# Slope basin depositional model of the Paleogene Gosau Group of Gams on top of the incipient Eastern Alpine orogenic wedge (Austria)

Koukal, Veronika; Wagreich, Michael; Eder, Lukas

Department of Geology, University of Vienna, Josef-Holaubek-Platz 2, A-1090, Vienna, Austria.

This study focused on the Paleogene deep-water depositional system of the Upper Gosau Group at Gams, Styria. The examined sections of Danian to Ypresian age (NP1–NP12) comprise sediments of the Nierental and Zwieselalm formations. The sections predominantly consist of thin- to medium-bedded, sandy and silty turbiditic beds, including fine breccia layers at the base, respectively silty shales or claystones on top. Further pelagic marls, slump beds and mass flow deposits occur. Normal grading, lamination, amalgamation of sandy beds and bioturbation are characteristics of all sections. The thickness of sandstone beds varies strongly from only centimeters to several meters, sandy/silty turbidite beds between 11 and 100 mm prevail. Complete Bouma intervals (Ta to Te) are scarce, but Tbcd intervals are often visible. Based on heavy mineral-, thin section-, microprobe- and paleoflow analyses, provenance was from the surrounding Northern Calcareous Alps (NCA) rocks and exhuming metamorphic Upper Austroalpine units to the south. Provenance indexes based on heavy mineral assemblages indicate the dominance of an upper greenschist to lower amphibolite metamorphic facies source of the investigated sediments. In addition, biogenic-calcareous material was delivered into the basin by adjacent contemporaneous shelf zones. The lithic arenites of the Paleocene Gosau Group show a peculiar composition for sandy turbidites, due to the source area, the metamorphic basement units of the Austroalpine and the extended reworking processes at the southern margin of the NCA and across the shelf of the Austroalpine microplate. The sedimentary depocenter was situated at the slope of the incipient Alpine orogenic wedge, in frontal parts of the NCA, facing the subducting Penninic Ocean/Alpine Tethys. The evolution of the basin was connected to the eoalpine and mesoalpine orogeny, and the adjunctive transpressional setting. Thus, a comparison of the depositional system of Gams with traditional submarine fan models of turbidite/deep-water deposition is complicated, due to the model premise of an unconfined, often large turbidite complex, which developed on the slope and expanded further at the toe of slope. The Gams slope basin provided a small depositional area and accommodation space on the incipient alpine orogenic wedge, and the pervasive tectonic deformation of the NCA destroyed and obscured important features of the formerly confined source-to-sink system. However, the Gams deep-water depositional system is interpreted as a submarine fan, deposited into a small confined slope basin, positioned along an active continental margin, bound and influenced by (strike-slip) faults, related to crustal shortening. The development of the Gams slope basin and its infilling sequences was mainly dominated by tectonism and sediment supply, rather than by eustatic sea-level fluctuations. General greenhouse conditions, with enhanced chemical weathering under seasonal conditions are assumed for the entire Gosau Group of Gams (Upper Cretaceous to Eocene), which enhanced erosion and facilitated a greater terrestrial sediment supply. Particularly, an increased input of siliciclastics around the PETM is noticeable, including significant numbers of sandy turbidites. The basin was cut off during the Eocene due to renewed orogenic activity. A Quaternary analogue for the Paleogene basin setting of the Gams area is represented by the Santa Monica Basin in the California Continental Borderland.