U.S. DEPARTMENT OF THE INTERIOR
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U.S. GEOLOGICAL SURVEY – NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
JOINT OFFICE FOR MAPPING AND RESEARCH

MISCELLANEOUS INVESTIGATIONS SERIES
MAP I–2089–A

U.S. GEOLOGICAL SURVEY
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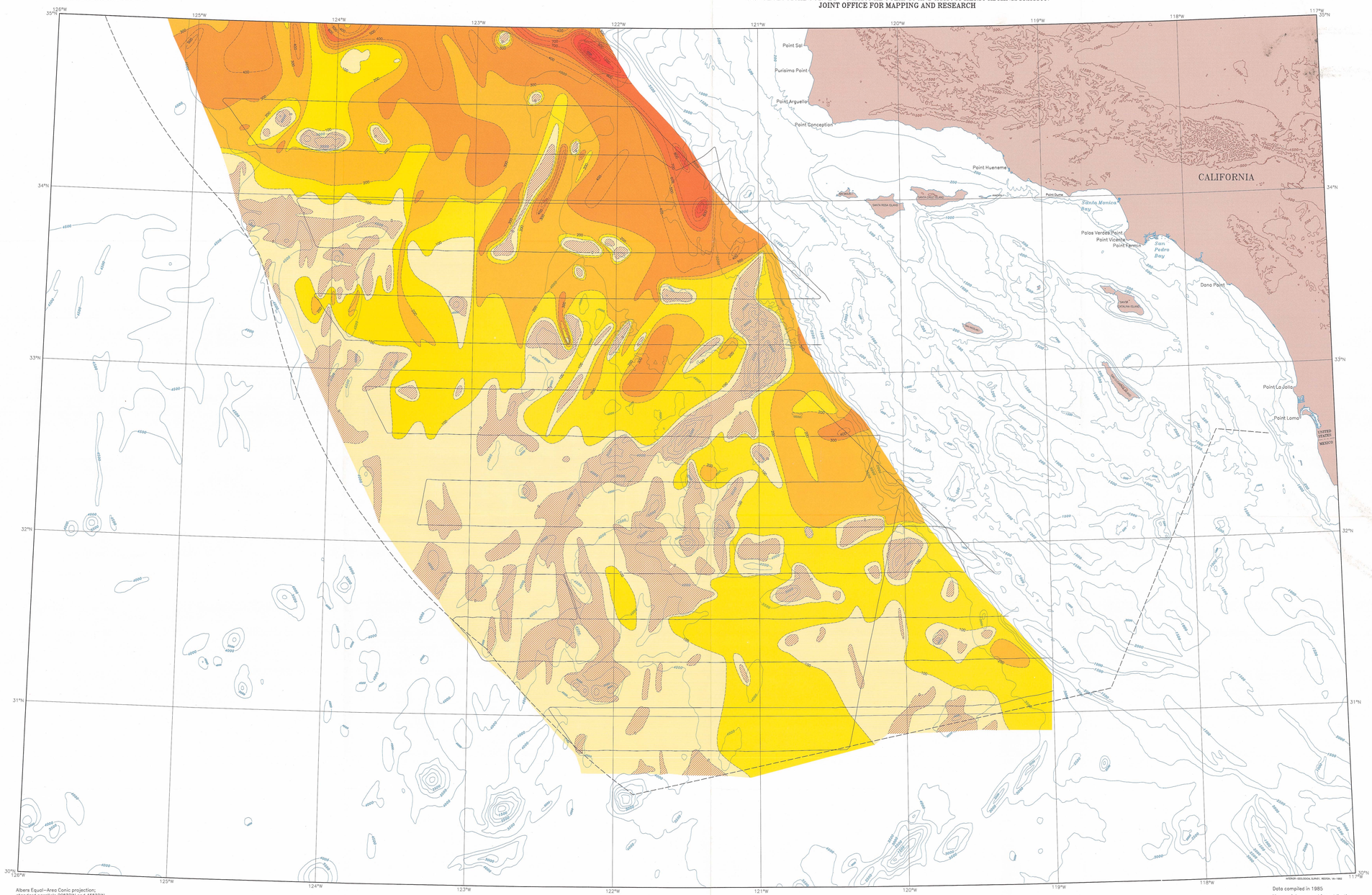
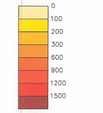


EXPLANATION

SEDIMENT THICKNESS, IN METERS



CONTOUR INTERVAL = 100 METERS

MAP SYMBOLS

- Basement outcrop
- 200 Isopach
- 4000 Bathymetric contour
- 500 Topographic contour
- EEZ–SCAN 84 trackline
- Exclusive Economic Zone boundary

INTRODUCTION

The U.S. Geological Survey conducted a series of cruises, EEZ–SCAN 84 (EEZ–SCAN 84 Scientific Staff, 1986), to collect reconnaissance data on the newly proclaimed Exclusive Economic Zone (EEZ), the area out to 200 nautical miles from the coastline of the United States. The cruises systematically surveyed the entire conterminous United States west coast EEZ using the Geological Long-Range Inclined Asdic (GLORIA) side-scan sonar, a 160-in^3 airgun seismic-reflection profiler, a 3.5-kHz high-resolution seismic-reflection profiler, a 10-kHz echo sounder, and a proton-precession magnetometer. The nominal trackline spacing throughout the survey was 30 km.

Derivative maps of sediment thickness (I–2089–A, I–2090–A, I–2091–A) and depth to basement (I–2089–B, I–2090–B, I–2091–B) in the basins of the west coast EEZ were compiled from both the sonar-image data and the deep-penetration seismic data obtained on these cruises. Only EEZ–SCAN 84 data were used for the map compilations because available data from other cruises in this region are sparsely located, have poor navigational control, or were obtained with seismic systems that were not powerful enough to resolve oceanic basement. For this map series, sediment thickness and depth to basement were determined only in the deep-ocean basin regions because the seismic system used on the EEZ–SCAN 84 cruises could not resolve oceanic basement beneath the thick sediments of the continental slope. All the data used to compile the maps are presented in the "Atlas of the Exclusive Economic Zone, Western Conterminous United States" (EEZ–SCAN 84 Scientific Staff, 1986).

BASEMENT OUTCROPS

GLORIA imagery was used to locate areas of basement outcrop throughout the region. Where possible, sediment thickness on and immediately adjacent to basement outcrops was measured from seismic data. Where there was no bathymetric or seismic control, a seamount peak was assumed to have no sediment cover. A pattern is used on the map to indicated all basement outcrops.

DATA REDUCTION

Acoustic basement in the basins, invariably oceanic Layer 2, was observed on all of the seismic records. One-way traveltime was measured from the sea floor to acoustic basement. Because the trackline spacing of about 30 km is relatively large compared to the data density along track, we chose to measure the sediment thickness every 0.5 hour or at an interval of approximately 7.5 km. Water depth was measured with a 10–kHz profiler. Depth to basement was calculated using the sea surface as the zero datum and adding the corrected water depth (Carter, 1980) to the sediment thickness.

Acoustic traveltimes were converted to depths by first calculating a regression equation from the interval velocity versus depth data of Connard and others (1984). Their data base comprises a compilation of all available Deep Sea Drilling Project data plus wide-angle refraction data, which were collected in Cascadia Basin west of Oregon and represents the best data set available for the United States west coast EEZ. The regression equation was integrated to determine sediment thickness as a function of one-way traveltime. The resulting equation is

$$z = 1400t + 0.5t^2$$

where z is sediment thickness in meters, and t is one-way traveltime in seconds. Sediment thicknesses calculated using this equation were compared to values calculated from the general equation of Carlson and others (1986). Values for sediment thickness calculated by the two equations differed by no greater than 10 percent throughout the range of traveltimes.

BATHYMETRY

The bathymetry is from Chase and others (1981). The bathymetric data were compiled from a variety of sources, and data quality is inconsistent. Because of differences in navigational precision and density of coverage, the bathymetric contours of a feature may be at a different location than the corresponding isopleths derived from the EEZ–SCAN 84 data, or a feature may not be indicated on the bathymetry at all. These situations occur because either the feature is poorly located in the bathymetric data set or, especially in the outer EEZ, the bathymetric data are too sparse to have defined the existence of a feature.

ACKNOWLEDGMENTS

Topographic digital data bases were corrected and verified by Christina Lief. Gerald Evenden developed the computer software system, MAPGEN, used to compose this map. Reviews, suggestions, and technical contributions from Edward C. Escowitz and Florence Wong and advice about cartographic design from Will Stettner substantially improved the quality of this map.

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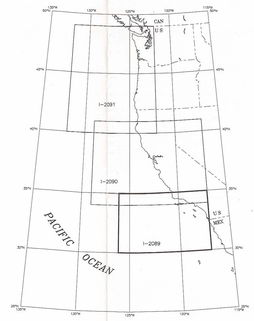
INDEX MAP



CONTINENTAL MARGIN MAPS

A part of the U.S. Geological Survey (USGS) marine mapping program is the preparation of the Continental Margin Map (CONMAP) series at a scale of 1:1,000,000. These maps are organized in overlapping panels that provide complete coverage of the Nation's Exclusive Economic Zone (EEZ). This map is one of three that provide coverage of the Pacific continental margin of the conterminous United States.

The base information on this map (coastline, bathymetry, topography, and state boundaries) was extracted from the U.S. Geological Survey–National Oceanic and Atmospheric Administration (NOAA) Joint Office for Mapping and Research (JOMAR) digital data library. United States topographic contours in the JOMAR library were generated by computer using a modified version of the 3–arc–second elevation data provided by the Defense Mapping Agency (DMA). Bathymetric contours were synthesized using depth data from various United States sources. United States coastline data on this map are a modified version of the NOAA digital coastline file. Mexican coastline data were digitized from an Army Map Service series map of southern California and northwestern Mexico. State boundaries are from the USGS National Atlas files.

MAP SHOWING SEDIMENT ISOPACHS IN THE DEEP–SEA BASINS OF THE PACIFIC CONTINENTAL MARGIN, POINT CONCEPTION TO POINT LOMA

By

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