Measurement of dew condensation at rain-fed paddy field in Tropics

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As a part of the Global Energy and Water cycle EXperiment (GEWEX), the GEWEX Asian Monsoon Experiment (GAME) is being implemented to understand the role of the Asian monsoon in the global energy and water cycle and to improve the simulation and seasonal prediction of Asian monsoon patterns and regional water resources. For these objectives, we have been monitoring vapor flux, precipitation, evapotranspiration, radiative flux and their seasonal, intra-seasonal and interannual variation at the target area of the humid temperate area in Southeast Asia.

Although dew cannot provide water in quantities as large as fog or rain, its condensation is important as water resource or energy and water cycle in arid and semi-arid zones. Also, dew, in contrast to other meteorological sources of water, is not a precipitation; its amount is dependent not only on the local atmospheric humidity, but also on the radiative, thermal and aerodynamical properties of the substrate and of its surroundings (Monteith and Unsworth, 1990).

We present in this paper dew condensation at rain-fed paddy field, Sukhothai (17·04'N, 99·42'E) located at Chaophraya river basin, which is one of the observation sites in the framework of the GAME project was selected for measuring heat and water vapor exchanges between biosphere and atmosphere in time and in space using a micrometeorological fluxes measurement method since March 1997.

From surface energy fluxes observations, it is cleared that the daily average of evaporation in dry season was about 0.7 mm/daytime in spite of no submerge water and low soil water contents. The decrease of soil humidity from January to March corresponded to only 0.4 mm of evaporation. In contrast, vapor pressure in dry season was not relatively low which corresponded to about 60 % of that in rainy season. Therefore, low surface temperature in early morning and non-low amount of water vapor even in dry season caused oversaturated air conditions, which is dew condensation in early morning.

The peak of evaporation by eddy correlation technique was 8:00 o'clock irrespective of the peak of solar radiation. Also, the observed dew condensation by weighting observation and evaporation during dry season accounted for more than 50 % of evaporation in early dry season, and then the ratio of dew condensation in the evaporation decreased gradually from February with an increase of lowest surface temperature. This indicates that dew condensation is strongly related to evaporation in dry season.