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Use of 3-D Stratigraphic Modeling to Quantify the Influence of Topography and Basin Deformation on Deep Water Systems

Recent progress in stratigraphy has improved our understanding of sedimentary basin infill. Sediment architecture is the response to the complex interaction between three processes : the creation of accommodation in the basin, the supply and the transport of sediment. Stratigraphic modelling is an emerging technology which helps to quantify this interaction and its evolution through time.

We will present in this poster the principles and some applications of the Dionisos stratigraphic software. The interaction between the three main processes (accommodation, supply and transport of sediment) is numerically solved at each time step. The creation of accommodation space is linked to paleotopography and basin deformation, induced by tectonic movements, sea level variations, sediment loading and compaction. The supply of sediment can be an inflow (volume of water and sediment coming into the basin from the erosion of adjacent source areas, ...), or an in-situ production (e.g. for pelagic carbonated mud). The transport of sediment is simulated using two sets of equation, in order to reproduce the interaction between the long-term evolution of sedimentary processes (controlled by long-term fluvial and gravity transport), and the short-term evolution (induced by catastrophic rain fall, slope failures, and turbidity flows).

Two applications will be presented to illustrate these principles : a confined basin (the Annot Sandstone, France), and a passive margin setting (the Pab Sandstone, Pakistan). Constrained by detailed outcrop studies, the simulation of these two formations enhances the influence of the basin bottom morphology and its deformation through time on these deep water systems.