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SHALLOW SEA-FLOOR MORPHOLOGY BETWEEN POINT AÑO NUEVO AND SANTA CRUZ, CALIFORNIA

U.S. Department of the Interior
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by
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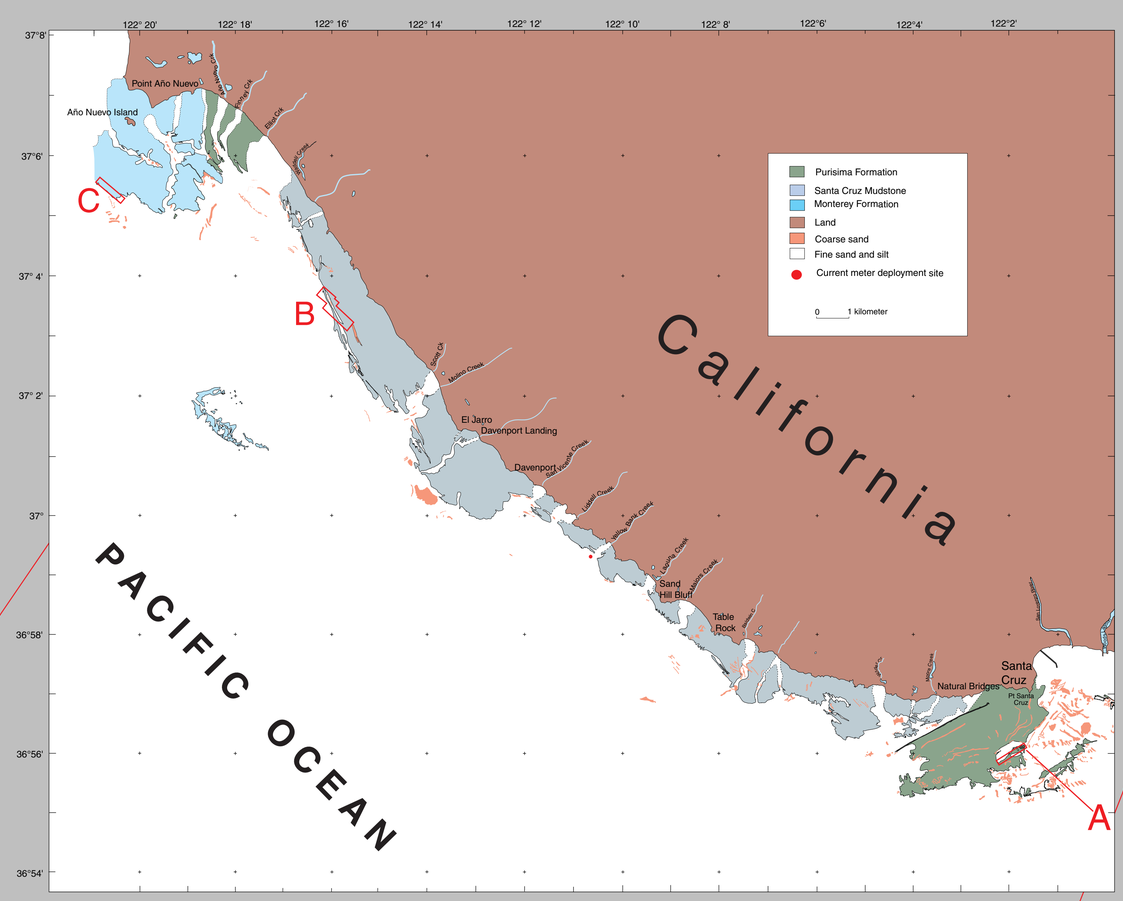
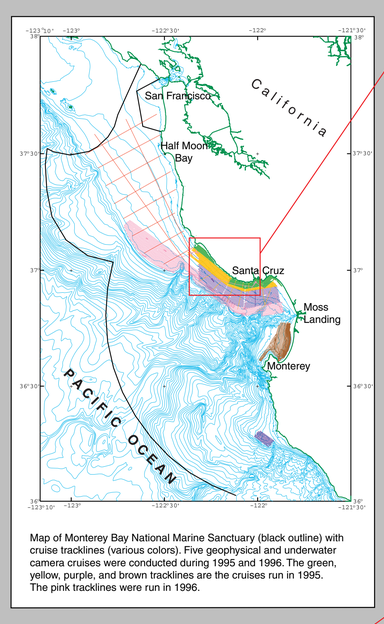
ABSTRACT

This preliminary seafloor map displays submarine rock exposures found along the northern part of Monterey Bay National Marine Sanctuary. The extent of rock exposures on the sea floor is based on interpretations of side-scan sonar records, seismic-reflection records (not displayed here), and underwater video. The mapping defines the nearshore morphology of the central California coast between Point Año Nuevo and Point Santa Cruz. The extensive occurrence of nearshore rock outcrops poses questions concerning longshore sediment transport pathways, sediment storage sites in the nearshore zone, and identifies previously unmapped fish and wildlife habitats.

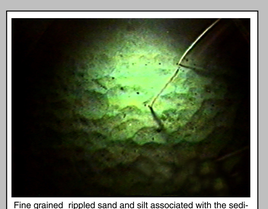
Previous studies of longshore sediment transport along the northern part of the Monterey Bay National Marine Sanctuary indicate that sediment is being transported along shore from the Golden Gate to the south and deposited into Monterey Bay (Best and Griggs, 1991). Tait and others (1994) proposed a conceptual model of a rocky coast line that detours longshore transport of littoral sediments. This survey supports the conceptual model of Tait and extends seaward the onland mapping of Clark (1981). This preliminary map of the areal distribution of seafloor rock outcrop and sediment in the nearshore extends from approximately 4 meters out to 60 meters of water depth. The map shows a shallow nearshore that has extensive rock outcrops consisting of upper Miocene to Pliocene Purisima Formation, middle to upper Miocene Santa Cruz Mudstone, and lower to middle Miocene Monterey Formation. High- resolution seismic-reflection data collected coincidentally with the side-scan data show that these rock units are incised by paleo-stream valleys that extend offshore to water depths of 30 to 40 meters and may serve as sediment storage sites within the littoral zone. Verification of seafloor interpretations were attained using underwater video and grab sampling after the initial mapping was completed. This project will allow us to study the relationship of exposed bedrock highs and current patterns by mapping of bedforms on the seafloor. The results of this study can be applied to understanding the dynamics of longshore sediment transport in the nearshore environment of a rocky coast.



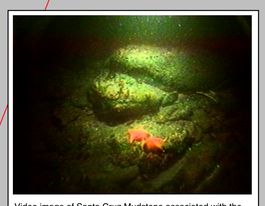
This poster is preliminary and has not been reviewed for conformity with U.S. Geological Survey editorial standards.



Map of Monterey Bay National Marine Sanctuary (black outline) with cruise tracklines (various colors). Five geophysical and underwater camera cruises were conducted during 1995 and 1996. The green, yellow, purple, and brown tracklines are the cruises run in 1995. The pink tracklines were run in 1996.

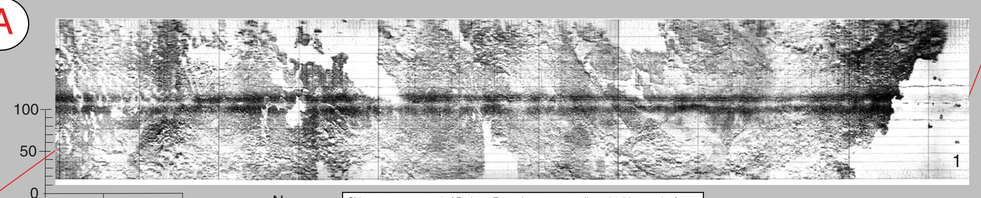


Fine grained rippled sand and silt associated with the sediment textural pattern as seen at point "1" on side-scan record "A." Note the worm tubes and the discontinuous ripples. Water depth is 45 to 50 meters.



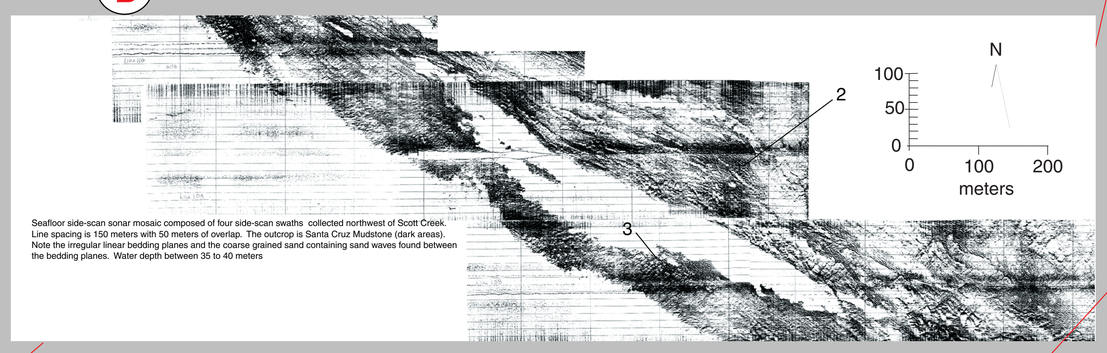
Video image of Santa Cruz Mudstone associated with the type of outcrop noted at point "3" on side-scan record "B." Water depth is 25 meters.

A

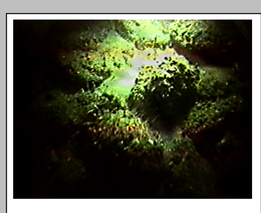


Side-scan sonar record of Purisma Formation outcrops collected 1.5 km south of Point Santa Cruz . The mottled appearance of the outcrop, is due to surficial boulder -cobble lag overlying the bedrock unit. The light portions of the record consist of medium- to fine- grained sand. Each horizontal line represents 10 meter spacing from the middle of the record. Water Depth 39 to 40 meters.

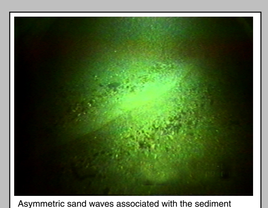
B



Seafloor side-scan sonar mosaic composed of four side-scan swaths collected northwest of Scott Creek. Line spacing is 150 meters with 50 meters of overlap. The outcrop is Santa Cruz Mudstone (dark areas). Note the irregular linear bedding planes and the coarse grained sand containing sand waves found between the bedding planes. Water depth between 35 to 40 meters

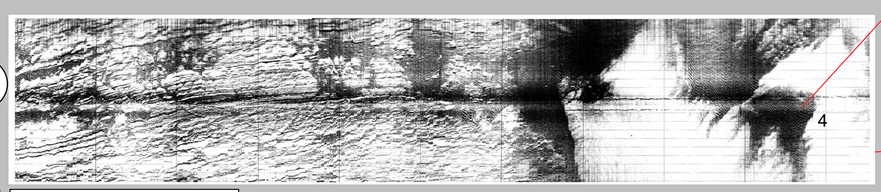


Large boulders and cobbles associated with the Purisima Formation. This video image was taken offshore of Point Santa Cruz. Note the fine sand between the large cobbles. Water depth 55 meters



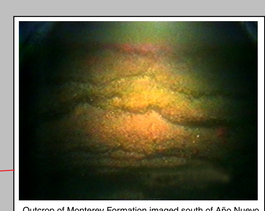
Asymmetric sand waves associated with the sediment textural pattern seen at point "4" on side-scan record "C." Note coarse grained sand in the trough between the sand waves. Water Depth 25 meters.

C



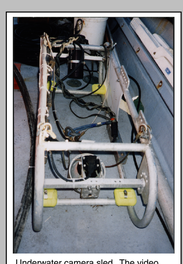
Side-scan sonar record of Monterey Formation outcrop collected south of Año Nuevo Island. Note the thin parallel bedding planes and sand waves of coarse grained sand (dark regions) near low areas. The light areas to the right represent fine grained rippled sand. Water depth 45 meters

Underwater photo of cobbles and pebbles in coarse sand. The field of view is 3 feet by 2 feet. The large rock in the upper left is part of the Santa Cruz Mudstone. This sediment texture is associated with the type of seafloor at point "2" on side-scan record "B". Water depth 20 meters.



Outcrop of Monterey Formation imaged south of Año Nuevo Island. Note the bedding planes, which are typical of the Monterey Formation. Water depth is 45 meters.

The 500-kHz side-scan sonar fish used for this survey. The large yellow fin at the top of the fish and the tail fins are for stability. The long black rectangle along the side of the fish body are the transducer heads. The research vessel is the R/V David Johnston.



Underwater camera sled. The video camera is at the upper end of the sled, and the light is at the lower end. The yellow square objects are diver's weights to add stability to the sled.

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