A Master's Thesis Project

Universitat de Barcelona – Facultat de Ciències de la Terra

Geometry of the salt-detached Qiulitage structure (Kuqa fold-and-thrust system, NW China): Evaluating sub-salt reservoir potential through seismic and structural interpretation

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ABSTRACT

The Kuqa fold-and-thrust belt developed in the southern foreland of the Tian Shan mountain range in NW China, accommodating Cenozoic intraplate shortening derived from the collision of the Indian and Eurasian tectonic plates. It is characterized by two main east-west striking fold-and-thrust systems separated by a wide syncline. The southern front is the so-called Qiulitage fold-and-thrust belt that comprises of a series of salt-controlled structures that are predicted to be favourable targets for exploration. The surface and subsurface geometry of the 280km-long, E-W trending Qiulitage fold-and-thrust belt exhibits significant changes along-strike, and are examined and compared in the central and eastern regions for this study.

In this study, seismic data is integrated with surface and well data to create new interpretations of the Qiulitage. Interpretations are validated by methods of cross-section restoration in the central region. Deformation style is strongly controlled by a décollement associated with the salt located within the Kumugeliemu Group. Additionally, shales and gypsum in the Jidike formations and upper Triassic also behaved as secondary décollements. The thrust system in the central region experienced a strong decoupling effect between pre- and post-salt sequences due to accumulation of thick salt beds, while the eastern region did not, due to the absence of salt. Shortening in the east is balanced locally, and involved the basement. Some observations dispute the existing theory, or suggest a different interpretation proposed by other studies. The analysis in this study may not only forward knowledge about the Qiulitage structure, but may also hold significant implications for future petroleum exploration initiatives.