Radar Method for Atmospheric Stratification Condition Unambiguous Determination by Synergy Data of Sea Surface Altimetric and Scatterometric Observations

Prof. Arakelyan Artashes
Leading Scientific Researches, Institute of Radiophysics & Electronics
arakelyanak@yahoo.com (374 1) 440 566

Dr. Hambaryan Astghik
Shief Engineer, Ecoserv Remote Observation Centre Co.Ltd (374 1) 440 566

Abstract: The results of some theoretical and experimental investigations show that the difference of near sea surface air and water temperatures influences on microwave reflective characteristics of ruffled sea surface. The cause of this influence is temperature dependence of the sea surface wind wave spectrum. Besides, temperature-wind variations of radar backscattering coefficient are commensurable. Therefore, for a solution of the sea surface remote sensing inverse problem applied to near surface wind field parameters (wind speed and wind direction) retrieval it is necessary to have exact information about the condition of atmospheric stratification. However, at present, it is unknown effective and correct methods for atmospheric stratification condition precise and remote evaluation.

In this presentation the results of theoretical researches and numerical estimations of sea surface radar backscattering coefficient temperature-wind dependences are presented. Spectral, angular, polarization, temperature, wind and wave features of sea surface microwave reflective characteristics are considered.

It is shown that under fully developed sea wave condition, by combining data of sea surface altimeter and scatterometer observations, it is possible to evaluate unambiguously and precisely the difference of near surface air and water temperatures, that is to estimate the condition of atmospheric stratification. A radar method for atmospheric stratification condition evaluation is suggested. The method, which is based on a join application of data of sea surface altimetric and scatterometric observations allows, under fully developed sea wave condition, simultaneously and unambiguously evaluate the near sea surface wind speed as well.

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