



## Abstract View

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# Some Observations of Baroclinic Diurnal Tides over a Near-Critical Bottom Slope

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### ABSTRACT

The time-depth structure of the baroclinic diurnal tide has been examined with the aid of current and temperature profiles on the West Florida Continental Shelf. Of interest is the fact that the diurnal frequencies (e.g., the  $K_1$  and  $O_1$  tides) are near the “critical frequency” corresponding to the bottom slope and density stratification at the experimental location.

The baroclinic semidiurnal tide was rather weak and most of the semidiurnal tidal energy was contained in the barotropic currents. This large ratio of barotropic-to-baroclinic, semidiurnal tidal energy is in agreement with the results obtained by Koblinsky (1979) from previous (current meter) measurements in the same area.

In contrast, the baroclinic diurnal tide is quite strong and exhibits appreciable structural variations with time. The diurnal oscillations are predominantly of low vertical modal order, and there is no evidence of the concentrated “beams” of internal tidal energy which have sometimes been observed in other areas (e.g., Torgrimson and Hickey, 1979). However, the diurnal structure is modulated in a fashion which seems to be more complicated than can be accounted for by a simple “beating” effect between the  $K_1$  and  $O_1$  constituents. This relatively rapid modulation in amplitude and vertical structure indicates that there was present a significant transient component in either the generation or propagation of the internal diurnal tide. It is shown that variations in the vertical shear of low-frequency currents which occurred were in the correct sense and were potentially of sufficient amplitude to produce a subcritical bottom slope for the diurnal constituents during one period of the experiment. In this same period, there is clear evidence of near-bottom intensification of the diurnal oscillations. The data also show that the internal diurnal oscillations are propagating up-slope, away from the shelf break.

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