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STRONTIUM ISOTOPE STRATIGRAPHY IN THE UPPER CRETACEOUS OF THE EASTERN ALPS

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The $^{87}Sr/^{86}Sr$ isotope ratio of sea water shows a distinct evolution during earth history, thus givproviding a tool for precise chemostratigraphic correlations. The application of Strontium isotope Stratigraphy (SIS) is based primarily on measurements of marine biogenic material, e.g. shells or microfossils, or on bulk rock samples of limestones. Measured isotope ratios can be compared to standard seawater curves (e.g. Veizer et al., 1997; McArthur et al., 2001). The method of strontium isotope stratigraphy was applied to several Upper Cretaceous key sections in the Eastern Alps, e.g. the Rehkogelgraben and Buchberg sections of the Ultrahelvetic unit ("Buntmergelserie"), and sections of the Gosau Group of the Northern Calcareous Alps.

In Upper Austria, a succession of marls, marly limestones and limestones of the "Buntmergelserie" is exposed within several tectonic windows in the Rhenodanubian Flysch Zone. In the Rehkogelgraben near Gmunden, a newly found Cenomanian-Turonian boundary section was investigated, including distinctive black shale horizons. The transition from the black shales into marly limestones and red marls was found both in the Rehkogelgraben section and in the Buchberg section near Attersee. The section starts with limestones and marls of Late Cenomanian age, dated by nannofossils (e.g. *Lithraphidites acutus* and *Corollithion kennedyi*; nannofossil standard zone CC 10), overlain by a 1 m thick interval with 3 black shale layers. TOC values are about 5 %, carbonate contents are below 3%. Above this interval *Quadrum gartneri* has its first occurrence, defining the base of nannofossil standard zone CC 11. Based on correlations the Cenomanian/Turonian boundary is situated below the FO of *Quadrum gartneri*. The Lower Turonian is characterized by a 2 m succession of white to light grey marly limestones grading into alternating grey limestones and red marls in the Buchberg section. First results show a slight but significant shift of $^{87}Sr/^{86}Sr$ isotope ratios around the black shales and a following gradual decrease in isotope ratios.

Ammonite, inoceramid, foraminiferal and nannoplankton data allow the recognition of the Santonian/Campanian-boundary interval in sections of the Gosau Group in the Northern Calcareous Alps. In the Gosau area fine-grained sandstones (Sandkalkbank) with late Santonian ammonites and inoceramids is overlain by a lower Campanian marly succession. Nannofossil data indicate that the Santonian/Campanian boundary lies within the *Calculites obscurus* Zone (CC17). Curved *Lucianorhabdus cayeuxii* appear already in the Upper Santonian, defining nannofossil subzone CC17b. *Broinsonia* (*Aspidolithus*) *parca*, defining the base of CC18, has its FO about 20 metres above the Santonian ammonite assemblage, at about the same level as the LO of the planktic foraminifera genus *Dicarinella*. *Globotruncanita elevata* appears for the first time within the Santonian/Campanian boundary interval, above the sandstones. Strontium isotope data from the uppermost Santonian (brachipode shell of Sandkalkbank) indicate a $^{87}Sr/^{86}Sr$ isotope ratio of 0.707468 ± 7. Strontium ratios measured on planktic foraminifera increase up section into the Lower Campanian up to 0.707590 ± 20.

In the Gosau Group of the Lattengebirge near Berchtesgaden (southern Germany; Wagreich, 2003) a marly Santonian/Campanian boundary succession is defined by the FO of *G. elevata*, the LO of *Dicarinella asymetrica* and the FO of *B. parca*. Strontium isotope data from planktic foraminiferal tests allow a detailed correlation of the boundary to standard sections in England (0.707479 ± 5) and northern Germany (0.707472 ± 12; Gale et al., 1995). These values for the Santonian/Campanian boundary correspond to a level well below the first

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occurrence of *G. elevata* in the Lattengebirge section. Strontium ratios increase up section within the *elevata-asymetrica* Zone to 0.707540 ± 10.

The Campanian/Maastrichtian boundary was investigated in Gams and Gosau (Gosau-Group,Northern Calcareous Alps). The position of the *Globotruncanita calcarata* planktic foraminifera Zone in regard to the standard definition of the lower boundary of the Maastrichtian in northern Germany was investigated in detail. Our strontium isotope data for foraminiferal calcite of this zone (around 0.707670) confirm the results that this zone is of Late Campanian age and cannot be correlated to the Campanian-Maastrichtian boundary in northern Germany.

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Artikel/Article: Strontium isotope stratigraphy in the upper cretaceous of the Eastern Alps 419-420