THE LOWER MIOCENE PFÄNDER-DELTA ON THE SOUTHERN COAST OF THE MOLASSE BASIN

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The NNE-SSW-oriented Pfänder ridge east of Lake Constance (south-western Germany) marks the foreland dip panel defining the southern margin of the autochthonous Molasse in this area and is composed of a succession of clastic sediments of the Lower Freshwater Molasse, the Upper Marine Molasse and the Upper Freshwater Molasse. This sequence was controlled by the activity of an alluvial fan, the Pfänder Fan, which was situated between the Hörnli Fan to the west at the mouth of the Paleo-Rhine and the Hochgrat Fan to the east at the mouth of the Paleo-Iller. It did not nearly obtain the dimension of these very large fans, but it is detectable as an independent fan since the Lower Miocene [5]. In Lower Miocene times, when the marine Eggenburgian transgression invaded this area, a deltaic complex began to prograde in front of the fan at the coast of the Molasse Sea. Deposits of this deltaic complex within the Upper Marine Molasse are well exposed in deep gorges at the southern and south-eastern slope of the Pfänder ridge between Bregenz (Vorarlberg) and Siebers near Weiler (Allgäu/Germany).

The sharp and erosive base of the Upper Marine Molasse is marked by fluvial conglomerates, which are channel sediments of a proximal facies of a prograding alluvial fan, representing the basal low stand tract of the Upper Marine Molasse. It is overlain by a 50 to 110 m thick monotonous shoreface-succession of glauconitic sandstones on a transgressive surface, representing a transgressive systems tract. This facies type is detectable in all of the studied sections as well as the sections in the vicinity [4]. Above this part of the sequence the increasing activity of the prograding delta complex is detectable by deposits reflecting a higher energetic system with much coarse-grained sediments deposited within channels fed by a fluvial system. This part of the sequence is clearly influenced by tidal activities proven by megaripples and heterolithic facies types. In contrast to the basal third these parts of the sections, which were generated since the delta has been active, are not parallelizable even in closely neighboured sections. This fact was interpreted as the internal structure of the delta divided into different lobes and bays between [4]. The deltaic complex is interpreted as a high stand systems tract which is subdivided into several subordinated small cycles. In the talus centre, in the area around the Wirtatobel gorge, for example two terrestrial horizons are detectable; the second is well known because of its coal mining (vitrain) near Bregenz from 1840 until after World War II [2]. These terrestrial horizons represent a delta plain environment in the centre of the distributary fan, thinning out toward northeast. The heterogenic deposits of the active delta complex are overlain by marls of the transition zone or fine-sands of the lower shoreface in the north-eastern sections, respectively. This upper part of the sequence represents a new transgressive systems tract, may be the high stand systems tract is included, too. It shows the highest sea level of the Upper Marine Molasse Sea, the phase of the maximum transgression [4]. The top of the whole sequence of approximately 400 m thickness is cut by a sharp erosional plane, containing in all probability the regressive systems tract. It is overlain by thick coarse-grained conglomerates of the Upper Freshwater Molasse.

Because of the local character of a fan, controlled by tectonics, climate, compaction and subsidence, the described sequence-stratigraphic interpretation of the Pfänder succession is not clearly parallelizable with the general cyclic structure of the Upper Marine Molasse known from the Swiss [1] and German [3, 6] foreland Molasse.

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