



Field Measurements of Waves and Currents at the Mouth of the Columbia River

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Measurements of currents in the top 25 m of the water column, wave spectra, and wave breaking were collected at the Mouth of the Columbia River between May and September of 2013. Surface currents were measured up to 3 m/s on strong ebbs, and wave heights were measured up to 3.5 m. Waves were observed breaking in all depth regimes. We find the vertical structure of currents is important in determining the correct wavenumber. Using the surface current alone results in over (under) estimates of wavenumber, and, by extension, wave steepness for opposing (following) waves and currents of up to 20%. Using an approximate solution to account for the vertical structure of currents, wave breaking is seen to increase with corrected wave steepness. Models of breaking fraction based on steepness compare favorably. The best breaking model explicitly takes currents into account. A quasi-spectral model also compares favorably. Residuals with the spectral model suggest the importance of directional spread.