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Shelf-Fed Turbidite System Model and its Application to the Oligocene Deposits of the Campos Basin, Brazil

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Despite the large number of models involving the genesis and sedimentary facies of deep-water sandstones, none of these models adequately explains the origin and evolution of the extremely clean, widespread (more than 6000 km^2), predominantly massive, thick (more than 150 m), blanket-like sandstones deposited in the deep-water environment of the Campos Basin during the Oligocene. Consequently, to explain this sandstone, I propose a shelf-fed turbidite system model, which is strongly based on the Campos Basin data set.

The basic framework necessary for the development of a shelf-fed turbidite system includes: (1) deposition of a large volume of clastics during the buildup of the shelf-sand-rich unit, which later constitutes the main source of sediment for the system, (2) localized tectonic pulses that modify the outer-shelf declivity and trigger mass-flows, and (3) a relative fall of sea level, which causes exposure of the shelf sediments and reworking in a shallow, high-energy marine environment. These three basic elements are equally important for shelf-fed turbidite system development, but relative sea-level position controls the development of the progradational, aggradational, and retrogradational depositional phases within the system. Submarine canyons are commonly scoured during all three phases on the outer shelf and lower slope environments.

The shelf-fed turbidite system model may apply to other sedimentary basins, principally to those of the Atlantic-continental margins that have a thick evaporite sublayer. Halokinesis can provide the necessary room for the shelf sedimentary-unit buildup, the tectonic pulses that trigger the flows, and even localized relative sea-level oscillations that can accelerate or abort any one of the depositional phases of the system.

Wagner E. Peres received his B.S. in Geology (1977) at the University of Brazilia, Brazil, and his Ph.D. in Seismic-Stratigraphy (1990) at The University of Texas at Austin. He has been working for PETROBRAS, either as an explorationist or as a manager, for more than 18 years. As an explorationist, he has processed and/or interpreted data from every Brazilian sedimentary basin where PETROBRAS has had any activity, including the Campos Basin, where he worked for four and a half years between 1982 and 1987. During this period, the Company drilled all 71 of his proposed exploratory wells. Among these wells are the wildcats that discovered the Barracuda Field and the giant oil fields that encompass the Marlim Complex. The total estimated recoverable oil reserves for all these fields together can surpass 6.5 billions of barrels. Since 1992, he has been the Exploration Manager for PETROBRAS AMERICA in Houston, TX. ■