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**Coastal Ocean Current and Wave Response to Hurricane Jeanne Using High Frequency Radar: Implications for Surge Modeling**

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The coastal current response was observed by a pair of high frequency radars (known as Wellen Radar-WERA) during the passage of hurricane Jeanne in 2004 between Miami and North Key Largo, Florida. These real time measurements, acquired every 15 minutes, revealed a fairly complex coastal ocean current response. Since the measurements were acquired on the “clean” side of Jeanne, an eastward current response of 1 m s-1 emanated from the Biscayne Bay (depths < 20 m) where offshore surface winds approached 22 m s-1 with gusts up to 25 m s-1. This current response forced an eastward bulge of ≈ 100 km2 resulting in an apparent offshore Florida Current meander. The Florida Current velocities decreased in response to the hurricane since the winds were generally orthogonal to the current. As Jeanne moved inland, the cyclonic rotating winds were in phase with the Florida Current resulting in a stronger coastal surface flow to the north of more than 2 m s-1.

Comparison of the WERA data to the 10-m winds observed at the NOAA CMAN station at Fowey Rocks suggests that during the period of strong forcing, the radar inferred wind direction follows that measured at Fowey (slope of ~1 and a bias between -5 to -10o). The inferred surface winds, derived from the 2nd order returns in the Doppler spectra, indicate a bias of 2 m s-1 and a slope of ~0.8 between the observed and inferred wind speeds. The correlation coefficient exceeds 0.7 over this domain where the WERA winds look reasonable. The directional wave spectra from the WERA measurements indicates wind seas responding to the strong wind stress containing most of the wind-driven energy with little indication of a strong low-frequency wave (swell) component moving with the storm since the Bahama islands presumably filtered out this faster moving wave component. Using the forced surface currents and winds at Fowey Rocks, the surface drag coefficient is estimated from the forced shallow water equations with constant bottom topography following Jarosz *et al.* (2007). In the present case of relatively shallow water (< 80 m), a simple scaling reveals that the observed forced response can be described to first order by linear, time-dependent depth-integrated horizontal momentum equations. For winds between up to 22 m s-1, the drag coefficient increases to a maximum of about 1.8 x 10-3 in accord with values of Smith (1977). *Given that high frequency radars are being deployed globally, the approach of using the real-time surface velocity measurements has promise to improve surge models if radar sites can be hardened to withstand hurricane force winds for landfalling storms.*