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Squashing Water Saturation Curves by Rock Types: a New Technique with Stratigraphic Applications

It is commonly accepted that logs saturation profiles represent a record of the drainage and/or imbibition processes that a reservoir experienced during the geologic history. What is less recognized is that this record, purged from saturation alterations induced during the development of the fields, can give invaluable stratigraphic information and help in understanding static and dynamic aspects of the reservoir.

This paper illustrates the use of a squashing technique, applied to the depth of the bulk volume water curves, and developed in wells drilled in the Minagish Oolite, a clean microporous carbonate from the giant Minagish Field (Kuwait).

The methodology, applied by rock types in cored wells, consists in vertically shifting saturation profiles within each well, to match capillary pressure type curves referred to a common oil water contact. The second step consists in assessing the hydraulic communication of the saturation profile segments between different wells. This is accomplished by transforming the height above the common oil water contact of each segment into "pseudo pore pressure", and evaluating which segments fall on the same pressure gradient.

This methodology substantiates the presence of, and allows correlating, membrane seals controlling the distribution of hydrocarbons in the reservoir at initial static conditions. The identification of these seals, through this procedure and in situations where other techniques may be inadequate, can have significant implications for detailed development geological modeling studies and for a sound reservoir management.