



## **Distributed deformation structures in shallow water carbonates subsiding through a simple stress field (Jandaira Formation, NE Brazil)**

Giovanni Bertotti (1), Kevin Bisdom (1), Hilario Bezerra (2), John Reijmer (3), and Carol Cazarin (4)

(1) Delft University of Technology, Faculty of Civil Engineering and Geosciences, Geoscience and Engineering, Delft, Netherlands (g.bertotti@tudelft.nl), (2) Department of Geology, Federal University of Rio Grande do Norte, Brazil, (3) Faculty of Earth and Life Sciences, VU University Amsterdam, (4) CENPES, Petrobras

Despite the scarcity of major deformation structures such as folds and faults, the flat-lying, post-rift shallow water carbonates of the Jandaira Formation (Potiguar Basin, NE Brazil) display well-organized fracture systems distributed of tens of km<sup>2</sup>.

Structures observed in the outcropping carbonates are sub-vertical, generally N-S trending mode I and hybrid veins and barren fractures, sub-vertical roughly E-W trending stylolites and sub-horizontal stylolites.

These features developed during subsidence in a simple and constant stress field characterized by, beside gravity, a significant horizontal stress probably of tectonic origin. The corresponding depth curves have different origin and slopes and, therefore, cross each other resulting in position of the principal stresses which change with depth. As a result, the type and amount of fractures affecting subsiding rocks change despite the fact that the far-field stresses remain constant.

Following early diagenesis and porosity elimination in the first 100-200m depth, Jandaira carbonates experienced wholesale fracturing at depths of 400-800m resulting in a network of NNW-NE trending fractures partly organized in conjugate sets with a low interfault angle and a sub-vertical intersection, and sub-vertical stylolites roughly perpendicular to the fractures. Intense fluid circulation was activated as a consequence through the carbonates. With increasing subsidence, sub-horizontal stylolites formed providing calcite which precipitated in the open fractures transforming them in veins. The Jandaira formation lost thereby the permeability it had reached during the previous stage. Because of the lack of major deformation, the outcrops of the Jandaira Formation is an excellent analog for carbonate reservoirs in the Middle East, South Atlantic and elsewhere.