



## **Bryomol carbonates and cross-stratified calcarenites: A Lower Miocene mixed carbonate - siliciclastic system from the Upper Marine Molasse Sea**

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During the Early Miocene (Ottangian - ca. 17.8 Ma), the central Molasse Basin of the North Alpine Foreland Basin was flooded by the shallow Upper Marine Molasse Sea (OMM). During maximum flooding, the Randengrobkalk consisting of bryomol deposits and nearshore cross-stratified calcarenites were deposited on the northern coastline of the OMM. These deposits represent a mixed carbonate - siliciclastic system, allowing environmental signals from both sediment types to be used to interpret the depositional environment.

The bathymetric gradient from the coastline to deeper water was dictated by the underlying morphology of the Jurassic limestone, which was flexed down by the orogenic loading of the Alps. This resulted in a bathymetric gradient, comparable to a shallow ramp. The observed vertical and lateral transitions from carbonate to mixed siliciclastic-carbonate deposits are interpreted to represent a change from a distal to proximal environment and thus the southward progradation of the OMM coastline due to uplift or sea-level fall.

The Randengrobkalk is separated into different sedimentary facies types according to: 1) the admixture of siliciclastics and carbonates, 2) biogenic content and 3) sedimentary structures. Standard microfacies techniques were applied to the carbonates including component identification, fabric analysis, and multivariate treatment of quantified data. The carbonates dominated sediments generally consist of rudstones and packstones dominated by molluscs (bivalves and gastropods), bryozoans, balanid barnacles and echinoids. Coralline algae and benthic foraminifera are rare, coated grains

can also be present. The taphonomy of the biogenics shows a wide range preservation which can be correlated to siliciclastic content and grain size.