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[Volume 6, Issue 6 \(November 1976\)](#)

Journal of Physical Oceanography

 Article: pp. 801–809 | [Abstract](#) | [PDF \(646K\)](#)

Parameterization of Air-Sea Interface Fluxes of Sensible Heat and Moisture by the Bulk Aerodynamic Formulas

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(Manuscript received January 9, 1976, in final form May 28, 1976)

DOI: 10.1175/1520-0485(1976)006<0801:POASIF>2.0.CO;2

ABSTRACT

The parameterizations of the sensible heat and moisture fluxes by the bulk aerodynamic formulas are determined from a compilation of existing data, together with some new results. The data set comprised 152 determinations of the sensible heat flux and 30 of the moisture flux from experiments in which the fluxes were measured directly over water with suitable turbulence instrumentation. Least-square-error fits were performed on the data. The moisture flux (and therefore the latent heat flux) is adequately described by the bulk formula with a coefficient of 1.32×10^{-3} . The parameterization of the sensible heat flux is complicated, for the data show 1) a small positive heat flux for zero temperature difference between the air and sea surface, 2) the coefficient for stable conditions is smaller than for unstable conditions, and 3) the coefficient appears to increase at high wind speeds, as shown by the data of Smith and Banke (1975). Separate bulk formulas are presented for the sensible heat flux for the different conditions of the temperature field.

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