

SCA 9210 Description of Wettability and Fluid Contacts by Using Core and Log Data.

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Introduction

Petrophysical properties, wetting characteristics, reservoir heterogeneties and fluid migration results in an unique saturation distribution and gradient. The analysis and interpretation of this gradient gives valuable insight in the state and history of the hydrocarbon accumulation.

The initial fluid distribution versus depth is the result of the balance between the capillary and the gravitational forces. By including the informations regarding heterogeneties in the interpretation it may be possible to identify the strength of the capillary forces or the wettability of the reservoir rock. The work presented in this paper show how this can be done in a practical manner by using conventional core and log data.

Three North Sea chalk fields are studied and used as examples for description of fluid distribution, wettability, heterogeneties and hydrocarbon migration. The method presented is however general and can be used for other fields and other types of reservoirs.

Very little research has been performed to integrate core and log derived saturations. The 'J' function suggested by Lewerett (1942 and 1943)^{1, 2} has been used with success for some reservoirs. The function works well if the reservoir rock is fairly homogeneous. For heterogeneous rocks and for systems with multiple contacts, the method become difficult in use. Heseldin (1974)³ suggested an alternative approach which was further developed by Alger et. al. (1989)⁴. The Heseldin/Alger method has the disadvantage of using an empirical fit to log and core data. The estimation of fluid contacts are also somewhat impractical. If multiple fluid contacts exist, the method often fails to identify these. The method has been used by at least one oil company from the late 70 ties, some 10 years earlier then published by Alger.