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Carbonate chemistry and stable isotope measurements from Cretaceous Oceanic Red Beds of the Eastern Alps

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Cretaceous Oceanic Red Beds (CORBs) are pelagic sediments deposited ubiquitous in Upper Cretaceous ocean basins with ocurrences from New Zealand to DSDP cores in the Atlantic. CORB deposits occur worldwide shortly after the anoxic Cenomanian-Turonian Boundary Interval (CTBI) and are thought to represent the oxic state after a major anoxic state of the ocean (e.g. Wang et al., 2005). CORBs are known in from Helvetic/Ultrahelvetic, Penninic and Austroalpine units and were deposited above and below the CCD. This work concentrates on deposits from above the Cretaceous CCD which is estimated to be at 3600m depth (Tyrell & Zeebe, 2004).

Two profiles from the Austroalpine and Ultrahelvetic realm are compared regarding their carbonate bound elements and stable isotope distribution to get a hold of the mechanisms of CORB formation. Both profiles contain the transition of grey marl sedimentation into CORBs. Both sediments are pelagic marls with varying carbonate content, low sedimentation rates and low TOC content.

The Ultrahelvetic Buchberg section is characterized by alternating marl limestone cycles with 100 000 yrs orbital forcing and display the Lower Turonian transition into CORBS. The Austroalpine Santonian Brandenberg section consits of grey marls grading into red marls which are cut by turbiditic deposits at the top of the profile.

Acetate and EDTA extraction of the carbonates were followed by ICP analysis of carbonate bound main and trace elements. Mn/Sr vs. δ18O plots are used to check for diagenetic overprint. In particular the distribution of carbonate bound Fe, Zn, Co, Cu, Mn and Ba are of interest because in combination with stable isotope measurements they can give information on the oxidation state and nutrient cycling in the ocean basin.

One main question during CORB deposition is the timing of colouring. The hematite might be a secondary mineral formed by oxidation fronts which percolate during late diagenesis. Here we show that in both sections the carbonate bound (ferrous) iron decreases significantly in the CORB part which indicates a primarily more oxic environment and a true change in oxidation state of the ocean basin.

References:

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