Accepted Manuscript

The influence of paleo-bathymetry on total organic carbon distribution tested in the Cretaceous Hammerfest Basin, Barents Sea

Benjamin Emmel, Anindito Baskoro, Gerben de Jager, Arnt Grøver, Ole-Andre Roli

PII: S0264-8172(18)30367-2

DOI: 10.1016/j.marpetgeo.2018.09.003

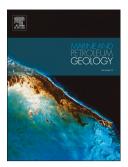
Reference: JMPG 3483

To appear in: Marine and Petroleum Geology

Received Date: 29 January 2018
Revised Date: 29 August 2018
Accepted Date: 3 September 2018

Please cite this article as: Emmel, B., Baskoro, A., de Jager, G., Grøver, A., Roli, O.-A., The influence of paleo-bathymetry on total organic carbon distribution tested in the Cretaceous Hammerfest Basin, Barents Sea, *Marine and Petroleum Geology* (2018), doi: 10.1016/j.marpetgeo.2018.09.003.

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ACCEPTED MANUSCRIPT

The influence of paleo-bathymetry on total organic carbon distribution tested in the Cretaceous

Hammerfest Basin, Barents Sea

- Stochastic paleo-bathymetry reconstructions
- TOC distribution models for end-member paleo-bathymetries
- Nonlinear uncertainty propagation from bathymetry to TOC models

Benjamin Emmel¹, Anindito Baskoro^{2,3}, Gerben de Jager¹, Arnt Grøver¹, Ole-Andre Roli¹

- 1) SINTEF Petroleum; Basin Modelling, S. P. Andersens veg 15 B, Trondheim 7031, Norway
- 2) Department of Geoscience and Petroleum, Norwegian University of Science and Technology (NTNU), NO-7491 Trondheim, Norway
- 3) Research and Development Centre for Oil and Gas Technology 'LEMIGAS', Ciledug Raya street 109, South Jakarta, Indonesia 12230

Keywords: Paleo-bathymetry, Barents Sea, Hammerfest Basin, Cretaceous, Total Organic Carbon, Basin Modelling

Abstract

In basin modelling and petroleum system analysis geometries during deposition of sediments (paleowater depth) and distribution of organic matter are initial parameters used for further interpretation or modelling. This paper presents an approach, combining backstripping with a probabilistic forward sedimentary model to calibrate paleo-water depth (PWD). The stochastic PWD results serve as an input for organic facies models and the study demonstrates how PWD will influence models for total organic carbon distribution in a sedimentary basin. For the Late Cretaceous Hammerfest Basin, mainly shelfal to upper bathyal bathymetries (average PWD values vary between 118 and 318 m) result in average total organic carbon (TOC) varying between 0.47 and 5.24 wt% across the basin. For the different models basin averaged TOC values are similar but vertical and lateral distribution pattern change significantly, especially towards the shallow end-member PWD. The results indicate that PWD uncertainties propagate non-linearly into source rock distributions.

1. Introduction

Redistribution of mass on the earth's surface is mainly guided by local directions of slopes, set up by the existing topography and bathymetry (e.g., Allen, 2009). Together with understanding the coupling

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