

3D deterministic modelling of turbidite transport and sedimentation: application to the Santos Basin (Brazil, Eocene Fm)

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Dionisos, a 3D stratigraphic model, has been developed at the IFP, in order to simulate and better understand the evolution through time of the sedimentary architecture of a basin.

A forward stratigraphic simulation is based on the reconstruction of palaeo-geography evolution. Fluvial, wave and gravity actions on sediments are deterministically simulated using macro-scale sediment transport equations. Each lithology (gravel, sand, shale, ...) is transported separately, then mass balance and classical compaction laws are used to define sedimentation or erosion rate from the computed flow of each lithology. That leads to a progressive simulation of the 3D stratigraphic architecture of the basin infill.

The transport equations used in Dionisos have been improved and calibrated using analog studies and micro-scale deterministic models. Then, this stratigraphic modelling approach have been applied and validated on numerous field case studies.

A special focus will be put on the Eocene Brazilian margin which is a very good example of a passive margin evolution, with a ramp morphology during the Lower Eocene, which progressively evolved towards a platform-slope-basin morphology during the Middle Eocene. The overall stratigraphic architecture of this margin was reproduced, leading to a better understanding of the relation between coastal to upper offshore platform deposits, and deep-offshore turbiditic fans.