SEAMOUNT SUBDUCTION ON THE CONTINENTAL MARGIN OF COSTA RICA CAUSING DEFORMATION AND MASSIVE SLOPE FAILURE - NEW EVIDENCE FROM HIGH-RESOLUTION SIDESCAN SONAR DATA

V. Hühnerbach (1), D. G. Masson (1), W. Weinrebe (2) & C. Ranero (2)
(1) Southampton Oceanography Centre, Challenger Division, Waterside Campus, Southampton SO14 3ZH, United Kingdom, (2) GEOMAR Research Centre, Wischhofstrasse 1-3, 24148 Kiel, Germany (vhh@soc.soton.ac.uk)

The subduction of seamounts attached to the Cocos Plate on the Pacific margin of Costa Rica causes spectacular deformation and widespread slope failure. The seamounts measure several kilometres in diameter and up to 2 km in height and each leaving a parallel-sided depression, traceable of up to 55km away from the trench, in its wake. This wake in being created by compression and uplift of the continental slope as the seamount passes beneath it, followed by collapse due to landsliding as support for the uplifted area is withdrawn.

TOBI sidescan sonar data from cruises in 1999 and 2002 show, in detail, the geological processes involved in creating the deformation and slope failures. In the areas of uplift above the seamount a complex pattern of normal and strike-slip faults is found. This uplifted area is relative broad, up to twice the width of the seamount.

Subsequently, as the seamount passes beneath the fractured area, slope failures occur above the steep trailing edge of the seamount, as the buttressing effect of the seamount is lost. In most cases failures are restricted to the immediate area of the seamount’s trailing edge, resulting in long narrow "scars" similar in width to the seamount.

The landslide processes are dominated by debris flow, but also include sliding of coherent blocks and debris avalanche. Landsliding occurs by repeated slope failure, producing a series of overlapping debris flows. Downslope sediment transport is typically over limited distances, resulting in partial "backfilling" of the scar as its
headwall moves upslope.

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