3.1.P08

Carbon isotope stratigraphy of Upper Cretaceous chalk from the Danish North Sea

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The temporal $\delta^{13}C$ variation of Maastrichtian sea water have been established from bulk coccolithic chalk samples from the M-10X and E-5 wells. The wells are situated 35 km apart and located in the vicinity of the Dan and Tyra oil and gas fields.

Samples were picked each m to record the stratigraphical variation and a high resolution profile was sampled on a dm scale to resolve linkages between isotope variation and lithology. On a dm scale the ^{13}C isotope composition range is 0.1 ‰ corresponding to alterations between laminated and bioturbated chalk. In these cycles the laminated parts are preferentially more negative in $\delta^{13}C$ values. On a 10 m scale the stratigraphical variation produce a pattern that are recognisable between the wells and five units have been identified (Figure 1). These chemostratigrafical units do not conflict with the established biostratigraphy of which currently 3 datum levels have been identified in the wells.

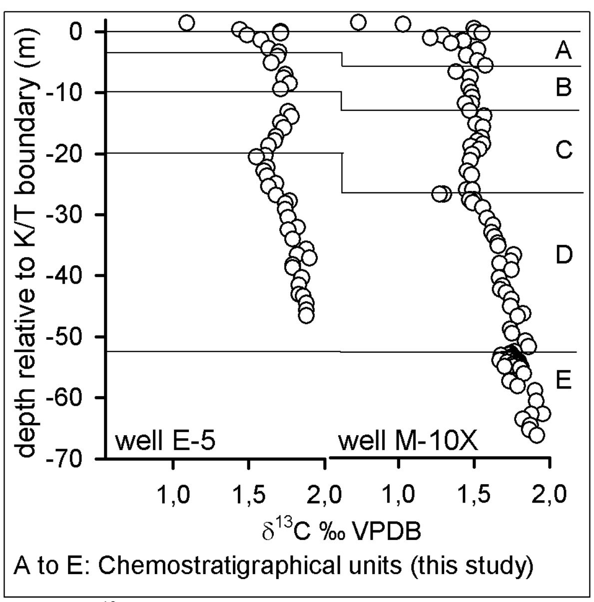

Figure 1: $\delta^{13}C$ variation in wells.

The ^{13}C stratigraphy forms a robust framework for quantifying the difference in burial history between the Dan and Tyra fields. Main feature is a 1 ‰ shift in $\delta^{18}O$ values between the cores which is attributed to differences in the fluid flow dynamics between the Dan and Tyra fields.

3.1.P09

The fluoritization of carbonate and its effect on reservoir property in Tarim Basin, NW China

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The Tazhong 45 oil pool, lying in the Tarim Basin, Northwest of China, is in a fluoritized carbonate strata of the Middle-Late Ordovician age. Its reservoir bed consists of fluorite and limestone. It has a considerable hydrocarbon potential, about 1567.0×10^4t oil and $67.07\times10^8 m^3$ gases. It is the first time for the fluoritized layer to be discovered serving as hydrocarbon reservoir rock in Tarim Basin, so the genesis of the fluoritization and its effect on the reservoir property and hydrocarbon accumulation are of particular interest in this paper.

The microscope observation indicates that the fluorite is the replacement of calcite. There are several other hydrothermal minerals accompanying the fluorite, such as quartz, pyrite and chlorite etc. The mineral assemblage suggests that the fluorite is precipitated from a hydrothermal fluid. Almost half of the homogenization temperatures of the fluid inclusions in the fluorite are higher than 300°C, and some of them even higher than 400°C. This feature also suggests that the fluorite is precipitated from hydrothermal fluid for only a hydrothermal fluid can reach such a high temperature.

The $^{87}Sr/^{86}Sr$ ratios of the fluorite, ranging from 0.708891 to 0.709305, are higher than those of the Mid-Upper Ordovician limestone host, ranging from 0.708458 to 0.708688. The hydrothermal fluid responsible for the fluorite precipitation is related to the felsic magma generated by the mixing between the initial malfic magma and the crustal materials at the late stage of the magmatic activities in the Permian. The felsic magma usually has high $^{87}Sr/^{86}Sr$ ratios, and the fluorine necessary for the fluorite precipitation can also be got from the crust. The strontium isotope features come into the hydrothermal fluid derived from the felsic magma and then are inherited by the fluorite precipitated from the hydrothermal fluid.

Theoretical calculation shows that the molecular volume decreases by 33.5% after calcite is replaced by fluorite, and the volume shrinkage can greatly enlarge the porosity of the reservoir after the replacement. Practically, there are a great number of intergranular cavities and fractures in the fluorite. So the fluorization greatly enhances the reservoir quality of Tazhong 45 area, and the fluorite and limestone host become efficient reservoir rocks.