END-TO-END WIND RETRIEVAL SIMULATION FOR NSCAT ANI) TWO-BEAM SCATTEROMETERS

Simon H. Yueh, Michael W. Spencer, and Wu-yang Tsai
Jet Propulsion Laboratory
California Institute of Technology
4800 Oak Grove Drive
Pasadena, CA 91109
Tel: (818) 354-3012
Fax: (818) 393-5285

David G. Long
Electrical and Computer Engineering Deptartment
Brigham Young University
Provo, Utah 84602
Tel: (SOl) **378-4383**
Fax: (801) 378-6586

Abstract

This paper presents the end-to-end performance simulation of NASA scatterometer (NSCAT) which is to be launched on the ADEOS platform in 1996 for the remote sensing of ocean wind fields. Additionally, simulation is performed for two-beam scatterometers with the fore and aft beams separated by 90 degrees in azimuth with various polarization configurations to evaluate the applicability of two-beam scatterometer designs. In this investigation, the σ_0 data file is simulated from the ECMWF input wind field based on the NSCAT instrument parameters and SASS2 model function which relates σ_0 to the polarization of antenna beam and the incidence angle, wind speed and direction of each wind vector cell. Subsequentl y, the simulated σ_0s measured by all antenna beams at different azimuth angles arc co-registered for further wind retrieval processing. Two techniques arc used to retrieve the wind fields from the simulated σ_0 data file. The first technique, which is to be used for NSCAT data processing, retrieves all ambiguities for each wind vector cell and applies a median filter to select the ambiguity for the output wind field. This technique which has been shown be adequate for NSCAT, however, is found to be un-acceptable for 2-beam V-polarization systems with a high frequency of failure in selecting the closest ambiguity to the input wind field, This is because of the inferior skill of a two-beam system compared with a tllree-beam system like NSCAT and indicates that a more advanced wind-retrieval technique is required for two-beam systems. To this end, a model-bascxl wind retrieval technique, which represents the wind field by its vorticity and divergence and estimates the polynomial expansion coefficients of these two scalar fields from the σ_0 samples, is found to have a great potential in making the skill of two-beam systems comparable to a three-beam system. Finally, it is found that duc to the skill provided by the up-clown wind asymmetry reported in the SASS2 model function for H-polarization, the median-filter based ambiguity removal technique as applied to 2-beam dual-pol systems produces results that arc comparable to NSCAT, even though it fails for 2-beam V-pol systems.