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Evidence and implications of an upper-Cretaceous deep-sea fan on the Abyssal Plain of the Congo-Angola basin

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The analysis of more than 19,000 km of 2-D multi-channel seismic reflection profiles, from the ZaiAngo Project and some other industrial data sets covering an area of ca. 200,000 km2 on the slope and abyssal plain of the Congo-Angola basin, allowed us to analyse the seismostratigraphic record down to 9 seconds two-way travel time.

At about 7.5 to 9 s (twt), unconformably onto the oceanic crust, a basal seismic unit consists of parallel, medium-to-high amplitude internal reflections onlapping the basement. This unit is located on the abyssal plain and extends for more than 200 km seawards of the present-day base of the slope. The isopach map shows a radial fan-shaped depocentre, centred around the present-day Congo river outlet, with maximum thickness of up to 2.5 km. Overlying this basal unit there are the prograding deposits of the Neogene Congo deep-sea fan.

The lack of boreholes in these distal areas of the continental margin does not allow direct dating of this sedimentary unit. Since there are no clear magnetic anomalies in this area of the South Atlantic, the ocean crust age is still controversial and published ages range from 127 Ma (Barremian) to 117 Ma (Late Aptian). Nevertheless, if we assume an Aptian age for the oceanic crust, this provides an oldest possible age for the base of the basal unit. Additionally, the unit's top bounding seismic marker can be traced throughout most of the basin. Long distance correlations with dated markers in the continental margin suggest a Turonian age.

Based on the findings described above, the basal unit would represent an Albo-Turonian deep-sea fan deposited on the ocean crust. Furthermore, the morphology and location of this fan suggests a feeding source close to present-day Congo River (an upper Cretaceous paleo-Congo?) which in turn has important implication on the continental paleo-drainage history. In addition, this basal unit might be a good candidate to contain mature source rocks. Future thermal modelling should allow the evaluation of the generation potential of this sequence and its relation to known gas seepage features of the basin.