

Structural Evolution and Impact on the Hydrocarbon Potentials of the Southernmost Part of the Northern Zagros Mountains (Iraq, Kurdistan Region)

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Abstract

The Geli Mountain is a well exposed anticline structure to the NW of the city of Dohuk in the northern part of the Kurdistan region of Iraq. This mountain lies between the Peshkabir structure to the west and the Linava structure to the East in the southernmost part of the outcropping Zagros Mountain

The main objective of the study was to better constrain the interpretation of subsurface dataset and to better plan future exploration activities. The study was based on a surface geology field work, on a fault and fracture analysis at different scales and on the interpretation of 2D seismic data.

The integration of all the data, observation and information collected during the field work with remote sensing and satellite image interpretation and microscopic observations on samples collected in the field has allowed to finalise a new geological map of the Geli Mountain area. The new geological map has been used to driving the interpretation of the seismic lines available and in producing four geological cross section across the Geli Mountain.

On a structural point of view, the Geli Mountain structure is separated from the adjacent mountains/structures by two major regional bounding faults. A north-south oriented regional fault to the west separates the Geli Mountain from the Peshkabir Mountain. A NW-SE oriented regional lineament separates the Geli Mountain from the Linava area. Both these two lineaments/faults can be followed on satellite images and using remote sensing techniques for tens of kilometres.

Based on all the observations the Geli Mountain can be divided, along strike, into three main structural zones with different deformation styles and associated geometries that are the result of the structural evolution of the area have an impact on the exploration potentials and associated risks of the Geli structure.

The main conclusions are that:

- +) The Geli Mountain plunges and closes to NW and is a separate structure with respect to the Peshkabir Mountain
- +) The geometry of the structure in the Plunging and Central zones is similar and it can be associated to a fault- bend fold with an associated backthrust system

- +) The central and western part of the structure are separated by some shear faults that have allowed the central part to move slightly forward and develop wider.
- +) These shear faults are likely to be the latest tectonic event after the formation of the Geli structure.
- +) The easternmost part of the structure (High Shear Zone) is strongly affected by shear movement and this has resulted in the rotation of the fold axis in the higher elevation (transpressional component)
- +) The geometry of the structure in the High ShearZone could be associated to a fault propagation fold with a transpressional component
- +) The High Shear Zone is also characterised by a well-developed system of backthrust that caused the shifting of the fold axis to the north and the formation of a steep backlimb
- +) No evidences of plunging of the structure towards East are evident from the data collected. This could imply that either the Geli Mountain is part of a wider structure that continue to grow to the east (Linava structure) or that the plunging evidences have been hidden by the high shear movements within this zone.