

Paleogene deep-water facies of the Upper Gosau Subgroup at Gams (Styria, Austria)

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The Gosau Group of Gams comprises deposits of Late Turonian to Ypresian age which rest unconformably upon Permian – Jurassic strata of Tirolian nappes (Northern Calcareous Alps, NCA). Outcrops of the Nierental Formation (Upper Campanian – Selandian) and the Zwieselalm Formation (Maastrichtian – Ypresian) were investigated along Gamsbach creek and some tributary creeks between Krautgraben and Gamsforst in the eastern Gams basin.

Detailed sedimentological studies within the Upper Gosau Subgroup above the K/Pg were made, including bed-by bed measurements of sections, heavy mineral-, microprobe- and thin section analysis. Biostratigraphic correlation of sections is based on calcareous nannoplankton and led to a composite section with four facies assemblages for the investigated area.

The Danian section of the Nierental Formation (NP1 – NP4) consists of hemipelagic to pelagic red and gray marls and marly limestones, intercalated with minor thin, normally graded, sandy and silty turbidite beds as well as slump beds and submarine debris flow deposits. Turbiditic sandstones are rich in carbonate and include redeposited material from NCA, bioclasts (foraminifera, corallinacea) are common. Debris flow deposits include also Paleocene limestones. Variable geometries (channel-fill, lenses) and textures (matrix- to clast-supported) of these mass transport complexes are present.

The basal part of the Zwieselalm Formation (NP5 – NP12) is indicated by the first thick (> 1 m) turbiditic sandstone bed. An interval (NP5 – NP9) of gray carbonate-rich sandy and silty turbidites (i. e. “classical turbidites”), gray marls and marly claystones changes into a carbonate-poor succession (NP9 – NP10) of sandy and silty turbidites and claystones. Turbiditic shales are dark gray, only a few centimeters thick and mostly devoid of carbonate. The Paleocene/Eocene-boundary interval is characterized by thin-bedded turbidites with russet to brown claystones, deposited below the calcite compensation depth (CCD). An interval (NP10 – NP11) of turbiditic sandstones with higher carbonate contents follows, intercalated with gray, reddish and greenish marls. Towards the top of the Zwieselalm Formation (NP12), the thickness of fine-grained sandstone beds decreases. Breccia layers at the base of turbidites and several slump beds are characteristics of the Zwieselalm Formation. Thicker sandstones show Bouma Ta-e sequences, more frequent thinner beds often only show Tcd sequences. Water escape structures, bioturbation and amalgamation of turbiditic sandstones are visible in all sections. Thinning- and fining-up cycles indicate small turbidite fan(s) prograding into a confined slope basin.

Heavy mineral- and thin section analysis suggest a mixed siliciclastic-carbonate source from the rising metamorphic hinterland, the NCA and small contemporaneous carbonate platform areas. Material derived from the south filled up a (partly) confined slope basin along the active margin of the Austroalpine microplate.