Integrated Basin and HC Systems Model, Silurian-Carboniferous, Southern Algeria

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Paleozoic basins of southern Algeria comprise several HC systems: i) infra-Cambrian (?) source rock, Upper Ordovician reservoirs; ii) Silurian source rock, Lower and Middle Devonian reservoirs ; iii) Upper Devonian source rocks, Lower Carboniferous reservoirs. Since 2006 commercially productive gas reservoirs have been proven by several wells in the Reggane and Ahnet Basins. Previous basin evaluation has proposed HC generation predominantly during Mesozoic reburial, with pre-Hercynian generation having been largely ineffective (Purdy & MacGregor 2003, Geol. Soc. Spec. Publ. London, v. 207). Thermochronlogical data (Logan & Duddy 1998, Geol. Soc. Spec. Publ. London, v. 132) have indicated two-phased HC generation: i) simple burial heating to oil window before peak Hercynian orogeny (pre-Early Carboniferous); ii) Late Triassic heating to wet and dry gas window in the Latest Triassic, related to the development of the Central Atlantic Magmatic Province (CAMP) and doleritic dykes/sills (Reggane Basin); (iii) subordinate heating of less mature basin margins until recently.

In order to better assess the basin and HC development including the recently proven gas plays, an integrated study has been performed including: i) seismic and sequence stratigraphy at basin and reservoir resolution; ii) numerical basin modeling (subsidence/uplift, sediment flux); iii) palynostratigraphic (miospores, acritarchs) and organofacies analysis; iv) paleotemperature analysis including organic maturation, apatite and zircon fission track and (U-Th)/He dating. Focus is on the Reggane Basin, where ample 2D seismic coverage and calibration wells (logs, samples) have been available. Results include: i) trans- and regressive trends within the basin fill; ii) intra- and inter-basin correlation iii) lateral continuation and vertical connectivity of reservoir sandstones; iii) accommodation and sediment flux history; iv) paleotemperature development related to pre- and post-Hercynian burial and exhumation. The new data show, that the existing models of HC development for the Upper Silurian-Lower/-Middle Devonian and Upper Devonian-Lower Carboniferous systems have to revised.