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The Congo deep-sea fan: from basin-wide to block scale.

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With a surface of about 300,000 km^2 and at least 0.7 Mkm^3 of Cenozoic sediments, the Congo deep-sea fan is one of the largest submarine fan systems in the world and one of the most important depocentre in the eastern south Atlantic. The present-day fan extends over 1000 km offshore the Congo-Angola continental margin and it is sourced by the Congo River, whose continental drainage area is the second largest behind the Amazon's. Since there is a direct connexion between the drainage and the deep offshore basins, through the Congo submarine canyon, direct transfer of terrigenous material from the continent onto the abyssal plain takes place by-passing the shelf and upper slope of the basin. Thus, the study of such a system provides insights on the interaction between a giant distal submarine fan and the proximal mature passive margin, as well as a better understanding of the stratigraphic signature on ultra-deep accumulations from geological processes acting on the proximal margin. In this sense, the analysis of very large 2D seismic-reflection datasets and borehole data has allowed us to carry out multi-scale studies ranging from basin-wide down to block scale. We address questions regarding the time-space sedimentation partitioning on the Congo basin and its possible controlling factors. This has led to a re-interpretation of the post-rift history of the basin and a reconsideration of the stability of the Congo River as a long-term sediment supplier to the Atlantic.

The seismo-stratigraphic record of the Congo deep-sea fan results from a complex, but yet decipherable, interplay among processes acting at different scales: submarine erosions, salt tectonics, margin seaward tilting, continental uplift, and climate. In turn, the long-term evolution of this large submarine fan seem to control the distribution of small-scale features probably associated to short-term processes as present-day active liquid /gaseous hydrocarbon leakage. These features (i.e. seafloor depressions and mounds, and gas chimneys) appear associated to either stratigraphic elements: palaeo-channels, downlapping clastics wedges, onlaps and unconformity surfaces or to structural elements as growth faults, polygonal faults and salt-diapirs crestal faulting. Numerical Modelling and calibration with the observed leakage features on the continental slope, southwards of the Congo canyon, show that the hydrocarbon generation history is closely related to the onset and further progradation of the submarine fan.