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Regional Outcrop Study and 3-D Stratigraphic Modeling in a Foreland Basin Setting: The Example of the Grès d'Annot Turbidite Formation (French Alps)

The Grès d'Annot turbidite Formation (Eocene-Oligocene, French Alps) is a confined sand-rich deep-water system deposited in several tectonically controlled sub-basins, mainly fed from a major sediment source lying to the south: the Corsica – Sardinia Massif.

This study is based on sedimentological field surveys performed over the last three years and its objectives are firstly to build a predictive model for sand-rich confined turbidite systems and secondly to validate this model using stratigraphic modeling software: Dionisos, coupling basin deformation and sedimentation processes.

A regional geological model was constructed on the basis of sedimentological sections and photo-mosaics interpretation, using biostratigraphic dating, facies and sequence analysis to control the geometry of the turbidite sediments. Correlations were first made at a local scale, and then two major regional correlation panels were realized through the Grès d'Annot basin. Nine depositional sequences can be correlated from upstream (fan delta) to downstream (basin sand-sheets). These correlations suggest that the sequential organization results from East to West propagation of the Alpine thrust wedge and show the deepening, the infill and the spilling of the Grès d'Annot basin.

The 3-D stratigraphic forward modeling simulates the sedimentation and erosion processes in response to variations of eustasy, subsidence and sediment supply. It allows us to test and validate the hypotheses made in the geological model at basin scale. This approach leads to a better understanding of the link between structural deformation (inducing local confinement), sedimentary processes and geometry of turbiditic reservoirs in peri-orogenic basins.