# Interactions Between Submarine Channels and Structurally Controlled Topography in Deepwater Fold and Thrust Belts*

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## Abstract

The relationships between modern submarine channel systems and evolving structures in deepwater fold and thrust belt settings reveal several end-member channel – structure interactions (Figure 1). Each of these interactions can affect the deposition and morphology of the channel axis and the channel levees. These interactions, and combinations thereof, can control channel evolution over time and affect deposition of potential reservoir sands. Structures such as folds developed above underlying thrust faults, and strike-slip faults, not only control the positioning of submarine channels but also locations of increased sinuosity development. The structurally induced topography can control the location of focal points for the deposition of crevasse splays and sheet deposits at the bases of the channel levees.

This study uses near surface 3D seismic data from the deepwater fold and thrust belt of the Eastern Nile deep sea fan (Levant Basin, Eastern Mediterranean). In this setting, the down slope flow direction is perpendicular to the strike of the fold belt, which forms a significant bathymetric obstacle to flow. Thin-skinned strike-slip fault systems in this setting also play an important role in controlling channel flow pathways. The pathways of submarine channels are significantly affected by folds, which can result in preferential sinuosity development either within the hanging wall or footwall synclines. This preferential sinuosity development can lead to dramatic changes in the channel planform over a distance of only several hundred meters. Interactions between the submarine channel levee systems and the folds can be used as a method to constrain fold development.

The results of this study aim to improve our understanding of the interactions between submarine sedimentation and deformation in deepwater fold belt settings, particularly in terms of reservoir development and stratigraphic trapping potential.

**Figure**

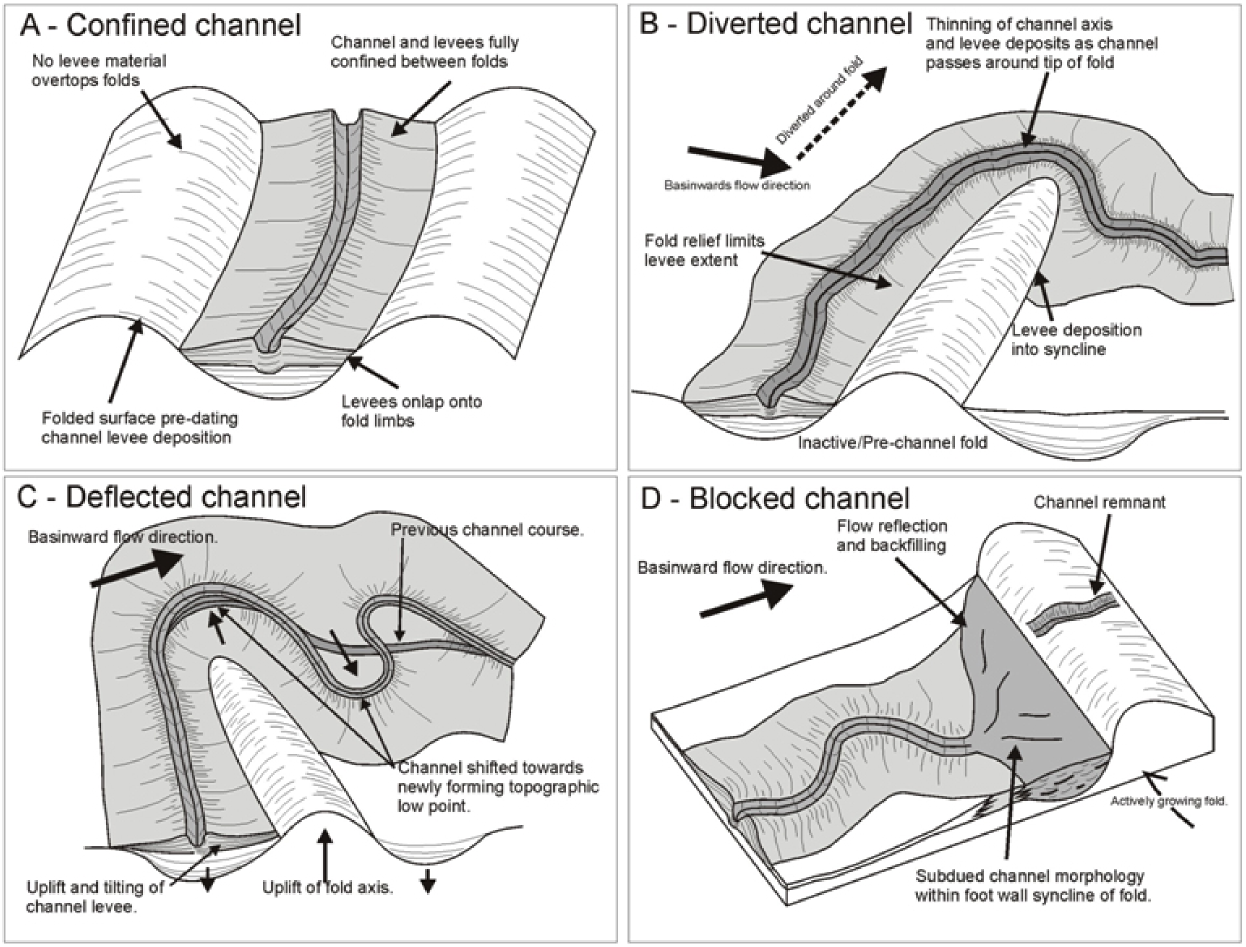


Figure 1. Block diagrams illustrating the four end member channel-structure interactions defined from this study. 1A: Confinement, in this example between two folds whose strike is parallel to the channel flow direction. Confinement localises the channel course and limits levee deposition due to the confining structures limiting the amount of local accommodation space. 1B: Diversion of a submarine channel around the edge of a pre-existing fold which is no longer active. 1C: Deflection of a channel by a pre-existing fold which is actively growing throughout the period of channel deposition. Fold growth results in channel migration away from the axis of uplift towards the newly forming bathymetric low points. 1D: A blocked channel as a result of post-channel folding perpendicular to the channel flow direction. In this case a channel remnant is preserved across the crest of the fold whilst upstream of the fold the channel has become blocked with increased deposition from reflected flows which have backfilled the footwall syncline.