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## Carbon dioxide measurements in the nocturnal boundary layer over Amazonian forest

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**Abstract.** Measurements of carbon dioxide concentration, temperature and windspeed were made in the nocturnal boundary layer over a tropical forest near Manaus, Brazil using a tethered balloon system. The measurements were made up to a maximum height of 300 m on ten consecutive nights in November 1995. Simultaneous surface flux and in-canopy concentration measurements were made at the surface close to the site. The observation period included several different types of conditions. Generally strong windshear and relatively weak temperature gradients prevented the formation of a strong capping inversion to the nocturnal boundary layer. On some nights, however, the inversion was sufficiently strong that the CO<sub>2</sub> concentration at 100 m above the surface exceeded 400 ppm. The concentration within the canopy was largely controlled by the presence of an inversion very close to the canopy surface. The temperature and wind profiles are contrasted with conditions in Randônia, Brazil, where the windshear was found to be weaker and higher carbon dioxide concentrations were observed in the early morning. The difference in carbon dioxide concentrations in the nocturnal boundary layer between dusk and dawn is used to estimate the regional nighttime flux of carbon dioxide. The value obtained generally exceeds the measured surface flux and sometimes exceeds the sum of the surface flux and the in-canopy storage made at the tower site. The reasons for the discrepancy are not clear; either one of the methods is in error or the regional carbon dioxide budget differs significantly from the local budget measured at the tower site.

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