DGMK/ÖGEW-Frühjahrstagung, Fachbereich Aufsuchung und Gewinnung
Celle, 25./26. April 2019

Organic Geochemical Data from the BGR-Petroleum Database - New Hints on Source Rocks in the German Molasse

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Abstract

Currently, petroleums from the BGR-archive are (re)analysed by mass spectrometry and Rock-Eval aiming at establishing an internal geochemical GIS-project and a database for related petroleum geochemical and environmental questions. Until recently ~250 samples from Germany are re-processed and one important sub-set is formed by petroleums from the molasse. In this presentation, the database is used to gain new information on the tentative sources rocks in the Eastern and, particularly, the Western part of the German Molasse.

The so far available data set of hydrocarbon biomarker data are supportive of the view that mainly two different source rocks expelled petroleums into reservoir rocks of different age in the molasse (Wehner & Kuckelkorn, 1995). However, our new data add valuable information on the source rock maturity and paleosettings during deposition.

The newly developed Rock-Eval "Oil Composition Index" (OCI; Scheeder & Blumenberg, 2018) of the studied petroleums appears to be mainly controlled by maturity and the kerogen-type (most likely type II in both sub-regions, the E and W molasses). In general, biomarker maturities, well recorded in the isomerization of steranes and e.g., diahopane/hopane-ratios, increase from E to W and this holds also among the group of petroleums with tentatively the same source rock from the E molasse. Of limited value appear to be the specific and elsewhere helpful biomarkers like isorenieratane as well as dinosteranes, because these compounds were found in petroleums from the E and W molasse. In contrast, abundances of the angiosperm-stemming terpenoid oleanane (see also Wehner & Kuckelkorn, 1995), relative abundances of C_{28}-steranes among regular steranes, 2-methyl hopane/hopane, sterane/hopane, and C_{30}-sterane/regular sterane ratios separate petroleums from the W (N of Lake Constance) and the E molasse very well. These biomarkers as well as other data (Ellrich et al., 1985) underline also for the W part of the E molasse (S of Ulm) a (mature) source rock similar to that in the E molasse (most likely the Cenozoic Sannois Fish shale).

Although the so far processed and partly novel samples support the overall existing oil-source rock correlations for the German Molasse, admixture of oils from additional source rocks cannot be excluded. This holds particularly because individual reservoirs in these hydrocarbon settings appear to have complex and distinct formation and migration histories.