NEW INSIGHTS ON MANAGING HYDROCARBON PROSPECTIVITY IN THE SUBDUCTION ZONES AND THEIR LINKED CONTINENTAL BASIN MARGIN AREAS

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We examine the hydrocarbon prospectivity associated with Romanian offshore Black Sea western-basin. We have explored volumes and variety of datasets in subduction zones and their associated continental basin margin areas. The exploration datasets include more than 175 2D seismic lines, 30 km^2 of 3D seismic data, covering the entire Western Basin block. We use eight exploratory drilled wells and several check-shot and VSP data, including reports on petrophysical analysis and production. Major hydrocarbon plays are Pliocene, Late and Upper Miocene sands. More than 15 oil and gas fields are operative in the Black Sea basin from marginal-size to major producing fields. Ninety percent of production comes from multi-stacked reservoirs of Tertiary age, in commercial quantities, especially in the western, northwestern and northern parts of the basin. Source rocks are associated with Cretaceous and Maykopean formations. Structures are either associated with four-way or 3-way structural closures or stratigraphic controlled traps. The Deepwater is underexplored with challenging petroleum systems. We carryout systematic mapping and modelling, integrating Exploration and Production (E & P) data, with focus on structural and strati-structural interpretation.

Organizing datasets in compatible formats are added challenges. The heterogeneity of geo-spatial data structures at times complicate the data integration process. In a separate project entitled "data warehousing and mining of upstream business data", we have integrated E & P data from different sources to collaborate intelligently, arrive at a compatible and unified metadata and finally load into workstations. In total, 13 horizons have been mapped in the study area with para-sequences of Miocene, Eocene, and Oligocene, including Cretaceous and Jurassic-age formations. Interpretation of major structural and stratigraphic features is the goal with precise reservoir geometries and depositional environments. Several isochrones, isochores and depositional models are computed, based on which reservoir patterns are interpreted with prospective locales in the shelf, slope and deep-marine western-basin. Two hydrocarbon plays are related to the shelf, deep-water basins and they are inverted half-graben, and gravitational gliding features. The most noticeable meandering channel features formed outward, are interpreted to have been associated with stream channels, migrated towards south, northeast and southwesterly direction. A petroleum system is established with viable hydrocarbon plays, which are associated with offshore-shelf (inverted graben-related structures) and gravitational-sliding related structures within the seaward or deep near-slope section of the Western Black Sea basin. The results provide new insights of hydrocarbon plays from added play fairway analysis. A conceptual depositional model is envisaged based on the integrated interpretation of isochrones and isochores. The attribute lobes match with gas discoveries in the shelf areas. Syn-sediments interpreted at Miocene, Oligocene, Eocene and Upper Cretaceous levels provide interesting prospective locales, especially in the southwestern and northeastern parts. Integration of multidimensional maps has benefits to petroleum exploration and prospectivity in areas, where the tectonics has undergone subduction process in continental basin margin areas. Several unproven plays of previous interpretation have been made successful with the undrilled channel and basin-floor fan features as productive targets in the deeper part of the study area.