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CLAY MINERALOGY COMPOSITION OF MIDDLE MIOCENE LEITHA LIMESTONE FORMATION FROM CORES OF A WATER WELL IN THE SOUTHERN VIENNA BASIN (AUSTRIA)

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The Leitha Mountains are located 30 km southeast of Vienna. They separate the Vienna Basin from the Pannonian Basin. The Vienna Basin is a thin-skinned pull-apart basin on top of the Alpine-Carpathian fold-thrust belt (Decker & Peresson, 1996). The basement of the Leitha Mountains is formed by Lower East Alpine crystalline units and covered by Badenian and Sarmatian (Langhian and Serravallian) sediments, which embodied a shallow carbonate platform (Schmid et al., 2001). Fully marine deposition started at the beginning of Early Badenian. During the Middle Miocene the Leitha Mountains formed a topographic high with extensive carbonate production. The succession is well known for coralline algal limestones (Leitha Limestone), but also comprises a variety of different facies types, which are topic of intensive research work (Wiedl et al., 2012). A 40 m deep water well was drilled in the northern part of the Leitha Mountains in February 2016. The Geological Survey of Austria was in charge for lithological and mineralogical data sampling and interpretation.

The well can be divided into 3 different stratigraphic and lithological zones with a transition from siliciclastic to carbonate depositional environment: 1) The cores from the first 8m comprise grayish to reddish sandy and gravel sediments. The sand fraction is characterized by a very high amount of shell fragments. The faunas were classified as Sarmatian siliciclastic sediments in a shallow marin environment. 2) Between 8 and 13 meters lithology is changing completely. There is a predominance of dark gray marls and clays with high rate of bioturbation. Diverse bentonic foraminifera and nannoplancton give evidence to a deep neritic to bathyal habitat of Upper Badenian age (NN6). 3) Until the final depth of 40.4 meters there is an intercalation of dark grey clay marls with Leitha limestone enriched in corallinacea and foraminifers. The faunal elements including nannoplancton data indicate Middle Badenian age (NN5) in a shallow middle neritic depositional environment.

For representative grain size analysis, wet sieving and X-Ray sedigraph techniques have been applied. The bulk rock and clay mineralogy of 8 samples was determined by XRD. The sample from the Sarmatian section is composed of 41% quartz, 6% phyllosilicates, 9% feldspar and 44% carbonate, mainly calcite. The bulk rock mineralogy of the underlying Upper Badenian samples show a dominance of phyllosilicates up to 57%, followed by quartz with a maximum of 30%, carbonate content varies between 10-30%. The samples of the Middle Badenian succession consist almost completely of carbonate (75-88% calcite). There is evidence of tectonic and climatic control in the clay mineral assemblages. Clay mineralogy of all samples is dominated by smectite and illite, there is significant difference in the amount of kaolinite, chlorite and vermiculite. The siliciclastic influence of the Sarmatian cores is demonstrated by the highest amount of vermiculite and chlorite and little amount of kaolinite. Upper Badenian samples show lesser amount of vermiculite, chlorite and kaolinite and the highest quantity of smectite, which correspond with a period of sea level highstand. High content of kaolinite (18-37%) and complete absence of chlorite was detected only in the Middle Badenian samples, which indicates strong tropical weathering conditions and less tectonic influence in the source area.

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