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Remote Sensing for Marine and Coastal Environments

Remote Sensing of the Atmosphere and Ocean Surface using Active and Passive
Microwave Systems

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Conference Topics Addressed:

oceanographic Applications (eg. , Air/Sea Interactions)
New Sensors and Systems

Presentation Method: No preference

Summary:

Microwave radiometers measure the radiation emitted by the ocean surface and the intervening atmosphere. Microwave scatterometers measure the scattering characteristics of the ocean surface. In both cases, the signal is influenced by a variety of geophysical parameters including sea surface temperature, salinity, wave height-, surface roughness, air temperature, humidity, and aerosol content. The surface roughness in particular is important- because it is linked to the winds over the ocean surface.

Ocean winds are important to weather prediction and climate studies. They drive ocean currents which can transport thermal energy over large distances, and they provide clues about the nature of atmospheric circulation patterns. A satellite borne microwave system can be used to measure the surface winds over the oceans because the winds affect the emissivity and scattering characteristics of the surface. .

The radiation emitted or reflected by the ocean surface is also affected by absorption and radiation in the atmosphere before it reaches a satellite system. In the microwave frequency range, the most important- factors are water vapor and liquid water in clouds.

In this presentation, we will discuss the problem of retrieving ocean surface winds and other geophysical parameters using a radiative transfer model with active and passive microwave data. The atmosphere is modeled as layers with different temperatures, humidities, pressures etc. , using information from the National Meteorological Center. The absorption and radiation characteristics of the atmosphere are derived from a millimeter wave propagation model (MPM) described by H. Liebe. Using a combination of active and passive data can provide better wind direction ambiguity removal compared to current- systems which rely only on active data.