

# **Developing a Model for Open Shelf Shale Deposition: Sedimentology and Architecture of the Ordovician Tøyen Shale Formation**

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## **ABSTRACT**

Technological advancement in unconventional plays exploration stimulated tremendous production of oil and gas from organic-rich fine-grained siliciclastic rocks referred to as 'black shales'. However, despite the wide abundance and economic significance of shales, its depositional framework and processes leading to preservation of organic matter are not well understood. In this study we intend to use the Ordovician Tøyen Shale Formation of Scandinavia, Southern Sweden and Norway, to develop a comprehensive sedimentological model for shales deposited in an open-shelf environment. Common for many important shales depositional settings, excellent exposure and accessibility of outcrops and advanced knowledge of local biostratigraphy make the Tøyen Shale an ideal candidate for the proposed enterprise.

Examination of the succession will be performed on the field, core and thin section scales. Optical and Scatter Electron Microscopy will be used to determine fine-scale sediment characteristics. Correlation of measured sections supported by biostratigraphic data will provide the background for the sequence stratigraphic framework. In order to determine zones of the highest organic matter content and hydrocarbon potential in the succession, TOC and Rock-Eval pyrolysis analyses will be performed.

The resulting model will aid the understanding of the processes operating on marine shelves and their effect on shale facies architecture and distribution of organic-rich high-TOC intervals. Even though this model is based on an Early Paleozoic example, the processes influenced specific to open shelf successions facies architecture should make it applicable to many unconventional systems worldwide.