

## **High Resolution Spatial Models of a Carbonate Platform Margin (Early Jurassic, Jebel Bou Dahar, Southern High Atlas, Morocco)**

**Klaas Verwer<sup>1</sup>, Oscar Merino-Tome<sup>2</sup>, Giovanna Della Porta<sup>2</sup>, Jeroen A. M. Kenter<sup>3</sup>, Ted Playton<sup>4</sup>, Erwin Adams<sup>5</sup>, and Mitch Harris<sup>6</sup>**

<sup>1</sup> Faculty of Earth and Life Sciences, Vrije Universiteit, De Boelelaan 1085, 1081HV, Amsterdam, The Netherlands

<sup>2</sup> School of Earth, Ocean and Planetary Sciences, Cardiff University, Park Place, Cardiff, CF10 3YE, UK

<sup>3</sup> Chevron Energy and Technology Company, Appelgaarde 4, 2272 TK Voorburg, The Netherlands

<sup>4</sup> Jackson School of Geosciences, University of Texas at Austin, PO Box B, University Station, Austin, TX 78713-8902, USA

<sup>5</sup> Shell International E&P, Kessler Park 1, Rijswijk, 2288GS, Netherlands

<sup>6</sup> Chevron Energy and Technology Company, 6001 Bollinger Canyon Road, San Ramon, CA 94583-2324, USA

Studies integrating high-resolution 3D lithofacies distributions and stratal geometries in carbonate platforms are uncommon because of scarcity of 3D continuous outcrops. A seismic-scale and continuous carbonate-platform outcrop (Early Jurassic Jebel Bou Dahar, High Atlas, Morocco) provided those conditions and was analyzed using DGPS and LIDAR imaging. The DBD nucleated and developed in a rift setting during the Sinemurian and Pliensbachian, and drowned in the lowermost Toarcian. It measures roughly 35 by 4-5 km and is fully exposed as exhumed topography.

The Pliensbachian margin has a typical backstepped anatomy and is completely exposed along a platform, margin, to basin profile; this slope window measures 2.5 km in length, 1 km in width and provides access to a margin to toe-of-slope succession, which eventually evolved to a height of 450 meters. The margin is self eroding and shows repetitive backstepping. It consists of a 1) deeper dark gray peloidal rich wackestone-mudstone with abundant fossil remains of sponge like organisms and stromatolite-like cavities lined by abundant rims of marine cements; and 2) shallower coral framestone with dominant pink to light gray micrite or grainrich fabrics surrounding the coral branches. Updip of this boundstone belt, grain-dominated outer platform deposits with large coral patch reefs and dipping several degrees (up to 15°) prevail. Downdip, the steep (up to 40° degrees) slope is dominated by (mega)breccias and grain flow deposits derived from the margin alternating with thin-bedded turbidites and marls reflecting a highly discontinuous sedimentation pattern.

The spatial information on sedimentary bodies and stratal anatomy will be used to populate a full 3D depositional model of a backstepping margin. Such information is essential to improve our concepts of geostatistical modeling using outcrops, sequence stratigraphy, prediction from seismic reflection data, and flow models for hydrocarbon reservoirs.

Keywords: Jurassic, carbonate platform, digital field geology, digital outcrop model