



Observations of high-frequency internal waves in the diurnal warm layer

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The diurnal variability of currents and temperature in the near-surface layer was examined from observations collected for a period of 11 days in July 2016 on the outer continental shelf in the Gulf of Mexico as part the U.S. Naval Research Laboratory study. During the first 7 days of the experiment, sea surface temperature, air temperature, and wind speed and direction varied diurnally, and the next 4 days weather conditions became calm representing daytime heating, low winds varying from almost zero to 5 m/s with directions rotated from northerly to southerly also following a diurnal cycle, and surface wave heights were less than 0.5 m. When winds and waves were weak, a large diurnal cycle of temperature developed in the upper 10 m with stratification as large as 18 cycles per hour at 2 m depth. Internal waves like motions were observed within the highly stratified diurnal layer, where near-surface temperature varied by 0.2C with a periods of 3 to 4 hours, and velocity fluctuations as large as 20 cm/s were found in the upper 10 m. The dominant wave period of velocity fluctuations is similar to the wave period found in temperature records. Generation mechanisms of these trapped high-frequency waves to their evolution during the diurnal cycle will be presented.