ANALYSES OF THE WIND-DRIVEN RESPONSE OF TROPICAL OCEANS

by

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Numerical and analytical models are used to study the upper-ocean response to surface wind stress estimates from the tropical Atlantic and Pacific Oceans. These models are used to identify regions of important variability in the wind field, analyze the oceanic response, and demonstrate the applicability of remotely sensed vector wind stress and altimetry data. For example, a multi-mode linear model of the tropical Pacific was forced by three different wind products for 1979-1983, namely the FSU ship winds, the UH cloud motion winds, and the FNOC operational product, in order to investigate current capabilities to model upper ocean variability given reasonable estimates of the surface wind stress. Both model and XBT depictions of the mean seasonal cycle, 1979-1981, were analyzed along the major ship tracks in the western, central, and eastern tropical Pacific. Model solutions were also used to address array design questions in observing system simulation experiments. Subsequent analyses of the 1982-1983 solutions will be performed with respect to differences from the mean seasonal cycle 1979-1981, as well as, differences in the three wind products.

Related activities include participation on the Science Definition Team of NSCAT within a project titled "The Impact of NSCAT Winds on Tropical Ocean Modeling". In collaboration with Mark Cane (LDGO) and Vince Cardone (OceanWeather, Inc.), the objective of this work is to assess the value of NSCAT winds for

improving our ability to specify the state of the upper layers of the tropical ocean via numerical ocean models. TOPEX project activities include "Studies of Tropical Ocean Dynamics Using the TOPEX/POSEIDON Altimeter-Derived Sea Surface Topography". Together with Roger Lukas, Gary Mitchum, and Klaus Wyrtki (UH), studies of tropical dynamics using the TOPEX/POSEIDON altimeter-derived sea level will be carried out in conjunction with the large sea level dataset available at the TOGA Sea Level Center. Another TOPEX project with Eli Katz (LDGO), "Sea-Level Response to Wind Forcing in the Tropical Atlantic," seeks to study interannual variations of the seasonal circulation of the tropical Atlantic via a combination of in-situ observations, satellite observations, and numerical simulations of the sea surface height. In collaboration with Joel Picaut (ORSTOM/Noumea), Thierry Delcroix, and Catherine Gautier (SIO), our POSEIDON project, "Application of TOPEX/POSEIDON Altimetry Measurements to Observation and Modeling Studies of the Low-Frequency Upper Ocean Mass and Heat Circulation in the Tropical Pacific," will enhance the information content of TOPEX/POSEIDON altimetry with in-situ ocean data, satellite-derived surface fluxes and numerical ocean models for the purposes of studying the 4-dimensional variability of mass and heat in the tropical Pacific Ocean.

Ancillary activities include serving as Co-Editor for the Journal of Geophysical Research/Oceans and faculty advisor to graduate students within the Department of Aerospace Engineering Science at the University of Colorado.