ABSTRACT

The sedimentary record of the Turonian substage (Upper Cretaceous) offers an opportunity to examine climatic variations in a time of peak greenhouse climate. In the Bohemian Cretaceous Basin, recent cyclostratigraphic studies examined the cyclic variations of sedimentary environments of the Lower and Upper Turonian, while the cyclostratigraphy of the Middle Turonian substage has remained less understood. This thesis applied methods of spectral analysis to well logs and elemental composition data from several boreholes located in the central part of the Bohemian Cretaceous Basin, in order to better understand the environmental variations of the Middle Turonian substage and their possible astronomical forcing. A short eccentricity (~100 kyr) signature has been found in well log data, as well as the carbonate content of the Bch-1 borehole section and correlated over more than 20 km within the study area. Biogenic carbonate production is considered to be the cause of astronomically controlled cyclicity in content of Ca (proxy for $CaCO_3$). For most of the substage, the carbonate cyclicity was shown to be decoupled from clastic sediment input variations, except the basal part of the Middle Turonian succession where clastic proxies are in phase with carbonate variations. It is proposed that the astronomical cyclicity was transferred into the sedimentary record by a combination of regional and global processes (e.g., water chemistry and circulation changes within the basin, precipitation patterns, short-term eustatic fluctuations). Two age models of the Middle Turonian have been constructed from two different boreholes, based on the short eccentricity signature. The duration of the Middle Turonian substage estimated from the models converges on c. 1.8 Myr.

Keywords: Middle Turonian, cyclostratigraphy, Bohemian Cretaceous Basin, astrochronology, carbonate cyclicity, short eccentricity