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Measurements of Momentum and Sensible Heat Fluxes Over the Open Ocean

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ABSTRACT

Vertical fluxes of momentum and sensible heat have been measured above the sea surface by the direct dissipation method. Measurements were made over the open ocean from the Scripps Floating Instrument Platform (FLIP) during the Barbados Oceanographic and Meteorological Experiment (BOMEX). The results are compared with simultaneous measurements of the fluxes by the profile, dissipation, and eddy correlation methods.

The momentum flux was inferred from the rate of viscous dissipation \in above the sea surface. The dissipation was determined by integrating the velocity derivative spectra after correcting the spectra for filter response. The friction velocity (u_*) corrected for diabatic effects was 17.4 cm sec⁻¹, corresponding

to a shear stress τ =0.35 dyn cm⁻². Profile measurements by the University of Washington gave the same value of u_* in agreement with the present results.

Measurements of momentum flux by Oregon State University (OSU) and the University of British Columbia using dissipation and eddy correlation methods Options:

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gave somewhat higher values. Correction of the Kolmogoroff inertial subrange constant used in the OSU dissipation calculations gives fluxes in good agreement with the present work.

The sensible heat flux was inferred from the rate of dissipation χ of temperature variance. The temperature derivative spectra were corrected for instrument response and integrated to obtain values of χ . The average value of the sensible

heat flux was 0.74 mW cm⁻², in reasonable agreement with the profile and eddy correlation measurements. A value of sensible beat flux of 2.8 mW cm⁻² has been reported by OSU using the dissipation technique. Correction of the temperature inertial subrange constant used by OSU lowered their heat flux to 1.1 mW cm⁻².



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