WERA
Ocean Remote Sensing

OCEANS '14 MTS/IEEE
Where Challenge Becomes Opportunity St. John's
September 14-19

Session: Coastal Radar and applications 1

Wednesday – September 17 – 3:30 to 5:15 PM

Salon F

Dr. Anna Dzvonkovskaya

Initial Surface Current Measurements on the West Florida Shelf Using WERA HF Ocean Radar with Multiple Input Multiple Output (MIMO) Synthetic Aperture

High-frequency (HF) radar systems located at the coast are well-known as a measurement tool for synoptic online mapping of ocean surface current fields. These radars use surface electromagnetic wave propagation coupled to the salty ocean surface and are capable of monitoring thousands of square kilometers of the ocean surface. For oceanographic applications, low transmit power HF radar beamforming systems have been developed for operation in the 3-30 MHz frequency band. . These systems require the use of a linear array of receive antenna elements whose inter-element spacing is dependent upon the operational frequency chosen. This paper presents a new approach of applying the Multiple Input Multiple Output (MIMO) technique with a synthesized antenna aperture to a compact HF ocean radar. The initial results show that the MIMO HF radar configuration with collocated receive antennas can be used for both oceanographic measurements and ship tracking applications. Initial MIMO results also reveal that positive results can be achieved from a reduced length receive array without reducing overall system performance. The comparison between standard and MIMO configurations has been focused on the estimation of surface current velocities and comparison with in-situ acoustic Doppler current profiler (ADCP) measurements

Prof. Malcolm Heron

Observations and Theory of a Shoaling Tsunami Wave

A WERA phased array HF radar was used in Chile to observe the disturbance of the 11 March 2011 tsunami which originated near Japan. In this pilot study, three sites on a transect across the shelf were analysed at water depths of 40, 160 and 880m. The maximum wave orbital velocities increased as the wave-group propagated into shallow water. The increase in maximum wave orbital velocities between 160 m depth and 40 m depth followed linear theory, but between 880 m and 160 m depths, the tsunami wave-group was non-linear and over half the amplitude was lost. The HF radar data indicate that non-linear processes are occurring at this location as the tsunami disturbance propagates from deep water onto the continental shelf.

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