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Chemostratigraphy of lacustrine siliciclastics: how to process 200 m of monotonous mudstones (Most Basin, Czech Republic, Early Miocene)

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In the W to NW of the Czech Republic there are remnants of sedimentary basins (Cheb, Sokolov and Most Basins), which were part of the European Cenozoic Rift System. These basins were filled during the Burdigalian in purely terrestrial environment. Extensive peatlands (which produced economically important coal measures) in the Most Basin were covered by whole-basin Libkovice Lake after increase of the basin subsidence, and finally the lake covered more than 1000 km^2. The sedimentation was terminated in the upper Early Miocene probably shortly before the Middle Miocene climatic optimum (MMCO). The resulting monotonous, siliciclastic, fossil-barren deltaic and lacustrine sediments have total thickness of up to 250 m; there is no datable material in them and hence their age is based on biostratigrahy of the basin fill. The detailed stratigraphy including correlation over the entire Most Basin (dimensions about 20x50 km), has not yet been established. We have started our research to extract its palaeoenvironmental information content from the Most Basin. The first step of our work was a chemostratigraphic correlation of the sediments obtained from five long cores ($\sim$200 m) provided by Severoceske doly (a coal-mining company). We use EDXRF element analysis and chemical analysis by ion exchange with $[Cu(trien)]^{2+}$. Analysis of exchangeable/water soluble cations revealed that the Libkovice Lake was freshwater with only moderately mineralized water. Slight and smooth variations of major element content proved very stable sedimentary environment. Variations in K/Al element ratio, changes in the expandable clay mineral content (CEC), and Sr accumulations allow a detailed correlation of boreholes from different parts of the basin. Three crandallite-containing horizons formed by alteration of volcaniclastic fallouts (or mass flows) were found that supports our chemostratigraphic correlation. Spectral analysis suggests that Sr and K/Al variations possibly record orbitally driven changes in insolation. The orbital interpretation implies sedimentation rates up to 16 - 20 cm/ky during the major lacustrine phase (Libkovice Lake).. These sedimentation rates make it possible to obtain high-resolution data on depositional, volcanic and climatic changes during the Early Miocene in Central Europe.