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Hot Fluid Flow Episodes in Sealed Carbonate Reservoir Compartment as a Gas Field Creation Agent, Upper Devonian from SE Poland

Extensive fracturing of Devonian reefal and carbonate platform limestones with underlying peritidal-sabkha dolostone-anhydrite sequences created very permeable conduit system for fluids flow in the Lublin basin. Very weak primary porosity with better secondary ones developed during extensive dolomitization processes, gave a basis, together with the later massive fracturing during late Devonian/Carboniferous extentional and transcompressional tectonics in the region for origination of sealed by clay-rich formations carbonate reservoirs compartment system. Abundant pyrobitumens in vugs and caverns and oil stainings/traces in fluid inclusions are clear evidences of the formerly liquid hydrocarbons occurrence in the carbonate complexes. First oil migration has been recognised also in these processes products being carbonate and sulfate cements with measured homogenisation temperatures of fluid/methane inclusions of up to 2008C and +18 SMOW of oxygen isotopes. Second oil charging has been most probably induced by the hot volcanic-connected waters in the basin, giving carbonate cements with fluorite and sphalerite exhibiting 2708C homogenisation temperatures of fluid/methane inclusions even with 3708C and +16 SMOW of oxygen isotopes. Recent natural gas accumulation in these carbonate reservoirs is a product of the oil cracking processes during "hot" episodes in the basin. Such surely hot fluids flows, not effect of heat flow, seem to have transient character related to the oil charging and its successive oxidation/reduction and cracking reactions in the reservoir rocks. Highly overpressured, to 44 MPa, carbonate reservoirs were excellent permeable compartment for fluids/HC flow and later gas formation only during several short fracturing episodes in the basin history.