Palaeogeographic perturbations in the key-area between the Alpine Tethys and the Neotethys Realms during the time of tectonic overturns: Jurassic of the Alpine-Dinaric transition zone

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The major Mesozoic palaeogeographic disintegration of the present-day transitional area between the Alps and the Dinarides (Slovenia) occurred due to the Middle Triassic rifting event related with the opening of the Neotethys Ocean. By the Norian, three major palaeogeographic units were formed: the Dinaric (Adriatic, Friuli) Carbonate Platform (DCP) in the south, intermediate, E-W extending Slovenian Basin (SB) and the Julian Carbonate Platform (JCP) in the north. The platforms were characterized by a Dachstein type platform, while the basin was filled with hemiplegic and resedimented limestones, most of which are now dolomitized. To the west, there was a shallow water "bridge" between the two platforms. After the Triassic-Jurassic Boundary crisis, the palaeogeographic setting was preserved, but the margins of the platforms turned into ooidal factories. During the Early Jurassic, SB was almost exclusively filled with ooid calciturbidites from the north, which can be explained by the wind/leeward position of the basin with respect to the particular platform. The first rifting phase of the opening Alpine Tethys, generally dated to the earliest Jurassic, is poorly expressed in this area. The main products are limestone breccias that occur in the western part of the SB. In contrast, the second rifting phase (dated to the Pliensbachian in Slovenia) completely disintegrated JCP. The margins subsided first and were characterized by open shelf conditions with crinoid meadows, while the inner parts of the JCP remained shallow-marine. In the SB, the initial subsidence can be seen in the altered composition of the calciturbidites. Namely, the ooid/peloid dominated resediments changed to crinoid/lithoclast dominated. In the Toarcian, sedimentation ended on most of the JCP, with only sporadic marls occurring at the margins. At the same time, the sedimentary environment of the DCP also deepened and nodular or crinoid limestone was deposited. The SB is characterized by uniform clay-rich sediments that vary greatly in thickness, indicative of differential subsidence caused by the second rifting phase. In the Middle Jurassic, shallow-water sedimentation re-established on the DCP, the margin being characterized again by ooidal shoals, the sedimentation of the SB gradually changed to siliceous limestone, while the JCP and the "bridge" between the JCP and DCP are characterized by non-sedimentation. The last important Jurassic change occurred during the Bajocian-Bathonian stages. Condensed Ammonitico Rosso-type limestone began to be deposited on the "bridge" and the JCP, while sedimentation in the SB changed to pure radiolarite. In the past, this was interpreted as a result of thermal subsidence associated with oceanization of the Alpine Tethys. However, studies in the last decade suggest a more complex tectonic evolution. Because the area in question lies between the opening Alpine Tethys to the west and the concurrent onset of subduction of the Neotethys to the east, it has been subject to strong differential subsidence between the large-scale DCP and all units north of it. The exact nature of the tectonic deformation is not yet clear, but a transtensional regime is most probable. These events resulted in the disintegration and collapse of the northern DCP margin, as evidenced by the sedimentation of limestone breccia megabeds along the entire SB southern margin. These megabeds not only indicate enhanced tectonics, but also provide important information about the pre-Middle Jurassic architecture of the DCP margin, which is no longer preserved. They consist of very diverse limestone lithoclasts and an ooid packstone matrix. Analysis of the clasts revealed that the Late Triassic DCP margin was characterized by Dachstein-type reefs and the Early Jurassic by ooid shoals. In the interior of SB, these strata merge into ooid calciturbidites interlayered between radiolarite and become completely wedged in the northern part of the basin. Corresponding gravity-flow deposits also sedimented on the subsided "bridge" between the DCP and the JCP, and even on the northern margin of the DCP itself. An important difference is the simpler composition of the resediments in this area. Namely, they consist entirely of Middle Jurassic platform margin and slope lithoclasts. This is explained by the less pronounced palaeotopography between the active platform and submerged "bridge", which did not allow erosion of the older platform limestone (as observed in SB). The described collapse of the DCP margin caused it to retreat, and marginal reefs formed over the

eISSN 2353-3641 | ISSN 1731-0830

underlying inner platform limestones in the Late Jurassic. The emersion phase in the Kimmeridgian ended reef growth and the margin turned back into ooid rich shoals. At the same time, the SB was characterized by continuous radiolarite sedimentation and drowned JCP together with the "bridge" with the Ammonitico rosso facies, characterized by several stratigraphic gaps. Rare calciturbidites are interbedded in areas near the DCP (southern SB and a drowned "bridge"). At the end of Jurassic, all areas north of the DCP show uniform sedimentation of the Biancone Limestone Formation.