

## **Assessing the Potential of Unconventional Paleozoic Resources in the Algerian Saharan Basins: From Exploration to the Characterization of "Sweet Spots"**

**Bruno Murat<sup>1</sup>, Erwan Perfetti<sup>1</sup>, Stéphane Rousse<sup>1</sup>, Jonathan Allard<sup>1</sup>, Mahmoud Djidjeli<sup>2</sup>, and Lounes Adour<sup>2</sup>**

<sup>1</sup>Beicip-Franlab, Rueil-Malmaison, France

<sup>2</sup>AlNaft, Hydra, Algeria

### **Abstract**

The Paleozoic series of the sedimentary Sahara basins of Algeria encompass various conventional petroleum systems. Unconventional hydrocarbons are also present, mainly in the tight sandstones of specific intervals of the Cambro-Ordovician, as well as in the shaly source-rock intervals of the Silurian and the Frasnian. In order to better assess the unconventional potential and the risks associated with such resources, and to target areas of interest, a three-year integrated study was performed. It covered the Tindouf, Reggane, Ahnet / Timimoun, Oued Mya / Mouydir and Berkine / Illizi basins, and was based on a large database, with the interpretation of over 250,000 km of 2D lines and around 80 3D seismic volumes, the use of more than 2000 wells for correlation purposes, 80 cored wells as well as outcrop analogues. A first phase of exploratory investigation made it possible to better characterize the intervals of interest (sedimentology, petrophysics, structural), to specify their architecture (distribution, extension, depth / thickness) and to understand the fluids and retention mechanisms (maturity, type of organic matter, quality of fluids, concentration). Through the dynamic simulation of petroleum systems, the accumulated volumes were calculated, and main areas of interest were thus identified. A second phase of investigation associated with an economic study allowed a better targeted and detailed evaluation of these areas of interest, by adding the aspects of deliverability (fracture and geomechanics) and characterization of "sweet spots" (evaluation of resources, conceptual development plans and environmental impacts). In particular, the conceptual development plans were based on an estimate of the ultimate recovery (EUR) per well calculated from the hydrocarbon densities and condensate rates obtained by the geochemical models. In order to calibrate the EUR per well in each of the basins, two Algerian unconventional pilot wells and several analogues of North American shales (e.g. Marcellus) were taken for comparison. Such development plans assist future decisions on the development of unconventional resources.