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3D modelling of the Carnian Crisis in a new FWF Project (P22109-B17) – Ammonite mass mortality (200 000 000 !!! specimens) as proxy for the Carnian Crisis (Taurus, Turkey)

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The Upper Triassic in general, and the Carnian stage in detail was devastated by one of the most severe ecological crisis of the Mesozoic Era, the Carnian Crisis (= Carnian Pluvial Event), when the carbonate platforms demised and with them most of the reef-builders disappeared. The Orthoceltites assemblage (ammonoids, cephalopods) was formed in the Carnian Crisis, now located at the boundary from Kartoz and Kasimlar Formation (Anatolia, Turkey), can act as proxy for the environmental activities and biotic crisis in the Carnian time. It has to be noted that the ultimate cause of this drastic Mesozoic crisis is still under comprehensive discussion. The main investigation topics of the project are the palaeoecologic, palaeobiogeographic, litho-, cyclo- and magnetostratigraphic development of the Upper Triassic (Carnian) ammonoid mass-occurrence at the Asagiyaylabel section in Anatolia (Turkey), formed during the Carnian Crisis. This area is a key section within the Taurids and has a connecting and intermediate position. Situated on the western end of the Cimmerian System at that time it shows connection to both, the Neo-Tethys and the Palaeo-Tethys Oceans. New insights into the taxonomy and the palaeoecology of the investigated ammonoids and associated macro- and microfossils are expected. The abundant ammonoid Orthoceltites, at least 200 000 000 !!! specimens, is assumed to be a new species. Further topics of investigation are the original position and environmental conditions of the sedimentation area at the Asagiyaylabel section, located in the Taurids. The formation of the ammonoid beds is either autochthonous or allochthonous (transported). Expected 3D modelling results will be essential to reach geodynamic, palaeooceanographic and palaeobiological conclusions. This further leads to the question of the original water depths during the formation of ammonoid mass occurrences. As a multitasking project, one aim is to underline a crucial fact in working within different sciences as the Structural Processes Group at the Departments of Geodynamic and Sedimentology (University of Vienna) and the Geometric Modelling and Industrial Geometry group (3D technology at the Vienna University of Technology). Interdisciplinary collaboration with other scientists is essential in modern times. Statistical analysis of the orientation and relative position (e.g. imbrication) of the ammonoid shells can hint to current or transport directions. 3D modelling of calcite-cement distribution (representing geopedal structures) and post-diagenetic calcite-veins displacing several ammonoids will complete the geometrical reconstruction and shed light on the biostratinomic and additional diagentic processes. The combination in analysing different fossil groups with additional analysis of istotopic, magnetostratigraphic, cyclostratigraphic and geochemical features will help to extract details of the Upper Triassic history around one of the most severe crisis in the Mesozoic time, the Carnian Crisis. Investigations, undertaken at sections (e.g. Asagiyaylabel) possessing this time interval, can work as proxy for the major Upper Triassic Tethyan crisis. Environmental changes as displayed by the sea level and climate can become more obvious and the ‘motor’ behind the demise better understood.