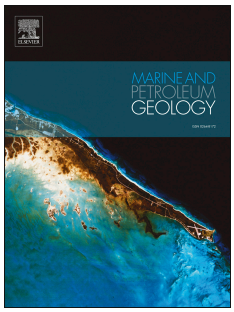
# Accepted Manuscript




Clay coating preserving high porosities in deeply buried intervals of the Stø Formation

Henrik Nygaard Hansen, Kristoffer Løvstad, Reidar Müller, Jens Jahren

PII: S0264-8172(17)30361-6

DOI: 10.1016/j.marpetgeo.2017.09.011

Reference: JMPG 3069

To appear in: *Marine and Petroleum Geology*

Received Date: 8 February 2017

Revised Date: 29 August 2017

Accepted Date: 12 September 2017

Please cite this article as: Nygaard Hansen, H., Løvstad, K., Müller, R., Jahren, J., Clay coating preserving high porosities in deeply buried intervals of the Stø Formation, *Marine and Petroleum Geology* (2017), doi: 10.1016/j.marpetgeo.2017.09.011.

# Clay coating preserving high porosities in deeply buried intervals of the Stø Formation

Henrik Nygaard Hansen[a,*], Kristoffer Løvstad[a], Reidar Müller[a] and Jens Jahren[a]

[a]*University of Oslo, Department of Geosciences, Sem Sælands vei 1, 0371 Oslo*

[*]*Corresponding author: henriknh@mail.uio.no*

## Abstract

The Stø Formation is the most important reservoir interval in the Norwegian Barents Sea, however the reservoir quality can be highly affected by the detrimental effects of quartz cement where there have been extensive post depositional burial. Core plug data from well 7219/8-2 in the Southwestern Barents Sea shows abnormally high porosity and permeability values in certain units of the deeply buried and otherwise highly quartz cemented Stø Formation. The amount of quartz cement in the samples is inversely proportional to the porosity. Samples with high and low porosities are similar texturally and mineralogically, but the high porosity samples have a layer of illitic clay coating the majority of the detrital quartz grains. Illitic clay coating present at grain contacts can result in a lowered IGV given they aid in the dissolution of quartz at interfaces, also creating a source of dissolved silica. Clay induced dissolution means that silica saturation is not a limiting factor in quartz cementation in these samples. The results show that the illitic clay coating is capable of limiting the amount of authigenic quartz overgrowth from 20-23% in samples with negligible grain coating to 5-11% in the intervals with high coating coverage. The illitic clay coating inhibits quartz overgrowth by limiting the surface area available for nucleation on detrital grains. The Stø Formation comprises mainly shallow marine deposits of highly reworked clean sandstone. Abnormally high porosities appear to be linked to settings where sediments of a more proximal location are preserved without extensive reworking. The grain coating clay is illitic and most likely originates from clay infiltration processes prior to final deposition. The difference in extent of clay coating in similar facies can mostly be correlated with varying amount of post depositional reworking. This study suggests that there is a potential for considerable porosity and permeability to be preserved in deeply buried sandstones in the Barents Sea. This study could be important in the future exploration activity of deeply buried structures in the area.

*Keywords: Stø Formation; Barents Sea; Reservoir quality; Diagenesis; Quartz cementation; Grain coating; Illite; Porosity preservation.*