

Graduate School of Oceanography - OCG 695

March 24, 2008, 3:30 PM, Corless Auditorium

Seminar Abstract

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Parameterization of air sea momentum exchange under high wind conditions

An accurate estimate of momentum flux between the atmosphere and the ocean is a key boundary condition for hurricane modeling and forecasting. The momentum flux is usually parameterized by a drag coefficient, which is considered to be a function of wind speed and stability and does not account for the effect of sea states. Consensus has it that the drag coefficient at low to moderate winds increases with wind speed based on numerous past field observations. However, the drag coefficient at high winds is inconclusive due to lack of direct field measurements.

To investigate the spatial distribution of the drag coefficient under hurricane conditions, NOAA/NCEP WAVEWATCH-III, an ocean surface wave model, and a wave boundary layer model are combined to include the surface wave effect on momentum flux calculation. Furthermore, based on the results of idealized uniform wind experiments from 10 m/s to 60m/s, a new parameterization is proposed to express the drag coefficient as a function of the input wave age (the phase speed of dominant wind forced waves divided by the wind friction velocity) and wind speed. The results show the drag coefficient levels off at high wind speed and are qualitatively consistent with recent field observations by Powell (2003), who conducted wind profile measurements around hurricane eyes using Global Positioning System dropwind-sonde (GPS sonde) since 1997. Their findings also revealed the variability of the drag coefficient at different quadrants of hurricanes. This observation provides guidance for further improvement of the drag coefficient parameterization.

Cheng-An Tung received a B.S. and an M.S. in Ocean Engineering from the National Cheng Kung University, Taiwan, in 2000 and 2002 respectively. He entered GSO as a Ph.D. candidate in the fall of 2005. His co-major professors are Tetsu Hara and Isaac Ginis.

Please rank the abstract and presentation in areas A-G using the scale below:

0=Decline to Evaluate 2=Above Expected Standards 4=Below Expected Standards
1=Outstanding 3=Acceptable 5=Poor

A. Quality of Abstract _____ E. Quality of Verbal Communications _____
B. Preparation of Material _____ F. Adequacy of Visual Aids _____
C. Timing _____ G. Ability to Handle Questions During
D. Scientific Content _____ Discussion _____

Comments and Suggestions:

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