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Morphology and seismic facies of a sedimentary wedge off São Sebastião Island, São Paulo Bight, southwest Atlantic Ocean

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São Sebastião Island (SSI) is located in the São Paulo Bight, southeastern Brazil. It represents a major boundary between the shelf to the south, which is mainly covered by recent mud derived from the de la Plata River, and the shelf to the north, where sediment distribution is patchy, comprising variable amounts of sand and mud due to a complex physiography with numerous nearshore islands [1, 2]. The SSI is separated from the mainland by the São Sebastião Channel (SSC). Currents on the inner shelf exhibit a seasonal behavior, flowing in alternate directions in response to dominant winds. In addition, upwelling-favorable wind conditions may allow the intrusion of cold waters derived from the Brazil Current through the SSC [3]. At least two wedge-shaped deposits attached to the island are recognized, an inner wedge in the SSC and an outer wedge forming the seaward shoreface of the island. In this contribution the major morphological and stratigraphic features of the outer sediment wedge are describe and the potential factors controlling its genesis discussed.

The dataset available to the study is composed of geophysical and sedimentary data acquired during three oceanographic cruises (Geosedex, Cunha and Cunha 2) executed between 2013 and 2015. Seismic data were acquired using sparker, boomer and chirp sound sources. The seismic data were processed using the Radepro™ software and interpreted using the Kingdom IHS™ software. Overall seven sediment cores were collected in the study area using gravity and piston corers.

The sediment wedge off SSI is composed of up to four subunits that are mainly show a foresteping stacking pattern. However, the most recent sub-unit can be regarded as an acoustically semi-transparent sediment drape. A preliminary correlation with available sediment cores indicates that the most recent sub-unit is mainly composed of mud. An irregular degree of acoustic masking is observed in the proximal part of the sediment wedge.

The SW-NE oriented sediment wedge extends laterally for at least 32 km. Across-shelf, the wedge extends up to 25 km offshore from SSI, reaching a sediment thickness of nearly 40 m. The wedge initially has a relatively flat surface which, at an average water depth of 33 m, transforms relatively abruptly into a seaward slope characterized by a convex offlap break.

The presence of the Serra do Mar mountain range along the coastline of the São Paulo Bight forces the drainage system towards the interior of the continent, thereby blocking any significant seaward fluvial supply in the area. It is tentatively proposed that the origin of the wedge is related to the sediment transport capacity of wind-driven currents, the trajectories of which are modified by the physiographic

setting of the SSI, which generate shadow zones favorable for sediment accumulation. This study stresses the importance of coastal configuration in modifying coastal current patterns.

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[2] Mahiques MM, Tessler MG, Ciotti AM, Silveira ICA, Sousa SHM, Figueira RCL, Tassinari CCG, Furtado VV, Passos RF (2004) Hydrodynamically-driven patterns of recent sedimentation in the shelf and upper slope off southeast Brazil. Cont Shelf Res 24:1685-1697

[3] Castro BM (2013) Summer/winter stratification variability in the central part of the South Brazil Bight. Cont Shelf Res 89:15-23

