AN EXPLORATION INTO CRUSTAL SUBSIDENCE RECORDED ON THE SAN JUAN SEAMOUNT

Robin L. Banner and Dr. Leslie R. Sautter
Dept. of Geology and Environmental Geosciences, College of Charleston

INTRODUCTION

Seamounts are more than submerged volcanic mountains; their bathymetry and surface features can hold important insights into crustal subsidence. The 19 million year old San Juan Seamount (Amsbary and Savage, 1991) which lies on the continental slope of the Southern California Borderlands approximately 255 km west-southwest of Los Angeles (Fig. 1) formed above an abandoned spreading center and once was a chain of islands (Paduan et al., 2009; Davis et al., 2010), though today the summit is 560 m below sea level. Before the seamount submerged, eight of its highest peaks formed a line of small volcanic islands with a combined area of 2.8 km². The tallest peak reached 140 m above sea level (Paduan et al., 2009). The seamount exhibits several features that reveal its subsurface past such as a subtle break in gradient at a depth of approximately 700 m, the likely boundary between the subaerial and steeper submarine lava flows. Profiles were made of four summits on the 2011 BASE Surface and seabed gradients above and below the present sea level boundary were calculated (Table 1) to clearly show this bathymetric feature.

METHODS

• The NOAA Ship OKEANOS EXPLORER surveyed the southern portion of the San Juan Seamount in March 2011.
• The ship was equipped with a Kongsberg EM302 multibeam sonar system.
• The acquisition software used was Kongsberg’s SeaForce Information System (SIS).
• CARIS HIPS & SIPS 7.1 was used to create a 35m resolution CUBE BASE surface.
• Backscatter was analyzed and a mosaic was created using GeoCoder.

RESULTS

Peaks of the southern portion of the San Juan Seamount lie at a depth of approximately 550 m. The seamount’s base lies approximately 3,500 m deep.

• Four cross-sectional profiles made from the 2011 BASE Surface show a clear discontinuity in slope at a depth of approximately 700 m, where the volcanic flanks below this boundary are steeper than 44.1˚.

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REFERENCES
