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A Forearc Section of the Cascadia Subduction Zone at Heceta Bank off Oregon Revealed by High Resolution Imagery and ROV transects: Extension of Geologic Mapping to the Continental Shelf

Details

Meeting [2000 Fall Meeting](#)

Section [Ocean Sciences](#)

Session [Frontiers of Marine Sediment Transport & Continental Margin Geology: A Tribute to Joe Kravitz III Posters](#)

Identifier OS61A-31

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Terms [Continental margins: divergent \[8105\]](#)

Abstract

A survey of Heceta Bank on the edge of the central Oregon continental shelf using an EM300 multibeam system displays a surface of truncated folded forearc basin fill of Late Miocene and Early Pliocene age in great detail, reminiscent of an aerial photographic image of a subaerial folded mountain belt. Combining

seismic reflection profiles and dated bottom samples with the imagery shows that the deeper water pre-unconformity (inferred) Late Miocene outcrops are poorly stratified both on the seismic reflection records and on the seafloor imagery, whereas the (mostly) Early Pliocene strata shallower-water sections are well stratified on the seismic reflection records and form distinct Ahogback@ ridges on the seafloor. Extensive jointing is present in both types of bedrock, but the Late Miocene jointing is generally more dense. Samples recovered by the remotely operated vehicle ROPOS reveal that the outcropping mudstones have been extensively bored by mollusks and worms in the upper 5 cm, creating a high porosity and probably significantly reducing the acoustic impedance of the seafloor. This biologically-produced modification may be the cause of the relatively low backscatter characterizing the outcropping areas. The nature of fan-shaped tongues of high-reflectivity material radiating from the top of the northern portion of the bank is enigmatic. Small round depressions just seaward of the shelf edge in the mud zone contain carbonate chimneys, chemosynthetic communities, and emit bubbles of gas when disturbed.

Cite as: *Eos Trans. AGU*, 81(48), Fall Meet. Suppl., Abstract OS61A-31, 2000

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