

The type-Gosau Group of the Northern Calcareous Alps: Upper Cretaceous to Paleogene basins

Michael Wagreich

Department of Geodynamics and Sedimentology, University of Vienna, A-1090 Vienna, Austria;
e-mail: michael.wagreich@univie.ac.at

The Upper Cretaceous to Paleogene strata of the Gosau Group is characterized by a large variety of facies and depositional systems, from continental to deep-marine, as a consequence of incipient Alpine orogeny (the Eo-Alpine phases of orogeny). Equivalent Gosau-type sediments occur within the wider Alps area, the Carpathians and the Balcanides in the CBGA regions. The term “Gosauschichten” or Gosau-type sediments or Gosau-facies was used loosely for transgressive Upper Cretaceous successions within an area from the Eastern Alps of Austria up to the Carpathians of Romania.

At its type locality in the Northern Calcareous Alps (NCA) of Austria, the Gosau Group is defined by a basal angular unconformity above Permian to Lower Cretaceous rocks, thus marking a new sedimentary cycle starting in late Turonian times. These deposits follow a phase of Lower Cretaceous to Cenomanian deformation, which was attributed partly to the “Austrian phase”.

The Lower Gosau Subgroup (LGS, Upper Turonian -Campanian) at the type locality and other Gosau basins in Austria starts with terrestrial deposits. Widespread (karst) bauxites indicate weathering in subtropical-tropical climate and give evidence for subaerial exposure of wide areas for the first time in the Mesozoic. Alluvial and fluvial conglomerates indicate syntectonic sedimentation and considerably tectonic relief, including source areas mainly from the NCA, but also from “exotic” sources both to the north and to the south of the NCA. Alluvial sedimentation passes gradationally into shallow-marine successions with a mixture of various facies types, from fan-delta conglomerates to coastal strata and small rudist and coral bioherms and lagoons. Abundant fossils like rudists, solitary corals, molluscs (gastropods like *Trochacteon*, *Actaeonella*, *Nerinea*, etc.; bivalves such as inoceramids) and ammonites mark these “Gosau-type” facies. Individual basins show strong intrabasinal and interbasinal facies changes within a few kilometers, and a rugged topography. Basins of the NCA were interpreted as relatively small, strike-slip related basins due to extension after contractional deformation and thrusting, including piggy-back basins on thrusts. Strong, short-lived tectonic subsidence pulses characterize this phase of basin formation.

The occurrence of ophiolitic detritus including chrome spinel in heavy mineral assemblages is a prominent feature of these basins. Serpentinic sandstones are known from Gosau basins especially in the southern thrust units of the NCA. This points to a common mechanism of tectonic basin formation related to Late Jurassic to Early Cretaceous Neotethys ophiolite obduction and suturing, to the south of these basins, building more widespread ophiolite bodies.

Above an unconformity, the Upper Gosau Subgroup (UGS, from Campanian onwards) comprises deep-water deposits such as marls and a broad variety of deepwater clastics such as turbidites up to the Eocene. A major subsidence pulse is present at the base of the UGS which deepens the whole NCA area step-by-step in bathyal to abyssal depths, with some of the northern basins showing deposition below the CCD. Metamorphic detritus from the exhuming Austroalpine basement complexes to the south of the NCA yielding garnet as the main heavy mineral forms the main sediment material.