

The DASA graben in Northern Niger, a case of a Paleo-Mesozoic basin evolving from uplifting to rifting

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The N70° DASA graben is a closed-rift that seems to be the deepest part of the Tim Mersoï Basin, which is located in the Northwestern part of Niger (Figs. 1,2) in West Africa. It contains a pile of more than 805 m of Paleozoic-Mesozoic sediments. The tectonic subsidence and uplifting was calculated using well log data and deducing the variations in sedimentary thicknesses over time. Geological mapping and tectono-sedimentary analysis indicate that the structural evolution of the DASA graben is characterized by two major periods (Fig. 3):

- The first period was marked by an uplift stage ranging from Carboniferous to Permian. It was typified by a weak subsidence rate (3.45 m/Ma on average), under a transpressive tectonic regime, with a decrease in the thickness of the sedimentary series along the axial zone of the graben, and an increase of the thickness towards the border areas.

- The second period was characterized by a higher subsidence rate (4.11 m/Ma on average) related to a change in the tectonic regime. It was marked by a rifting stage preserved over a long period, subjected to an extensive tectonic regime, from Triassic to Lower Cretaceous, during which the highest thicknesses of the sedimentary series developed in the axial zone of the graben.

The structural and sedimentological features defined the DASA graben as a particular type of syn-sedimentary basin evolving from a transpressive tectonic regime during the Paleozoic to an extensive tectonic regime during the Lower Mesozoic. Thus, the second period marked by an extensional regime would probably be related to the opening of the first stages of the Atlantic Ocean.

Keywords: DASA graben, tectono-sedimentary, uplift, rifting, polyphasic evolution, North Niger

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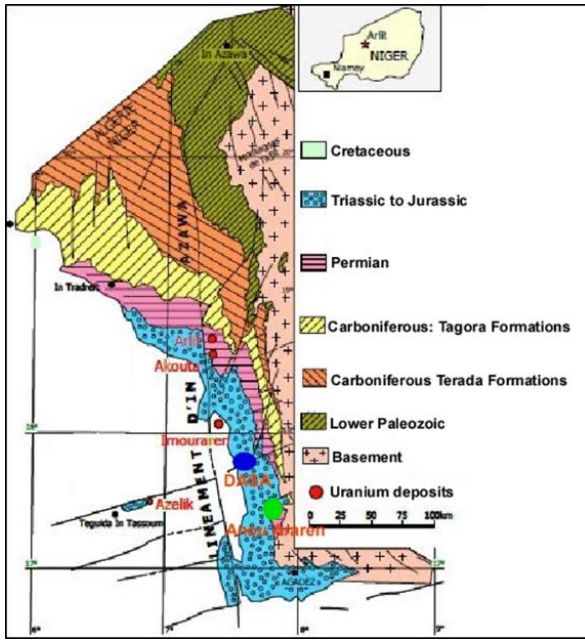


Fig. 1. Simplified geological map of the Eastern part of the Tim Mersoï Basin.

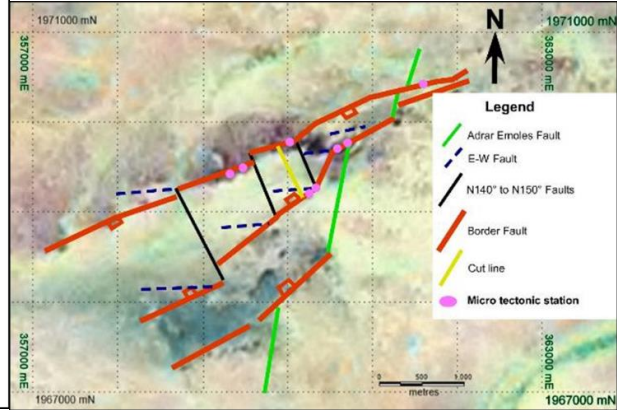


Fig. 2. DASA graben

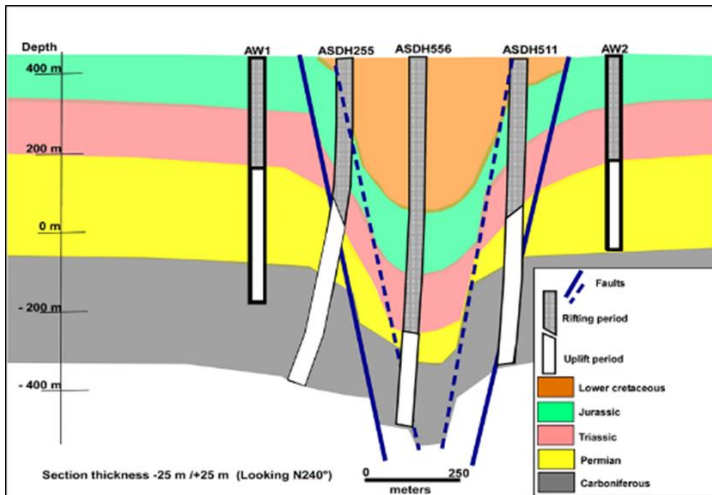


Fig. 3. DASA graben model evolution Carboniferous to Lower Cretaceous (COGEMA, 2006, modified)