Geophysical Research Abstracts,
Vol. 11, EGU2009-5127, 2009
EGU General Assembly 2009

Environmental changes in a fresh-water influenced Upper Cretaceous succession (Austria)

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The interplay of Late Cretaceous basin subsidence and sea-level oscillations produced a cyclic freshwater-marine succession within the Gosau Group in the basement of the Vienna Basin (Austria). Cycles have been investigated in the Markgraf Neusiedl 1 borehole cores (courtesy of OMV AG) of the Glinzendorf syncline. The Markgraf Neusiedl core sediments can be correlated to similar strata of the Grünbach Formation in the outcrop area of Grünbach-Neue Welt (Lower Austria, Northern Calcareous Alps). There, sections from abandoned coal mines were measured and described in detail. Biostratigraphic data indicate a Late Santonian to Early Campanian age of these cyclic sediments. The environment was characterized as terrestrial freshwater swamps interfingering with shallow brackish to marine sediments of a delta plain under warm and humid subtropical climate conditions.
The Upper Cretaceous borehole section starts with conglomerates and pebbly sandstones of alluvial environments. Conglomerates at around 4100 m depth yield probably freshwater algal calcite crusts with carbon isotopes of -3.2 per mil VPDB and oxygen isotopes around -4 per mil VPDB. At 4020 m coal seams and shale intercalations are present, grading into a shaly to silty succession with occasional mollusc layers up to ca. 3400 m. Carbon isotope values of 1 to 1.5 per mil and oxygen isotopes around -5 per mil are recorded. The upper part of the Cretaceous succession up to ca. 3200 m becomes more sandy to silty and carbon isotopes become more negative, around -3 to -5 per mil and oxygen isotope values up to -8 per mil, which may indicate a stronger diagenetic influence as carbon and oxyen isotopes covary in that interval.
Marine-freshwater cycles are expressed in geochemistry data and fossil assemblages, i.e. the rare occurrence of marine microfossils such as foraminifers and dinoflagellates.