Acoustic Backscatter, Offshore of Bolinas Map Area, California

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DISCUSSION

Backscatter intensity

High

Low

Contour interval: 10 m

Bathymetric contours were generated at 10-m intervals from a merged 2-m-resolution bathymetric surface. The merged surface was combined to collect bathymetry data from about the 10-m isobath to beyond the 3-nautical-mile limit of California's State Waters. Bathymetric contours were then clipped to the boundary of the map area.

Backscatter intensity depends on the acoustic source level; the frequency used to transmit the acoustic pulse; the acoustic pulse characteristics; the texture and sediment type of the seafloor; and the distance and angle at which the acoustic pulse reflects from the seafloor. The backscatter of the SWATHplus system was normalized for geometric gain and beam-directivity differences. Thus, the raw 16-bit backscatter data were gain-normalized to enhance the backscatter of the SWATHplus system. The resulting normalized-amplitude values were rescaled to 16-bit values, which were then exported as georeferenced TIFF images, imported into a geographic information system (GIS), and gridded into GeoJPEGs using GRID Processor Software, then imported into a GIS and converted to GeoTIFFs.

The merged bathymetric surface was then despeckled and angle-varying gain adjustments and corrected for slant range on a line-by-line basis. After the lines were corrected, they were mosaicked into a GeoTIFF, on which brighter tones indicate higher backscatter intensity, and darker tones indicate lower backscatter intensity. The intensity represents a complex interaction between the acoustic pulse and the seafloor. To account for tidal-cycle fluctuations, CSUMB used NavCom 2050 GPS receiver (AM) SVPlus sound velocimeter. To account for variations in water column sound velocity, the AM SVPlus data, and for variations in water height (tides) using vertical-position receiver (CNA V) data, and Fugro Pelagos used KGPS data (GPS data with real-time kinematic corrections). In addition, theShip was equipped with a GeoAcoustics HDI System for water column sound-speed measurement. The mission design was based on the SWATHplus system's water column sound speed and backscatter quality to ensure that the acoustic backscatter data were spatially and temporally sampled at a uniform rate using an Applanix POS MV Position and Orientation System for Marine Mapping. The ship's hull movement such as heave, pitch, and roll (position accuracy, ±2 m; pitch, roll, and heading accuracy, ±0.02°; heave accuracy, ±2 cm) were corrected for slant range on a line-by-line basis. After the lines were corrected, they were mosaicked into a GeoTIFF, on which brighter tones indicate higher backscatter intensity, and darker tones indicate lower backscatter intensity. The intensity represents a complex interaction between the acoustic pulse and the seafloor.