

Seasonal and inter-annual variation of turbulence fluxes measured over a lowland dry evergreen forest in Cambodia

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Introduction: Almost all the countries in Indochina Peninsula have been economically developing recently and forests have been diminishing rapidly. Cambodia is not the exception, although the developing status is slightly delay compared to other neighboring countries due to the political chaos caused by the civil war in 1970-1993. Thus in Cambodia, forests still remain in the lowland area. However, the lowland dry evergreen forests (DEF), which usually grow on the thick and fertile soil, especially become the target to be converted to agricultural field and rubber plantation forests due to its suitable condition for vegetation growth. Despite that precious species of plants and animals may make their habit there, the DEFs are disappearing without known its interaction with environment. Therefore, we have challenged to operate ground-based observations of hydrological and meteorological factors since early this century. As some parts of them, here we introduce the results of turbulence exchange measurement carried out over a DEF ecosystem.

Site and Methods: The observation was operated using a 60-m-high tower built in “O Thom I watershed” (12° 44' N, 105° 28' E), in Kampong Thom province, central Cambodia. The DEF is mainly composed of evergreen broadleaf species, such as *Vatica odorata* and *Dipterocarpus costatus*, and the terrain is rather flat. Although the forest has been conserved by the administrative order, the surrounding area has been gradually converted to other land use recently. A sonic anemo-thermometer (K-probe, ATI, CO in 2008-2010; CSAT3, Campbell Scientific Inc., UT in 2010-) and a ventilated thermo-hygrometer (HMP45A, Vaisala, Finland) were installed at the height of 51.0m of the tower for band-pass eddy covariance method. In 2011 and 2013, infrared-gas analyzer (IRGA: LI-7500 and LI-7500A, LI-COR, NE) was additionally set at the same height. The measurement has been made since 2007, but was often intermitted mainly because of electrical and instrumental breakdown. The data were collected at the rate of 10Hz using a data logger (CR1000, Campbell Sci.) and turbulence fluxes were calculated for each 30 minutes after the transducer shadow correction and conversion of coordinate system by the “double rotation” .

Brief results: In 2008-2009, monthly latent heat fluxes (LE) were rather steady and seemed mainly regulated by input radiative energy. Meanwhile, variation of monthly LE values was relatively large in 2011-2012, deviating from the trend of input energy in the end of the dry season, although evaporative demand from the atmosphere became large. These results suggest that evapotranspiration from the DEF was regulated by the incoming solar radiation in the wet season, whereas vegetation transpiration was sometimes suppressed in the dry season, probably depending on the degrees of soil dryness and other environmental factors. In the presentation, we will estimate the evapotranspiration trend more profoundly using additional measurement data, and will also discuss about the carbon dioxide flux using the IRGA data.

Keywords: Lowland dry ever green forest, Turbulence fluxes, Dry season evapotranspiration