

TEMPORAL AND SPATIAL TRENDS OF FLUXES AND CONCENTRATIONS OF CO₂ ABOVE AND
WITHIN THE CANOPY AT HOWLAND, MAINE: PRELIMINARY RESULTS

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In order to develop and evaluate models of net carbon exchange, we have collected profiles of CO₂ through and above the canopy for extended periods over three years as well as collected short-term trial data of diurnal CO₂, water vapor, and sensible heat fluxes above the canopy as measured by eddy correlation. For fluxes, carbon dioxide concentrations were measured with a LI-COR model LI-6251 fast response IRGA housed at the base of the tower. The air sampled from 26 m (7 m above the canopy) was brought through tubing to the IRGA. Both vertical air movement and water vapor density were measured adjacent to the inlet of this tubing at the same elevation using a Campbell Scientific model CA-27 1-D sonic anemometer and a Campbell Scientific model KH-20 krypton hygrometer. For eddy flux analysis, sampling of the three sensors occurred at a frequency of 10 Hz during sampling periods of 30 min. The CO₂ concentration profile through the forest was determined from sequentially collected samples at three levels within the canopy and at 7 meters above canopy using a system consisting of a dedicated LI-6252 CO₂ analyzer, switching valves, pumps, Teflon inlet tubes, calibration gases, and dedicated datalogger (model 21X, Campbell Scientific). These data are used to determine a storage flux of CO₂ associated with the change in CO₂ concentration within the air column. The effects of atmospheric stability, stomatal conductance, and soil moisture on concentrations and fluxes are described.

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