Late Holocene Record of Sedimentologic and Paleooceanographic Events in Western Guaymas Basin, Gulf of California

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Abstract

Transects of approximately 1.5 m-long vibracores obtained with MBARI's ROV Doc Ricketts reveal late Holocene sedimentologic and paleoceanographic events in western Guaymas Basin, Gulf of California (GOC) (~26.87 deg N, 111.338 deg W). Cores were located where layered near-seafloor sediments and subtle bedforms occur in 1793 to 1863 m water depths on the SW flank of the basin using detailed bathymetry and chirp profiles. Color banding was observed in the cores and gamma-density, XRF, grain size, and stable isotope data show that most of the banding is attributed to distal deposition from two turbidities. Distinctive white bands ~4 cm thick are present in three cores dispersed across ~300 m. The white bands are diatom oozes composed primarily of Thalassiothrix longissima as well as lesser abundances of Fragilariopsis doliolus and are probably a result of aggregations of Thalassiothrix-dominated mats that settle through the water column and accumulate on the seafloor. An AMS14C date taken ~3 cm above the white band in one core suggests this event occurred shortly before cal AD 1290 +- 30. The core sites were most likely located beneath an important oceanographic front between nutrient-rich and oligotrophic water masses, probably as the result of well-mixed upper intermediate and surface waters in the mid-GOC and better-stratified tropical waters to the south. This implies the existence of a deeper mixed layer to the N in the mid GOC region most likely controlled by equatorial La Niña events fueled by stronger and more persistent NW winds along the GOC. A substantial reduction in diatom abundance evident by low specimen counts and lack of white bands following this mat-forming event seem to correlate with an abrupt decline in biosiliceous productivity and increases in the abundance of tropical diatoms and silicoflagellates in core MD02-2517 (887 m water depth; western Guaymas Basin slope) at the end of the Medieval Climate Anomaly and transition to the Little Ice Age (~AD 1200-1300).