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On how the interaction of tectonics and sedimentation within the Niger Delta has created a complete petroleum system

The Niger Delta comprises a highly integrated tectonostratigraphic system where all elements of the deltaic system work in concert to form the source, reservoirs, seals, migration pathways and traps that are key to a working petroleum system. The delta was initially confined within the Benue Trough. Sediment mass was low and relatively few structures were developed. In this setting much of the sediment load bypassed the slope and was deposited on the basin floor. These strata were subsequently buried by the advancing delta front. Continued sediment loading during progradation of the delta created gravitational instability that in turn led to the development of linked systems of extensional, diapiric and contractional structures. These structures modified accommodation on the slope and the sedimentary systems compensated accordingly. Deformation of the delta caused restricted bypass of the sediment mass to the basin floor, creating the slope centered depositional profile observed today. The increasing sediment load had another important effect -- it generated hydrocarbons, which in turn helped create the structural form. The generation of hydrocarbons within shales of the lower deltaic sequences created overpressured conditions over a wide region. This facilitated the generation of the huge detachment surface that underlies the linked extensional and contractional regions. To complete the linkage, the structural and stratigraphic systems themselves not only interact to create traps and seals within the delta system but also serve as conduits for hydrocarbon migration. The Niger Delta is thus a complete petroleum system in which all elements are contained within the deltaic succession.