



Wave heave spectra from radar Doppler velocities at extreme low grazing angles

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The ground based microwaves radar systems are used for the measurement of the sea surface phenomena for more than three decades. By calibrating the radar cross section, the extraction of the wave spectral characteristics is a well established empirical methodology (Ziemer et al. 1993) with theoretical background (Alpers et al. 1978) and commercial applications (Nieto et al. 2004), which provides comparable measurements with wave buoys. The transfer function is necessary mainly due to the imaging mechanisms, like shadowing and or tilt modulation (Seemann 1997). To avoid the obligatory use of a transfer function, instead of the radar cross section, the Doppler velocity, which is a direct measurement of the sea surface, could be used. In this poster, a methodology for the determination of heave spectra based on time series of Doppler velocity acquired under extreme low grazing angle conditions, is presented. We prove that for the determination of the peak frequency the analysis of the binary shadow mask is sufficient, but for the calculation of the spectral density, a transfer function is necessary because of the gaps of the time series due to the shadowing. The physical and technical limitations are discussed and the algorithm is tested with in situ measurements from the coastal area of German Bight. Both properties, peak frequency and significant wave height from radar, have significant correlation with buoy measurements.