AAPG HEDBERG CONFERENCE
"DEEPWATER FOLD AND THRUST BELTS"
OCTOBER 4-9, 2009 – TIRRENIA, ITALY

Submarine Channel-Structure Interactions in Deepwater Fold Belts: The Relationship Between Channel Development and Growth Sequence Architecture.

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Understanding the structural control on sedimentation in deepwater fold belt settings is a key factor in predicting reservoir architecture where submarine channel systems are present. The aim of this study is to consider the detailed interactions between submarine channels and folds and place them within the context of larger scale growth sequences which develop adjacent to the fold limbs. 3D seismic data from the Levant Basin, Eastern Mediterranean, provides an ideal opportunity to study coeval deformation and submarine channel deposition in an active fold belt setting.

Growth sequences developed on the back-limbs and fore-limbs of folds in this area record changes in the relative rates of sedimentation versus uplift during fold growth. Growth sequences can be used to constrain the evolution of bathymetric relief during fold growth and we demonstrate that this can have a profound influence on the development and morphology of submarine channel levee systems. Two end member models are presented:

1. Sedimentation rate exceeds uplift: This results in little or no seafloor expression of the fold during deformation. Submarine channels typically flow perpendicular to the strike of the fold, but may show subtle changes in channel morphology (such as a change in sinuosity) caused by loss of accommodation space across the fold crest.
2. Uplift exceeds sedimentation rate: This results in positive relief developing at the seafloor causing deflection and diversion of submarine channel systems around the emerging fold.

Throughout fold growth the relative rates of sedimentation and uplift can vary, causing a transition between the two end-members and resulting in a complex vertical sequence of submarine channels becoming incorporated into the growing fold. The results of this study demonstrate that the response of submarine channels to uplift during fold growth can be assessed by careful consideration of growth

stratal architectures. This can provide useful information relating to potential development of reservoir sands or lack thereof, as well as constraining the evolution of bathymetric relief during fold development.