



Valle Levinson, A., A. Trasviña Castro, G. Gutiérrez De Velasco & **R. González Armas** (2004). Diurnal vertical motions over a seamount of the southern Gulf of California. *Journal of Marine Systems*, 50(1-2): 61-77. DOI: 10.1016/j.jmarsys.2003.09.016

Diurnal vertical motions over a seamount of the southern Gulf of California

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A 6-month time series of velocity and scattered sound intensity profiles is used to document diurnal vertical motions over a seamount, El Bajo Espíritu Santo, in the southern Gulf of California, Mexico. The vertical motions persisted throughout the period of measurements and is a noteworthy finding in this study. Data were collected with a 153.6-kHz acoustic Doppler current profiler (ADCP) deployed in water ~300 m deep between June 19 and December 8, 1999. Vertical velocities and scattered sound intensity anomalies recorded by the ADCP showed a well-defined diurnal periodicity throughout the period of observation. Peaks of both variables coincided with the timing of sunrises and sunsets and featured phase shifts consistent with upward or downward motions. It was likely that the diurnal peaks in vertical velocities and scattered sound intensity anomalies were associated with motions of the deep scattering layer that depicted vertical migrations of euphausiids and other zooplanktonic groups. This was suggested by plankton samples collected over the seamount early in the deployment and also given the frequency of the emitted sound and the documented dominant taxa of El Bajo Espíritu Santo. Typical upward velocities, at sunset, were 3 cm/s while downward velocities, at sunrise, were 4 cm/s over vertical spans of 100-150 m. The persistence of diurnal vertical motions throughout the 6 months of measurements was attributed to injections of zooplankton swarms from other parts of the Gulf of California by means of near-surface advective fluxes. Once in the area of the seamount, continued vertical migrations effected by the zooplankton groups probably reduced their chances of being swept away from this area as subtidal flows at depth were considerably weaker ($\leq 5\text{ cm/s}$) than those near the surface ($\geq 10\text{ cm/s}$) and frequently in opposite direction.

Palabras clave: Seamount, Hidroacústica, Vertical motion

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