Evaporatranspiration pattern for tropical canopies in South East Asia: A modal performance comparison using Biome-BGC model and observational datasets

Amy Chua Fang Lim, Masakazu Suzuki, Nobuhito Ohte, Norifumi Hotta (The Univ. of Tokyo), Natsuko Yoshifuji (Japan Science and Technology Agency)

Introduction

Tropical rainforest ecosystem is widely known for its important role in sustaining the global climatic system. Ecosystem simulation models like Biome-BGC model are often used to integrate meteorological data in assessing water, carbon and nutrient cycling within a certain ecosystem. However, the Biome-BGC version 4.1.1. (Thornton et al., 2001) model has not been use for tropical rainforest biomes. In our research, meteorological data was taken in a tropical forest canopy which is situated at Lambir Hill National Park, Sarawak Malaysia. The park is covered by undisturbed lowland evergreen tropical forest and had one of the lowest ratios in seasonal variations in precipitation and also temperature. Our main objective in this paper is to describe the performance of Biome-BGC model in predicting and simulating evapotranspiration pattern for tropical canopies in South East Asia.

Method

Meteorological data like temperature, precipitation, shortwave radiation and vapor pressure deficit used in the model were observed data collected for the period of July 2001 to June 2002. Site specification parameters like elevation and soil characteristics were set according to the study site area. Ecophysiological characteristic of vegetation were set to evergreen broadleaf forest parameter. Several trials using the Biome-BGC model were calibrated in available in the study site.

Results

The annual evapotranspiration, ET of 1403.4mm which was modified from Kumagai et al. (2005) is shown as ET1 with mean of LAI=5. By using the Biome-BGC model parameter, the estimation of ET was slightly lower and the mean of LAI=2.29 which is relatively small (Line ET2). After fitting and fixing the ecophysiological parameter to generate mean of LAI $\approx 5$, the value of evapotranspiration improves higher and is shown as ET3.

(Amy Chua F.L.; Email address: amychua@fr.a.u-tokyo.ac.jp)

Reference

1. Manfroi, O.J., et al. 2006. Comparison of conventionally observed interception evaporation in a 100-m² subplot with that estimated in a 4-ha area of the same Bornean lowland tropical forest. Journal of Hydrology 329 (p 329 – 349)