al.*, 2020). The CPE is distinguished in the sedimentary record as a period of intensive weathering and clastic influx into the marine realm, paralleled by a reduced carbonate deposition, as well as coal or bauxite accumulation on land.

The aim of this research was to identify this climatic episode in the Lokve section, Gorski Kotar area, in the External/Karst Dinarides with the help of petrography, clay mineral analysis and palynology. In this area, the Upper Triassic strata directly lays on Permian siliciclastics (SAVIĆ & DOZET, 1983). The recorded Upper Triassic succession is composed of sandstones, followed by an interval of red shale and dolomite intercalations, as well as grey shales between dolomite layers, and finally well-bedded dolomites in its uppermost part. Sandstones are determined as feldspar arenites to greywackes. They are composed of angular to rounded clasts and exhibit good sorting. The matrix is composed of clay minerals which are cemented by calcite. The shales are irregularly laminated, with very dispersed irregular dark laminae. Only rare quartz silt-size clasts are observed. Dolomites are mostly primary with well-preserved textures and alochem fabrics. Four types of dolomites are determined: dolomicrite, dolobiomicrite, dolobiosparite and dolobiolitite. XRD analysis of shales and sandstones showed a general increase in micaceous and clay minerals, coupled with a decrease in albite, hematite, and quartz along the section. Among the clay minerals only chlorite was distinguished, but no kaolinite was recognized.

The increase in carbonate sedimentation is interpreted as stabilization of the sedimentary environments, and cessation of siliciclastic input. Decrease in grains size of clastic component up section indicates more quiet environments and possibly more distal position on the stabilized shelf. The increase in clay sized particles is also related to the increase in micaceous minerals, and consequently to the decrease in quartz content. Although K-feldspar and plagioclase were recognized in XRD analysis, the lack of kaolinite, as a weathering product of such minerals indicates the climatic conditions were not humid tropical but rather warm arid. Change in shale colour, from red to grey is related to the reduction of iron, as the red clastic bare hematite, and in the grey shales pyrite is recognized. The "Carnian Pluvial Episode" sediments have some similar characteristics with the recorded Lokve section, but clear evidence for such an episode is not seen here. The Lokve section probably represents a younger Upper Triassic stratigraphic interval, representing the stabilization of carbonate production and deposition of the regionally recognized Main Dolomite.

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