

STORM-INDUCED EVENT DEPOSITS IN THE TYPE AREA OF THE GRUND FORMATION (MIDDLE MIOCENE, LOWER BADENIAN) IN THE MOLASSE ZONE OF LOWER AUSTRIA

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Since the 19th century in the Molasse Zone of Lower Austria sediments of the Middle Miocene (Lower Badenian) Grund Formation ("Grunder Schichten", Grund Beds) have been famous for their fossil content.

During two field campaigns in 1998 and 1999, organized by the Department of Palaeontology of the University of Vienna, in the type area at Grund predominantly sandy sediments of the Grund Formation were studied in eight sections.

These sections showed four different lithofacies with typical features of storm-beds. Sandy beds with typical vertical arranged sedimentological features like erosive base, basal



concentrations of coarse shell debris, mud-clasts and clast-horizons, normal graded beds, horizontal lamination of the upper plane bed, concentrations of plant and wood debris, asymmetrical ripples at the top, and syndimentary deformation structures (fig.1) point to storm-induced event deposits. The sands were mainly deposited as tabular to slightly wedge-shaped sand-sheets; only extreme events produced channel-shaped sediment bodies. Pelitic layers at the top of such event-strata represent fair-weather conditions.

Fig.1: A thick fining-upward and non-bioturbated sandy bed with basal coarse shell debris and erosive base, produced during a single storm event. Note deformed fair-weather pelitic layer with ball and pillow structures at the top, indicating quick deposition of the following bed.

The basal shell debris mainly contains mixed, synchronous-allochthonous, highly fragmented but determinable marine faunas from shallow to moderately deep environments. Together with land snails and bones of terrestrial vertebrates bottom currents transported the shelly fauna from shallow-marine towards offshore areas. Palaeocurrent data from groove marks, gastropod orientation, asymmetrical ripples and small dunes point to a transport towards ESE

to NE, from a coastal area at the margin of the Bohemian Massif. The various lithofacies clearly reflect a proximal-distal trend from the shoreface to the offshore area.



Fig.2: Highly bioturbated alternation of horizontally laminated sandy beds and pelitic layers, indicating the decrease of the hydrodynamic energy level. Bioturbations of *Zoophycos* are starting from a thick pelitic bed and reaching downwards into the sand.

The higher sections contain bioturbations like *Scolicia* and *Thalassinoides* typical for the Cruziana ichnofacies and bioturbations like *Zoophycos* (fig.2) and *Saronichnus*, typical for the Zoophycos ichnofacies. Such a mixture of trace fossils of different ethology is characteristic of the upper offshore - lower shoreface settings, where the proximal and archetypical Cruziana ichnofacies typically occurs. Altogether the development from the Skolithos to the proximal Cruziana ichnofacies to the proximal-archetypical Cruziana ichnofacies indicates an upward deepening from middle shoreface to upper offshore environments.

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