

CarbMed GIS: A GIS Project for the Petroleum Geology of Mediterranean Carbonates

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Abstract

The Mediterranean is characterized by a wide range of carbonate petroleum systems that developed in the complex context arising from the opening to the closure of the Tethys Ocean. In this work, we present a synthesis of these carbonate petroleum systems, based on data contained within CarbMed GIS, an unconventional GIS project developed to provide a tool for geological and E&P knowledge management and support the full range of hydrocarbon exploitation activities, from frontier exploration to field development in the Greater Mediterranean area. The basic data (i.e. logs, wells, sections and seismic lines, maps, fields) are overlain and integrated within a regional interpretation framework that includes mega-sequence stratigraphy, paleogeography and classifications of petroleum systems and petroleum systems elements. In the Greater Mediterranean area, 26 proven petroleum systems, which include hydrocarbons reservoired in shallow marine to basin carbonates reservoirs, have been identified. These systems have been described and classified on the basis of source rock lithology, GDE, age and the basin context within which source deposition and hydrocarbon generation/ migration occurred. Within these petroleum systems, a total of 53 proven carbonate plays have been identified and described based on reservoir characteristics. GIS maps summarize the proven and possible extension of each petroleum system and the geographical extent of each reservoir play fairway, based on detailed time-framed GDE interpretations. Results show an asymmetrical framework across the Mediterranean provinces. The northern area (e.g. Po Valley, Adriatic and Ionian) is dominated by plays associated with the large and long-lived isolated carbonate platforms of Adria, sourced by Triassic and Liassic deep water and intraplatform basin carbonate source rocks, whereas the southern and eastern areas (e.g. North African margin, Egypt and Levant) are characterized by plays associated with smaller sized carbonate systems that were deposited on mixed carbonate-clastic shelves. Along the North African and Levant margins, clastic source rocks and seals dominate although carbonates (and evaporite seals) are also documented. This study shows the ability of CarbMed GIS to enhance the value of local data by framing it in a regional context and its power in facilitating the analysis and systematic review of carbonate-hosted petroleum systems in the Greater Mediterranean area.