Sedimentology of the end-Cretaceous flysch sediments in the SE part of Slovenia

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At the beginning of Mesozoic the territory of the present-day Slovenia was a part of a large uniform carbonate platform. Paleographicaly it was a part of a passive continental margin of Pangea. In the Middle Triassic it broke from the main ontinental masses due to extensional tectonics caused by opening of the Meliata ocean, creating Apulian tectonic microplate. In its NE part, i.e. in the the pre-existing uniform platform area broke in to three paleogeographic units . In the north Julian Carbonate Platform in the middle the Slovenian Basin, and in the south the Adriatic Carbonate Platform. Adriatic carbonate platform remained relatively stable to the end of Cretaceous when the NE part of Apulian microplate collided with the European continental plate. This formed collision thrust system propagading from NE to SW, with thrust plain oriented NW-SE. In the front of the thrusting, flysch sediments were deposited, thus causing the 'death' of the Adriatic carbonate platform. Studied area is situated in the transitional part between the Outer and Inner Dinarides characterized by lower Mesozoic ovelain by deep-water, mostly Cretaceous flysch deposits. It lies in the SE part of Slovenia in the region Bela krajina. Flysch sediments are located in the most eastern part.

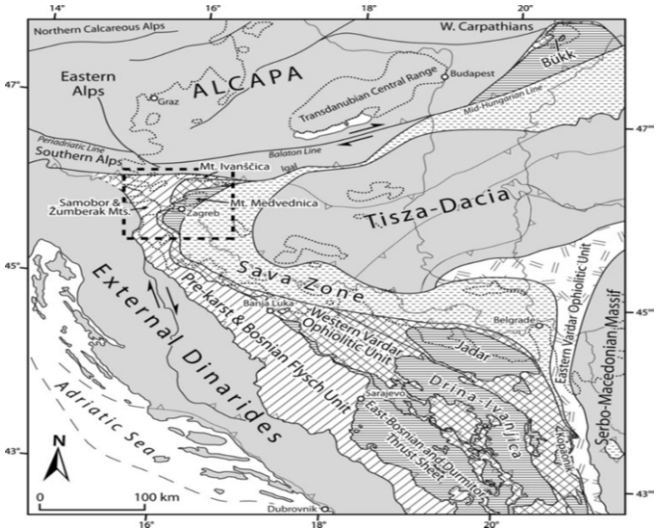

Fig. 1.: Paleogeographical sketch; studied section are situated close the Žumberak Mts. (Lužar-Oberitar, 2012)

Aim of the study was to determine the provenance and age of clasts in limestone breccia megabeds that dominate the basal flysch sediments and also to confirm the age of the flysch sediments. With detailed geological mapping (1:5000) we were able to establish the main geological characteristics of the studied area. Erosinal boundary separates the Jurassic limestone from the overlying end-Cretaceous flysch sediments. Flysch sequence is split into the three major parts. The lowest is the basal breccia that was formed with debris flows. The next part is marked by alternating marl and turbidite megabeds. We mapped six megabeds, each of them are at least five meters thick. They were formed with large-scale turbidite flows or based on particular beds also debris flows. Lithology is grading from breccia to coarse-fine grained calcarenite. Third part is marked with distal flysch deposits. The sampling for microscopical studies has been mostly done along the detailed geological section (1:100). We sampled breccias of the same grain size, from basal breccia and following six megabeds.

The diferences in the composition between the basinal breccia and megabeds is in the cements and the abundance of clasts but they show no significant diferences in composition of litoclasts. Basinal breccia consists of 60 % litoclasts and bioclasts and 40 % of micritic matrix. Megabeds consist of around 80% litoclasts and 20% sparitic carbonate cement. Megabeds exhibit upwards also the higher clast-roundness, more clear grading, and overall clearer organisation of turbiditic beds. This indicatesthe distalisation of the sedimentary environmentaway from the erosional part of the slope to the more deeper parts of the forming basin.

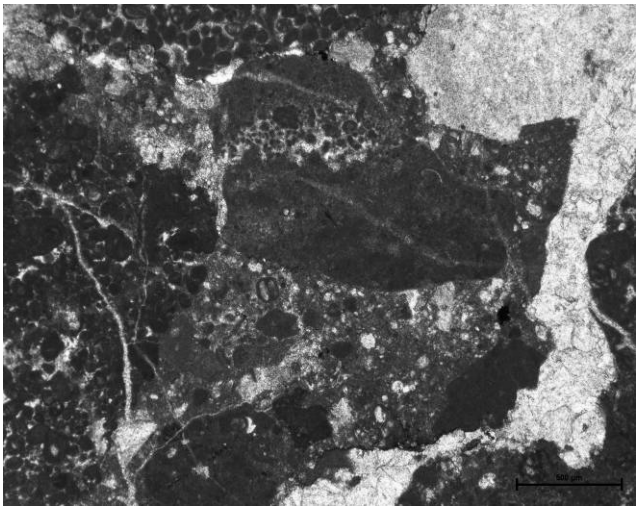

Fig. 2.: Different clasts in turbidite megabed.

With detailed microscopical studies, we were able to distinguish more, than ten different types of lithoclasts. All of them have their provenance from the Adriatic Carbonate Platform. Their age is from Turonian to Maastrichtian. They were deposited in shallow carbonate environments, with different composition depending of the water-energy of the original sedimentary environments. Their composition is changing form micritic clasts with some foraminifers (miliolidas) and green algae, to clasts dominated byintraclasts, ooides, foraminifers, brachiopodes and the abundance of rudist shells. There are also a lot of bioclasts in the thin sections, mostly consisting of parts of rudist shells. This shows that platform was still active until the upper parts of Cretaceous, more precisely-Maastrichtian stage. Maastrichtian age of the flysch sediments was confirmed by finding of pelagic foramenifera *Globotruncana stuartiformis Dalbiez* in the matrix of the breccia.

Lužar-Oberiter B., Mikes T., Dunkl I., Babič Lj., von Eynatten H., (2012): Swiss J Geosci, DOI 10.1007/s00015-012-0107-3