Abstract View

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The Effects of the Variations In Sea Surface Temperature and Atmospheric Stability in the Estimation of Average Wind Speed by SEASAT-SASS

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ABSTRACT

Wind speeds from the scatterometer (SASS) on the ocean observing satellite SEASAT averaged over 2° latitude by 2° longitude and a 92-day period are compared with wind speeds from ship reports in the western North Atlantic and the eastern North Pacific, where the concentrations of ship reports are high and the ranges of atmospheric stability and sea surface temperature are large. The comparison results are consistent for each region and for the combined data. Scatterometer winds are found to be generally higher than ship winds. The systematic dependence of the difference between scatterometer winds and ship winds on sea surface temperature and atmospheric stability are identified. The quality of ship reports is not ideal but should not depend on atmospheric stability or sea surface temperature. The systematic dependences, therefore may reflect the characteristics of scatterometer winds.

Multivariate regressions are used to extract the independent effects of different factors on the wind speed differences The difference between scatterometer winds and neutral winds from drip reports increases with increasing atmospheric stability and the trend is more prominent under stable than unstable conditions BY replacing neutral winds with observed winds, the stability dependence is reduced. At low wind speeds, the wind difference is found to depend also on sea surface temperature, probably due to temperature dependent factors, such as water viscosity, which are not included in the SASS model function. This dependence is greatly reduced at wind speeds higher than 8 m s^{-1}. After the systematic dependence is removed from the scatterometer winds, the rms difference between the scatterometer winds and the neutral winds from ship reports was reduced from 1.7 to 0.9 m s^{-1},

The scatterometer measures backscatter from ocean surface short waves. The results of this study call for better understanding of the energy input from the atmosphere to the short waves which may depend on atmospheric stability and the dissipation of this energy through processes that may be affected by temperature dependent fluid properties (e.g., viscosity and surface tension).

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