

II-CENTRAL & NORTH ATLANTIC CONJUGATE MARGINS CONFERENCE LISBON 2010

Re-Discovering the Atlantic, New winds for an old sea



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Re-Discovering the Atlantic:
New winds for an old sea...



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SHORT ABSTRACTS

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RUI PENA DOS REIS & NUNO PIMENTEL

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Organic Maturation and Source-Rock Potential of the Mesozoic Algarve Basin – Southern Portugal

Fernandes, P.⁽¹⁾; Borges, M.⁽¹⁾⁽²⁾; Matos, V.⁽¹⁾ and Rodrigues, B.⁽¹⁾

(1) University of Algarve, CIMA, Ed. 7, Campus de Gambelas, 8005-139 Faro, Portugal. Corresponding author: pfernandes@ualg.pt

(2) LNEG-LGM, Rua da Amieira, 4465-965 S. Mamede Infesta, Portugal.

The Algarve Basin is an important Mesozoic depocentre in southern Portugal. It is located south of the Upper Palaeozoic rocks of the Variscan basement and mainly comprises Jurassic and Lower Cretaceous carbonate lithologies. The basin extends from Cape Saint Vincent in the west to the Guadiana River on the Portuguese-Spanish border in the east.

This sedimentary basin was initiated by rifting associated with the opening of the North and Central Atlantic Ocean, following the breakup of Pangea. Lateral changes in facies and subsidence across the Algarve Basin, allow its division into the Western, the Budens-Lagoa, and the Eastern sub-basins. These relatively small depocentres are separated by major regional faults which were probably active during deposition. Sedimentation in the Algarve Basin started with Upper Triassic continental red beds and evaporites which unconformably overlie Upper Palaeozoic strata. These Late Triassic strata are overlain by Early Jurassic (Hettangian) volcanic rocks associated with the Central Atlantic Magmatic Province (CAMP). Following this magmatic event, Sinemurian to Tithonian marine carbonate sedimentation became well-established across the Algarve Basin. The dominant lithofacies are shallow water limestones and cycles of pelagic marls and limestones. The Early Cretaceous is represented by a mixed clastic and carbonate succession, deposited in nearshore and terrestrial settings. During the Late Cretaceous, a major basin inversion event occurred, related to Alpine tectonism and the emplacement of the Late Cretaceous syenite of Monchique (72.5 Ma) into Upper Palaeozoic strata. Therefore, no Upper Cretaceous strata are present in the Algarve Basin. Sedimentation resumed during the Miocene with bioclastic limestones which unconformably overlie the Jurassic and Lower Cretaceous successions.

Vitrinite reflectance values measured from the Algarve Basin are all within the oil-window, ranging between 0.82%Rm and 1.29%Rm. In the Western sub-basin the general trend observed is a decrease in vitrinite reflectance as sections become younger: 1.17%Rm for the Upper Triassic, 1.14%Rm for the Pliensbachian and 1.07%Rm for the Bajocian-Callovian. This suggests that the maturation process for this part of the basin may have been related to burial. The exception to this is the anomalous high value measured for the Aptian marls of the Porto de Mós, with values of 1.14%Rm. This value is tentatively related to a local elevation of the palaeogeothermic gradient of the basin related to Upper Cretaceous magmatism. In the Eastern sub-basin a similar trend for the maturation was also detected: 1.12%Rm for the Callovian, 1.08%Rm for the Oxfordian and 1.06%Rm for the Kimmeridgian. However, a slight higher value of 1.11%Rm was recorded for the Kimmeridgian-Tithonian succession.

TOC values recorded from marls and mudstones of the Algarve Basin vary remarkably with the age of the strata: 1.02% for the Toarcian, 0.06-0.81 for the Bathonian-Callovian, 0.06-1.77 for the Oxfordian, 1.08-1.17 for the Kimmeridgian, 0.02-0.54 for the Berriasian-Barremian and 1.08-2.27 for the Aptian Porto de Mós Marls. The samples from the Toarcian, Kimmeridgian and Aptian marls gave values always above 1% TOC indicating therefore a good source potential in terms of quantity of organic matter.