The influence of infragravity (IG) waves on the spatial and temporal patterns of particulate transport is not yet understood at cape-related shoals (i.e., inner-shelves characterized by non-uniform bathymetry) [1-4]. To analyze the connection between IG waves and tides, cross-spectral and cross-wavelet analyses were performed on time series data of current profiles and pressure at several locations around Cape Canaveral shoals [5-7] (Fig. 1). We focused on data collected during Spring of 2014 at swales (east and west) contiguous to Canaveral II shoal (Fig. 2). Overall during this experiment, time series of IG wave heights and pressure were coherent at ~2 cycles/day with a 95% statistical confidence at swale east (Fig. 3). High coherence (>0.75) and ~0° phases between tidal motions and IG energy at this location could be explained by changes in water depth that produced IG energy losses to sea-swell frequencies during low tide [8-9]. The reason why IG energy is not following a semidiurnal variability at swale west is not understood. These results may highlight the sensitivity of IG waves generation to changes in water depth within this shoal complex. Our results agree with previous studies regarding tidal variability of IG energy in nearshore and inner-shelf environments and could be applied to improve understanding of the role of bathymetry in particulate transport at cape-associated shoals.

Figure 1. Study area showing the location of mooring sites at the shoals of Cape Canaveral in the context of North America (A) and Florida peninsula (B). Double red circles in A and B highlight the location of Florida and Cape Canaveral, respectively. The map in C shows the bathymetry of the inner-shelf close to Cape Canaveral with numbers placed near the shoals being monitored. Right insets correspond to zoom-ins to numbered locations and circles indicate the actual mooring locations (magenta circles highlight the locations herein analyzed).

Figure 2. Ten-day segments of data collected at swales near Canaveral II shoal. Time series of pressure (A), a zoom-in to ~12 hours at red box in A (B), spectrograph of pressure bursts and $H_{IG}$ (C) and two sample spectra for black and orange bursts in B with a dotted green line indicating the limit for IG waves at 0.04 Hz (D), and time series of water levels and a band-passed version of $H_{IG}$ (E).

Figure 3. Coherence between pressure and $H_{IG}$. Time series of pressure and $H_{IG}$ (A), squared coherence (B) and phase (C) between pressure and $H_{IG}$ at different frequencies, wavelet transforms of pressure (D) and $H_{IG}$ (E), wavelet coherence (F) and phase between pressure and $H_{IG}$ at period ~0.5 days, or frequency ~2 cpd indicated in F by a dashed black line (G). Horizontal line in B and black solid contours in D through F indicate limits of 95% statistical significance.