

**A NUMERICAL MODEL INTENDED FOR TOC PREDICTION BASED TAKING INTO ACCOUNT THE EFFECT OF PRESERVATION AND DILUTION OF SEDIMENTARY ORGANIC MATTER**

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Ibach (1982) showed that organic carbon (TOC) in various Deep Sea Drilling wells showed an increasing trend with increasing Linear Sedimentation Rate (LSAR) until a maximum LSAR was reached. She believed that this increase was due to shorter exposure of organic matter to the sediment-water interface that consequently improved organic matter preservation. With further increase the TOC was reduced as a result of dilution by clastic sedimentation. A kind of empirical model from log TOC versus log LSAR plots were suggested (Ibach, 1982). This paper suggests a simple mathematical algorithm in order to model average TOC values for source rock sections as a function of the flux of initial deposited organic carbon and Linear Sedimentation Rate (LSAR). The model assumes that the deposited organic material decays as a function of LSAR following a first order isothermal kinetic-like expression. The model takes also into account the inorganic component that leads to auto dilution of the organic matter. Two calibration parameters together with the initial carbon flux and the organic-inorganic fraction allow model calibrations by fitting with observed TOC-LSAR data. This calibration must be carried out on observed data from regional studies as shown in Fig 1. The observed values in Fig. 1 are from isochronous sequences with durations of 5 million years from the Upper Farsund Formation of the Central part of the Danish Central Graben. The method by Dahl et al. (2004) was used in order to determine the TOC and LSAR of the oil prone and gas prone material. The best fit of the model suggested the general initial flux of deposited oil prone organic carbon to be 0,8 - 1.2 g/m<sup>2</sup> yr. This is comparable with the values suggested by Miller (1990) for the Upper Jurassic, Kimmeridge Clay Fm in the North Sea.

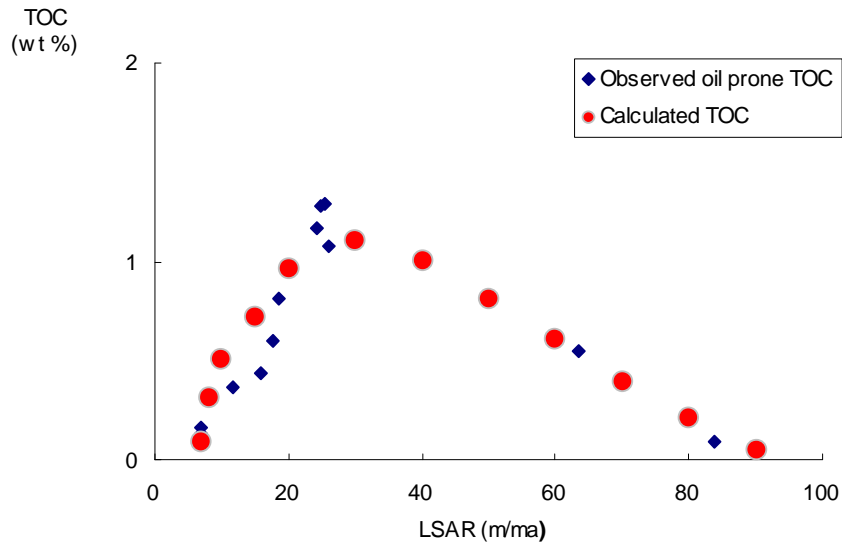


Figure 1. TOC of oil prone organic material versus sedimentation rate for the Uppermost Farsund Formation, modelled and predicted.

#### REFERENCES

- Dahl, B., Bojesen-Koef and oed, J. Holm, A. Justwan, H. Rasmusse, E., Thomsen, E. (2004) A new approach to interpreting Rock-Eval S2 and TOC for kerogen quality assessment. *Organic Geochemistry*, **34**, 1461-1477.
- Ibach, L.E.J. (1982) Relationship between Sedimentation Rate and Total Organic Carbon Content in Ancient Marine Sediments. *AAPG Bull.* **66**, 170-188.
- Miller, R. (1990) A Paleogeographic Approach to the Kimmeridge Clay Formation. *Deposition of Organic Facies, AAPG Studies in Geology # 30* (ed. A. Huc) The American Association of Petroleum Geologists, Tulsa, pp 13-26.