

Geochemical characterization of the Göstling formation in the Scheiblingbachgraben: Implications for climate change and hydrocarbon potential

¹Montanuniversität Leoben;

²Naturhistorisches Museum Wien;

johannes.weitz@unileoben.ac.at

The lower Carnian Göstling and Reingraben formations form the basal part of the Upper Triassic succession in the Northern Calcareous Alps. Due to the presence of a *Konservat-Lagerstätte* in the Reingraben formation, a significant hydrocarbon source rock potential seemed possible. However, recent geochemical investigations have shown that the Reingraben formation only has a limited oil potential. In contrast, very little is known about the amount and type of organic matter in the underlying Göstling formation.

Therefore, the main aim of the present study is to characterize the organic matter in the Göstling formation, which is about 5 m thick and excellently exposed in the Scheiblingbachgraben near Großreifling (Styria). The Göstling formation consists of about 50 siliceous limestone beds, gradually evolving into thinly laminated dark mudstones. The siliceous limestones as well as the thin intercalated layers were sampled in detail for geochemical analysis. Additional samples were taken from the limestone of the underlying Reifling Formation and the mudstones of the overlying Reingraben formation to enable geochemical differentiation between the formations. From a total of 50 samples, TIC (total inorganic carbon), TS (total sulphur) and TOC (total organic carbon) contents were determined and Rock Eval pyrolysis was conducted to determine the hydrocarbon potential of all samples.

The laminated dark marls and claystones in the Göstling formation have locally very high TOC contents (max. 11 wt.%). Low T_{max} values of about 430°C suggest low thermal maturity and are consistent with low amounts of (free) S1 hydrocarbons (average 0.10 mg_{HC}/g_{TOC}). The slope of the linear regression of the amount of S2 hydrocarbons against TOC yields an average hydrogen index of 400 mg_{HC}/g_{TOC}. This indicates the presence of oil-prone Type II Kerogen. The lithologic change from the Reifling Formation to the Göstling formation is characterized by a strong increase in TOC. The middle part of the Göstling formation shows low TOC content, even in laminated dark layers, whereas the uppermost part shows the highest TOC content. The TOC content decreases again within the Reingraben formation.

The strata observed in the outcrop was deposited during the climate change of the late Triassic Carnian Pluvial Episode (CPE). In the course of the CPE carbonate platforms drowned and carbonate productivity decreased drastically, due to increased siliclastic input in the marine domain caused by increased precipitation. The laminated sediments of the Göstling and Reingraben formations overlying the limestone of the Reifling Formation reflect this change. Therefore, a detailed biomarker study of the organic rich layers will also form part of this work.

Session: *Pangeo workshop: Mineral Raw Materials, and Energy Transition*

Keywords: *Organic geochemistry, Carnian Pluvial Episode, Climate change, Göstling formation, Biomarkers*