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An ophiolithic provenance for a freshwater influenced Upper Cretaceous succession (Gosau-Group, Austria) inferred by trace elements

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The interplay of Late Cretaceous basin subsidence and sea-level oscillations produced a freshwater-marine succession within the Gosau Group in the basement of the Vienna Basin (Austria). Cored sections (courtesy of OMV AG) have been investigated for the boreholes Markgrafneusiedl T1 and recently for Glinzendorf T1 and Gänserndorf T3 of the Glinzendorf syncline. These sediments are supposed to correlate to similar strata of the Grünbach Formation in the outcrop area of Grünbach-Neue Welt (Lower Austria, Northern Calcareous Alps) and yield a Santonian to early Campanian age

Fine grained samples were taken from the Upper Cretaceous borehole sections and were geochemically analysed (bulk rock). A lowermost succession of the borehole Markgrafneusiedl T1 from around 4100 to 4020 m interpreted as limnic deposits with relatively low carbon (-3.2 per mill VPDB) and oxygen (-5.0 per mill VPDB) isotopies is followed by marine sediments at around 3900 to 3400 m. This marine middle section has relatively higher carbon (-0.8 per mill VPDB) and oxygen (-5.1 per mill VPDB) isotope ratios. At the top between 3275 and 3200 m a limnic interval is likely again. Boron contents rise from 88 ppm on average in the non-marine parts to values up to 133 ppm in the marine intercept.

Differences of the provenance of the marine and limnic parts were investigated by using concentrations and ratios of trace elements with the aim to correlate the drilling sections of the different boreholes. Non-marine successions of the Markgrafneusiedl T1 cores show higher chromium and nickel contents up to 250 ppm respectively 400 ppm while the marine intermediate is characterised by only about 110 ppm chromium and 60 ppm nickel concentrations. In addition to that the lowermost freshwater influenced samples are enriched in Cr/V-ratio relative to the Y/Ni-ratio and therefore trend to an ultramafic source.

Summing up the observation of the trace elements lead to the conclusion that the provenance of the limnic succession could be ophiolithic in contrast to the marine interval. This conclusion is corroborated by the presence of chrome spinel in heavy mineral assemblages and points to a provenance from a Tethys ophiolitic suture to the south of the Northern Calcareous Alps.