



Abstract View

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The Spatial and Temporal Variations of the Turbulent Fluxes of Heat, Momentum and Water Vapor over Lake Ontario

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ABSTRACT

During the 1972 IFYGL “alert” periods, the NOAA/RFF/DC-6 gust probe instrumented aircraft was used to record time series of wind, temperature and water vapor at heights ranging from 18 to 300 m above the surface of Lake Ontario. The time series records show great variability. This is especially the case for evaporation when, in the fall, polar continental outbreaks move across the lake. In particular, such an outbreak of cold dry air moved across the lake at $12\text{--}15\text{ m s}^{-1}$ on 9 October 1972. This resulted in a drop of the air temperature at 30 m above the lake from 12 to 6°C while the evaporation rate increased to more than 1 cm day^{-1} . This may be compared to the 0.5 cm day^{-1} typical evaporation rate observed in the tropics during BOMEX. Furthermore, IR lake surface temperatures show cold regions ($\sim 5^{\circ}\text{C}$) along the north shore, presumably due to strong upwelling, while the center and south shore regions of the lake were of the order of $12\text{--}15^{\circ}\text{C}$. The turbulent flux quantities of momentum, heat and water vapor were obtained by the eddy correlation technique and their spectra were determined at several locations over the lake surface for 3 min sampling lengths. At the aircraft speed of 92 m s^{-1} this represents a flight path of about 17 km. The spectra demonstrate the tendency for the peak value to march to longer wavelengths with increasing height.

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