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# Active tectonic and sedimentary processes along the Sao Vicente Canyon (SW Iberian Margin): High-Resolution Imaging

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The SW Iberian Margin hosts the present-day boundary between the Eurasian and African Plates. Plate convergence of 4 mm/yr is accommodated over a large and diffuse deformation zone, characterized by significant and widespread seismic activity. The region is also the source of the largest earthquakes and tsunamis in Western Europe, such as the 1755 Lisbon event. One of the most prominent structures in this margin is the São Vicente Canyon (SVC), a deeply carved long conduit linking the Portuguese shelf and Horseshoe Abyssal Plain at 5000 m depth. The seafloor morphology and shallow structure of the SVC was the object of study as part of the HITS cruise on board the Spanish RV Hesperides (September, 2001). We present here our main results based on the analyses and integration of the newly acquired data: swath-bathymetry, TOBI sidescan sonar backscatter and high-resolution seismics. The SVC is deeply incised in a large amplitude syncline bounded by active structures (the São Vicente Faults and Horseshoe Faults), as suggested by swarms of shallow to intermediate earthquakes and seafloor faulting ruptures. The SVC is over 100 km long, 20 km wide and with more than 1000 m of vertical relief on its highest part. The canyon has asymmetric and rectilinear flanks following three main segments, from North to South: the canyon head with a N030 trend, the central part with a N045 direction, and the canyon mouth trending N-S. The Horseshoe Fault, which delineates the east flank of the SVC at the Horseshoe Abyssal Plain, follows a main N43 direction. The TOBI image from the SVC shows a large variety of acoustic facies illustrating differ-

ent tectono-sedimentary processes. The canyon floor is highly reflective and heterogeneous, where areas of coarse-grained beadload with chaotic seismic facies co-exist with localized outcrops of bared stratified rock-strata. The canyon flanks are mainly dominated by homogenous low reflectivity characteristic of hemipelagic sedimentation. However, high reflective areas and strong acoustic shadows are common towards the middle part and base of the canyon flanks, corresponding to incised gullies, landslide headscarps and mass wasting deposits. Tectonic activity, submarine erosion and ephemeral sediment transport draining to the Horseshoe Abyssal Plain (HAP) defines the present-day morphostructure of the SVC. During the Holocene, the most likely mechanism of landslide triggering in the SW Iberian Margin is seismic activity. Thus, the mass wasting processes (turbidites and debris flows) filling the HAP may give us valuable information of the earthquake event history of the margin, which we are also studying as part of the ESF EuroMargins SWIM project.