POSTER

The Western and Central Algarve Basin (South of Portugal) – Mesozoic subsidence evolution and tectonic controls

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The purpose of this study is to understand the structure and sedimentary infill of the Mesozoic Algarve Basin, located in the South of Portugal. To do so, we tried to understand the Paleozoic basement structuration and how it influenced and conditioned the Mesozoic subsidence evolution and depocenter migration, from the late Triassic until the early Cretaceous.

The origin of the Algarve Basin is related to the sedimentary infill of a passive continental margin, related with the repeated phases of the North Atlantic opening, which followed the breaking of Pangea in late Triassic times. (*vd.* Terrinha, 1998). Predominant extension promoted sedimentation throughout all the Jurassic and early Cretaceous. From late Cretaceous onwards, subsidence in the Algarve Basin has been reduced, suffering tectonic inversions in a compressive setting related to the Iberian plate position between the African and European colliding plates.

The Paleozoic basement is structured by fault sets trending mainly NE-SW and NW-SE, with sinistral and dextral slips movement components, respectively, formed at the end of Variscan orogeny and before the late Triassic extension (300 to 250 Ma) (Terrinha, 1998). The Mesozoic infill has been controlled by the reactivation of inherited basement structures, with the NW-SE faults compartmentalizing the basin in three sectors: Eastern sector, Central sector and Western sector (*vd.* also Matias, 2007). The Mesozoic overall thickness tends to increase towards SSE, controlled by NE-SW structural steps, diapirs and salt walls. Thickness also tends to increase towards SW, controlled by the NW-SE-faults.

This study is focused on the onshore Western Algarve Basin, based on the analysis of four onshore locations and two offshore wells (Santos *et al*., 2011). The interpretations were based on sedimentation and subsidence rates, calculated from decompacted thicknesses and paleo-water depths inferred from depositional system. It is important to refer that subsidence rates are very similar to sedimentation rates, due to the very small paleo-water depth variations associated with a long-lived carbonate platform in the Mesozoic of the Algarve Basin (*vd.* Santos *et al*., 2011). However, erosional hiatuses were not considered due to lack of quantitative data about well-known stratigraphic unconformities, leading to some underestimation of both rates.

From the comparison between three onshore locations: Sagres (S), Lagos (L) and Albufeira (A), shown in Figure 1, it has been possible to adress W-E spatial variations of the onshore depocenters. During the first phase (T^3-J^2) the depocenter was located in Sagres (S), the westernmost region of the basin, with a thickness three times higher than the other locations. During the second phase (J^3), a migration of the depocenter towards E is evident, but the Sagres region (S) still shows a significant thickness of sediments. During the final phase (K^1), Sagres (S) lost importance and the depocenter migrated towards W, lying in the central part of the studied sector: Lagos (L).

From the integration of all the variables studied in the six locations, a preliminary regional geodynamic interpretation shows that the SE offshore (wells) and the NW

onshore areas (Carrapateira e Sagres) are the most subsident in the first phase, suggesting a structural control by the basement's NE-SW fault movements, responsible for the tectonic uplift of the central block (Lagos and Albufeira). In the second phase there is evidence of another structural control by approximately N-S to NW-SE late variscan faults, reactivated during the Mesozoic: Aljezur fault (AF) and Portimão fault (PF). During the third phase a modification occurs in the basin, with clearly lower subsidence rates and no clear structural individualization. It is possible to assign the apparently random control of the sedimentary infill during the third phase (K^1) mostly to halokinesis, in agreement with other published works, which show the structural and halokinetic control of the depocenters in the Mesozoic Algarve basin (Terrinha, 1998; Matias 2007).

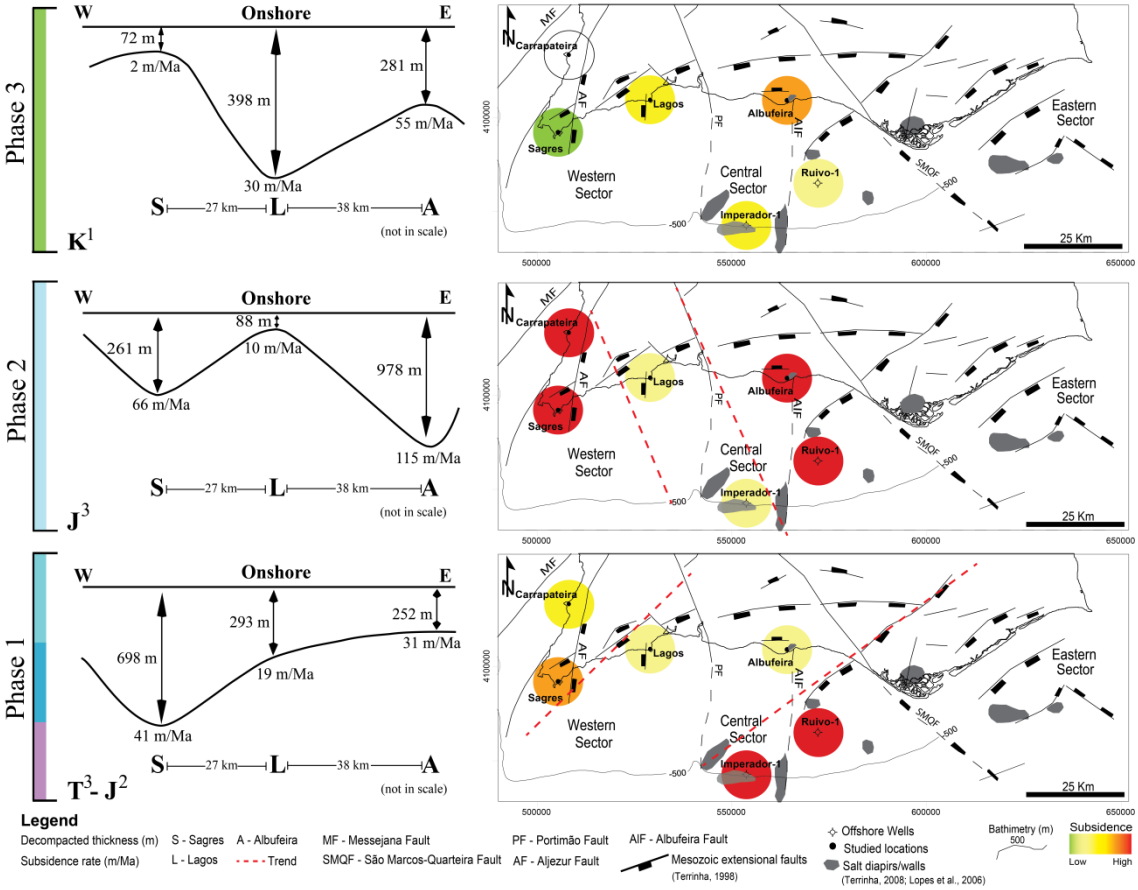

Figure 1 – Mesozoic subsidence evolution and tectonic controls in the Western and Central Algarve Basin (S Portugal). Left - decompacted thicknesses and maximum values of subsidence rates showing W-E spatial migration of the depocenters; Right - qualitative subsidence rates in the six studied locations, showing different tectonic controls in different evolution phases (modified from Santos *et al.,* 2011).

References

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