

Source rock potential of Oligocene Source Rocks of the Waschberg Zone, Lower Austria

MAGDALENA PUPP (1), REINHARD F. SACHSENHOFER (1), MARIA HEINRICH (2) & PIOTR LIPIARSKI (2)

Abstract

The Oligocene Menilite Formation is the most important source rock in the Carpathians and may have also contributed to hydrocarbon accumulations in the Czech part of the Vienna Basin. The main aim of the present contribution is to examine if equivalent rocks in the Waschberg Unit in Austria (Ottenthal Formation [NP22-23], Thomasl Formation [NP23-25]) hold a similar hydrocarbon potential.

The study is based on 50 core and cuttings samples representing the Thomasl Formation in wells Thomasl and Poysdorf (see also FUCHS et al., 2001) and 80 samples from an outcrop section near Ottenthal (“Waldweg”), which has been studied previously by RÖGL et al. (2001). The Ottenthal Formation is subdivided from base to top into marls and shales (Ottenthal Mb.; NP21-22), diatomaceous rocks (Galgenberg Mb.; NP22) and the Dynow Marlstone (lower NP23). Geochemical parameters from the Ottenthal section and borehole Thomasl are presented in Text-Figure 1.

The Ottenthal section is strongly tectonised. In Text-Figure 1, data from different complexes are arranged in such a way that they yield a continuous profile. The Oligocene succession, 32 m thick, starts with calcareous shales with very low total organic carbon (TOC) contents. They are overlain by carbonate-free shales and diatomaceous sediments. Although TOC contents are slightly higher than in the lowermost part, average TOC is only 0.7 wt.% (max. 1.1 wt.%). The Dynow Marlstone is characterised by high and upward decreasing carbonate contents. Very low TOC contents (average 0.4 wt.%) may result from dilution of organic matter by calcareous nannoplankton. TOC contents remain low in the overlying Thomasl Formation. The organic matter is thermally immature and the low HI (Hydrogen Index) values (max. 151 mgHC/gTOC) prove the presence of type III kerogen. Biomarker ratios indicate oxygen-depleted conditions and a varying, but typically high contribution

of land plants. Concentrations of diatom-derived biomarkers (C₂₅-HBIs) are typically low, although biogenic silica contents are high, especially in the lower part of the succession.

The Thomasl Formation in the Thomasl well is about 120 m thick. It is composed of calcareous shales with TOC contents ranging from 0.5 to 4.0 wt.%. HI values (14–416 mgHC/gTOC) indicate the presence of type III and type II kerogen. High TOC/S ratios in the Eggenburgian sediments may indicate a change to a low-salinity environment in early Miocene time. Biomarker ratios indicate strongly oxygen depleted conditions and a high contribution of diatoms to the biomass in the upper part of the Thomasl Formation. However, biogenic silica contents are generally low.

In summary, the hydrocarbon potential of the Oligocene succession in the Ottenthal section is very low. This is surprising, because rocks equivalent to the Ottenthal Formation hold an excellent source potential both in the Carpathians and in the Alpine Foreland Basin.

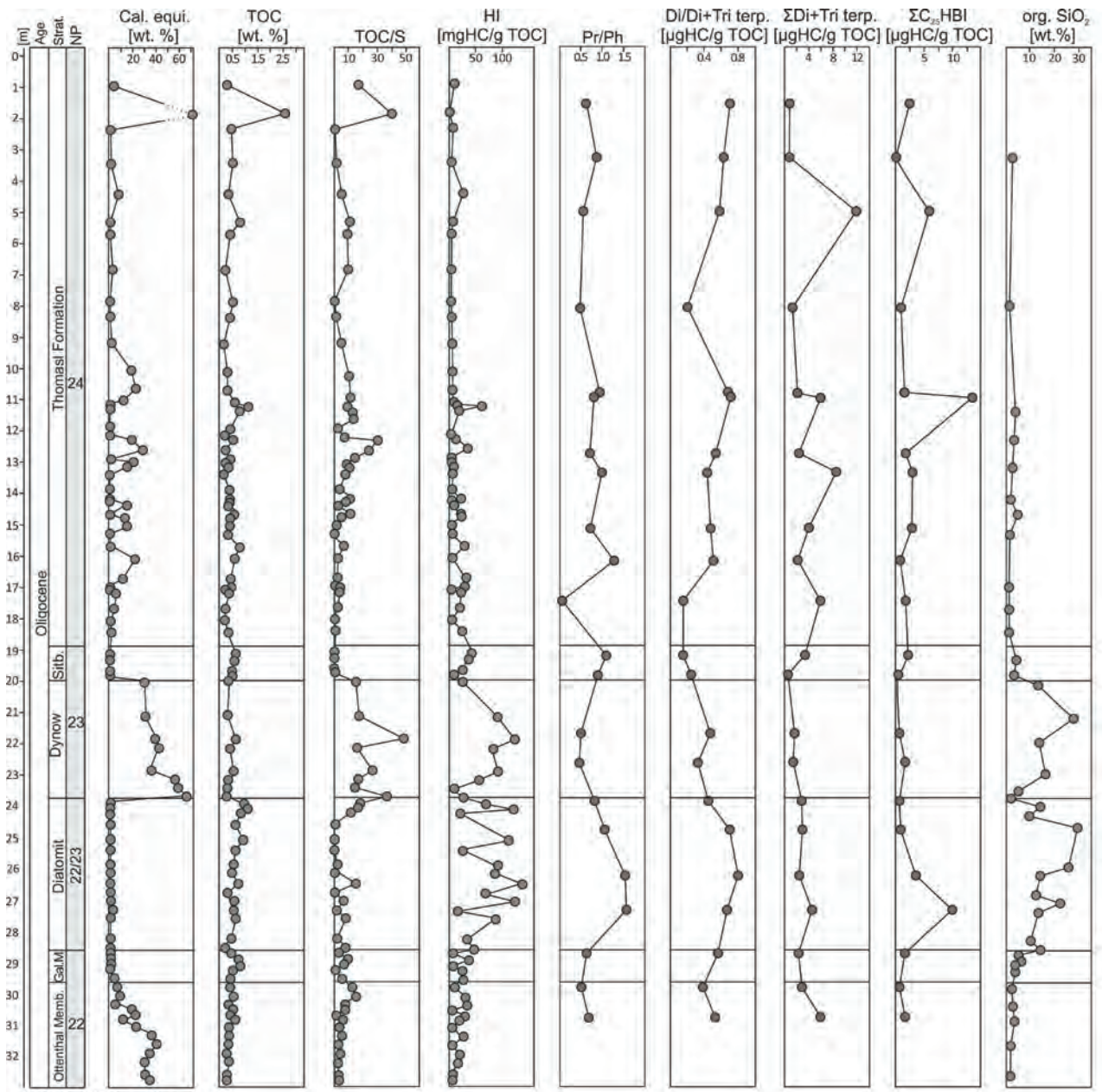
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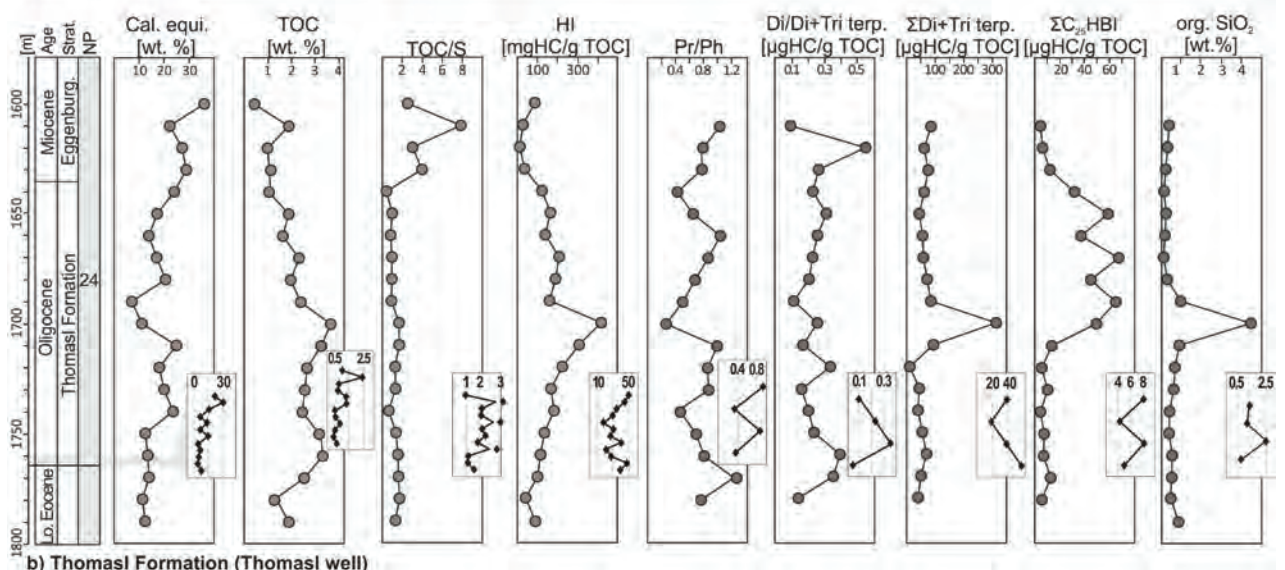
Text-Fig. 1.
Bulk and biomarker parameters of a) the Ottenthal section and b) the Thomasl Formation in well Thomasl.
Core data are shown as insets.

(1) Montanuniversität Leoben, Peter-Tunner-Straße 5, 8700 Leoben. erdoelgeologie@unileoben.ac.at

(2) Geologische Bundesanstalt, Neulinggasse 38, 1030 Wien.



a) Otenthal section



b) Thomasl Formation (Thomasl well)