



High-resolution Seismic based Guanabara Bay Geological History

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Abstract

Guanabara Bay is one of the most prominent features along the Brazilian coast. Its origin is associated with a response to the uplifting of Serra do Mar and the coastal massifs, in the Paleocene, and consequently the subsidence of Guanabara Graben. However, the most recent sedimentary filling of Guanabara Bay is associated with paleoclimatic variations and consequent sea level fluctuations, culminating in the last marine transgression since the Upper Pleistocene, which drowned a former Pleistocene River valley. This study investigates the seismic-stratigraphy of the sedimentary sequence based on 23 high-resolution seismic profiles performed by boomer and sparker sources with a frequency range of 200 and 800 Hz. The seismic data were treated in Emerson's SKUA-GOCAD software. The basement is marked by very irregular seismic reflectors, below which no other relevant reflections are observed. The juxtaposed sedimentary units characterize the sedimentary filling primarily in a fluvial environment and afterwards the marine sequences, initially in a high-energy estuarine environment, followed by the muddy filling, in a low-energy environment, and then Guanabara Bay drowning during the last marine transgression over the past 20,000 years. These sedimentary units are separated by two prominent unconformities. Paleo-drainage channels and prograding sequences are notable on most seismic profiles. The upper unit in the interior of the bay, in a low-energy environment, shows sub-horizontal layers, which flatten the underlying layers with the sediment influx of 45 rivers that flow into the interior of the bay. All seismic profiles collected are being reprocessed in order to better define the stratigraphy of the sediments that fill Guanabara Bay. The sediments accumulated in Guanabara Bay are sources for the northern portion of the Santos Basin during low sea level phases. Therefore, this work will provide subsidies for future investigations on the continental shelf allowing the correlation between the source areas and the deepest regions of the basin.