

THE VARIATION OF RADAR CROSS SECTION WITH WIND

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ABSTRACT

Previous X-band (8910 megahertz) and C-band (4455 megahertz) measurements by the Naval Research Laboratory indicate that two domains exist in the variation of radar cross section with wind at incident angles far from the normal. The first domain for low windspeeds is characterized by a rapid variation of radar cross section with wind and the second domain at higher windspeeds by an asymptotic approach to an upper limit (saturation). The transition between the two domains occurs at a windspeed of approximately 10 knots. Recent Joint Ocean Surface Study I observations tend to confirm this observation and offer additional proof of the validity of the composite surface model developed at the Naval Research Laboratory (and in the USSR) which relates the radar cross section of the sea to the wave-height spectrum. This confirmation was obtained by comparing the radar cross section measured by the four-frequency radar system with the radar cross section calculated from the ocean wave-height spectrum that had been determined by the optical analysis of photographs taken from Argus Island at the same time. A possible explanation for the wind variation of the radar cross section of the open ocean also was evolved, based on radar measurements in a wave tank under various wind conditions and subsequent comparison with optically determined spectra.