

OCEAN SURFACE BACKSCATTERING AT EXTREMELY LOW GRAZING ANGLES OBSERVED BY C-BAND POLARIMETRIC DOPPLER WEATHER RADAR

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RADAR

A C-band (5.34 GHz) multi-parameter radar has been operated in the Okinawa Subtropical Remote Sensing Center, National Institute of Information and Communications Technology (NICT), Japan. It is a full-polarimetric radar with Doppler measurement capability, located on the top of a mountain in the center of the Okinawa Island (128.06°E, 26.59°N, 360m above sea level), southernmost part of Japan. It observes precipitation in sub-tropical maritime climate region, aiming at precise estimates of rainfall rates and classifying precipitation particles [1]. The radar has two Klystron transmitters of 250 kW to transmit alternate polarization (horizontal or vertical) signals by pulse to pulse, and two receivers to receive both horizontal and vertical polarizations of backscattering echo from the targets. The radar has typically 200 km coverage with 0.9 degree beamwidth, transmitting 2.0/1.0/0.5 μ sec pulses, with its parabolic antenna of 4.5 m diameter. The spatial resolution, therefore, is a few kilometers in azimuth and a few hundreds meters in range.

OCEAN OBSERVATION

Okinawa Island is relatively small and plain, roughly 100 km in south to north, 10 km in east to west, and the highest point is at about 500 m above sea level (northeast of the radar). Located at 360 m above sea level, the radar has good view to the surrounding ocean. Therefore, we could have the radar observe ocean surfaces. We have had the observations in different wind conditions, since February 2007, taking a Plan Position Indicator (PPI) scan at extremely low grazing angles. The

grazing angle is chosen to be 0.5° , to cover 20 to 100 km range from the radar. The preliminary results showed that the radar cross-section was larger when the wind speed was larger. Downwind side of the island showed smaller radar cross-sections, as the island seemed to block the wind [2].

DATA ANALYSIS

We present detailed quantitative analysis of observation results including wind (speed and direction) dependency of the radar cross-section of HH (transmitting horizontal polarization and receiving horizontal polarization, and so on), HV, VV components and Doppler velocities. Ocean surface backscattering at extremely low grazing angles was examined numerically [3, 4] and experimentally with X-band polarimetric radar [5, 6], with C-band Doppler radar [7, 8], and so on. Ocean surface model is considered to interpret our results, by referring the preceding publications.

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