

Cyclostratigraphic Dating in the Middle Miocene (Lower Badenian) of the Southern Vienna Basin

Michael WAGREICH, Maksuda KHATUN, Johann HOHENEGGER, Anna SELGE, Karl STINGL, Robert SCHOLGER, Peter PERVESLER, Fred RÖGL & Christian RUPP

In the southern part of the Vienna Basin, a 102 m long scientific drill hole was cored in Middle Miocene sediments, from the subsurface at the type locality of the Badenian, the old brickyard Baden-Sooß (Lower Austria).

The succession consists of more than 95% marls and marly shales of the "Badener Tegel" (Baden Group). Biostratigraphic investigations on foraminifera (mainly lower part of Upper Lagenidae Zone) and calcareous nannoplankton (standard zone NN5) indicate an Early Badenian (Langhian) age. The main lithologies are bioturbated, medium to dark grey marls and shales with carbonate contents between 11% and 25% and organic carbon percentages between 0.35 and 0.65. Rare intercalations include up to 20 cm thick sand layers with some shell debris and a light-grey 5 cm thick tuff. A distinct m-thick interval around 84.5 m displays a fine mm-scale light-dark lamination with minor bioturbation. Grain size analysis of the marls indicates mainly silty clays. Mean grain size ranges from 2–4 μm . The sorting is rather poor. No distinct grain size trend has been recognized from top to bottom of the core. The marls are interpreted as hemipelagics, being mainly a mixture of pelagic biogenic carbonate and terrigenous clay and silt. The organic carbon-carbonate data follow a dilution controlled siliciclastic flux with a fluctuation in sediment supply.

Cycles in carbonate content, organic carbon content and magnetic susceptibility have been identified by power spectra analysis.

Over the complete core, spectral analyses on magnetic susceptibility demonstrated four significant ($p=0.01$) peaks with the periods of 40.3, 23.2, 11.1 and 8.3 m and an additional peak at 1.6 m. The lower, tectonically undisturbed part of the core shows cyclicity based on power spectrum analysis of carbonate content (peaks at 44.9, 22.4, and 15.4 m), almost identical to the magnetic susceptibility.

The percentage content of organic carbon demonstrates in spectral analyses largely similar peaks (35.3, 22.4, and 11.2 m), where the second peak is identical to the carbonate content and the third to magnetic susceptibility.

Using cross-correlation, periods around 40 m correlate significantly with the 100 kyr⁻¹ eccentricity cycle, the ~20 m periods with the obliquity cycle, and the 15 to 11 m periods with both precession cycles.

This equalization enables the calculation of an average sedimentation rate of 1.14 mmy^{-1} . Wavelet transformation was used to obtain the position of the cycle peaks in the profile. Cross-correlation with orbital cycles (La 2004) and the time frame given by biostratigraphic data results in the most probable dating of the Baden-Sooß core between $14.358 \text{ Ma} \pm 1 \text{ ka}$ and $14.163 \text{ Ma} \pm 9 \text{ ka}$.

Authors address:

Michael Wagreich & Maksuda Khatun
University of Vienna
Department of Geological Sciences
Althanstrasse 14
A 1090 Vienna
michael.wagreich@univie.ac.at

Fred Rögl
Natural History Museum Vienna
Geological-Palaeontological Department
Burgring 7
A 1010 Vienna

Johann Hohenegger & Peter Pervesler
University of Vienna
Department of Palaeontology
Althanstrasse 14
A 1090 Vienna

Christian Rupp
Geological Survey of Austria
Neulinggasse 38
A-1030 Vienna

Robert Scholger, Anna Selge & Karl Stingl
University of Leoben
Department of Geosciences and Geophysics
Peter-Tunner-Strasse 25-27
A-8700 Leoben