Examination of CO2 and heat exchange of a cool temperate deciduous broad leaved forest using multi-layered canopy model

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Many land surface models have many indefinite parameters about physiology or canopy structure. These uncertainties may produce the errors of CO_2 and heat flux from land surface, which potentially influence long time atmospheric CO_2 concentration and energy budget.

In this study, the influence of physiological parameters on CO_2 and water flux from land and vegetation is examined by multi-layer canopy model, MINCER (Watanabe et. al., 2006). First, the model is driven with full data sets from observations (control). Next, we change model parameter one by one. In change A, the photosynthetic parameter is averaged for one year. In change B, the under story is removed. In change C, the canopy closeness rate is changed.The integration period in all cases is one year (January to December, in 2003).

In change A, averaged sensible heat flux and is larger than that in control, and monthly averaged CO_2 flux is smaller than that in control. In change B, daily total sensible heat flux is not so different to that of control, but the maximum value is slight larger and the minimum value is smaller, respectively. CO_2 flux in change B is slight smaller than control in spring time. In change C, canopy closeness makes large sensible heat flux in daily mean for 1 to 5 W/m^2.