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Benthic microfossils, geochemistry and cyclicity of Rhaetian deep neritic to basinal sediments of the Northern Calcareous Alps

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The Rhaetian Zlambach Formation was previously suggested to have accumulated under stable normal marine conditions in a pelagic environment bordering to the so-called Meliata Ocean. Slumping structures and turbiditic beds are suggestive of a toe-of-slope to basin environment. Previous estimations of the maximum water depth of the Zlambach Formation vary between 50m and 500m. Preliminary results of the present study, particularly the absence of deep marine (bathyal) ostracods are suggestive of less than 200m water depth. A high resolution micropalaeontological and geochemical analysis of the Zlambach Formation at the Rossmoosgraben section (near to Bad Goisern, Austria) has proved significant environmental changes which were controlled by sedimentary cyclicity and changing water depth. The lower and middle part of the Zlambach Formation at the Rossmoosgraben section (Rhaetian 2-3) shows 4 to 6 meters thick depositional cycles consisting of thick clayey and silty marls in the lower parts and intercalated thickening-upwards micritic limestones in the upper parts. Intercalations of detritical limestones with abundant shallow-water foraminifera, geochemical proxies for the input of terrigenous clastics as well as the carbonate content prove turbiditic activity at the top of the cycles, probably caused by sea level fluctuations. Short-term sea level changes are also recorded in age-equivalent intraplatform basin deposits of the Northern Calcareous Alps (Kössen Formation). The microfossil assemblages of the Zlambach Formation also display cyclic changes. The ostracods show increasing total abundance and species diversity from the base to the top of each cycle and changes in the relative proportion of taxa. Relative small, smooth and thin-shelled healdiids and bairdiids are abundant in the lower part of each cycle. Larger thick-shelled and sculptured healdiids and bairdiids occur preferentially in the upper part of the cycles. Very distinct changes are recorded by the foraminifera assemblages and bioturbation patterns. In the lower parts of the cycles occur predominantly primitive agglutinated forms together with smaller nodosariid taxa while the relative abundance of other lagenids increases significantly towards the top. Laminated shales in the lowest parts of the cycles point to oxygen-poor conditions while the middle and upper parts show trace fossil associations indicating higher oxygen concentrations. Preliminary foraminifera and carbon isotope data as well as intervals with millimeter-scale laminations in the upper Zlambach Formation (Rhaetian 3) point to major environmental disturbance in the late Rhaetian.