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Hydrologic Characteristics of the Lam Phra Phloeng River Experimental Basin in Thailand

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1. Purposes

The hydrological characteristics in the tropical area is very important in the problem of the global environ ment through a hydrologic water cycle. But the hydrological characteristics of the tropical area are not clear due to the few example of the hydrological observation. So we start to observe hydrological elements in the tropical area, Thailand.

The main purpose of this study is to clarify characteristics of water balance in the tropical area.

To accomplished this purpose, hydrological field observation, that is, evapotranspiration, water level of river, heat flux etc. is carried out. Evapotranspiration was directly observed by the turbulence monitoring system. The experimental basin of the Lam Phra Phloeng River is located in the north-east part of Bangkok.

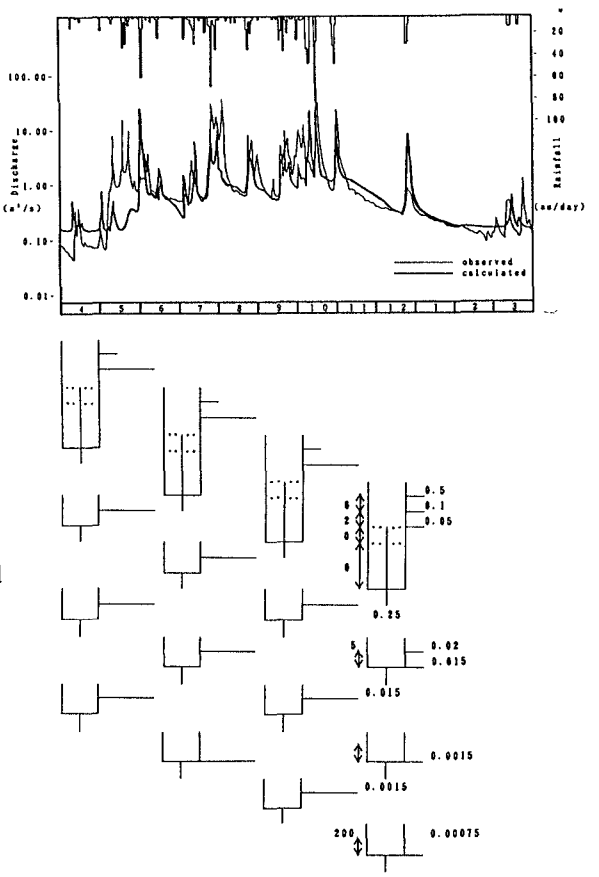

Fig.1 Example of runoff simulation by Tank model (April 1992 to March 1993)

2.Methods

The runoff model, that is, "Tank model" is used for analyzing the runoff characteristics of the Lam Phra Phloeng River experimental basin near Nakornratchasima, Thailand. There are three hydrological stations in the experimental basin. The hydrological components of the stations are wind velocity, wind direction, temperature, humidity, net radiation, heat flux at the ground surface and rainfall. The hydrological data are collected every 30 minutes and stored one month in the magnetic card in the card logger. The electric power is supplied by the solar panel. The tower was established on February 1996 in the Mae Klong watershed research station, Kanchanaburi managed by Royal forest department in the 100 km west of Bangkok. The height of the tower is 40 m from the

ground surface and located in the middle part on the hill slope . The evapotranspiration on the top of the tower was observed by use of the ultrasonic anemometer & the infrared humidity sensor through one day on February 1996.

3. Results

The runoff characteristics of the experimental basin is following. For the first step of runoff simulation, small evapotranspiration was used. In this case, considerable surface runoff & sub surface runoff are appeared similar as the observed one. Finally soil moisture is supposed as zero. Then calculated and observed runoff coincided(Fig. 1).

The example of the hydrological observation of the station on 16 July 1996 is following. Temperature was not change largely through the day. The amounts was 25 ℃ in the night and 30.7 ℃ at 14:00(Fig.2). Net radiation had peak value of 750 W/m^2 at 10:30 in the morning and minus value in the night time(Fig.3). Heat flux on the ground surface had the peak value of 40 W/m^2 and minus values in the night time(Fig.4). There is no rainfall of this day.

Evapotranspiration at the top of the tower in the Mae Klong watershed is following. The observation started at 12:00 on 14 February and finished on 11:00 15 February 1996. Evaporation(latent heat flux) had the maximum value of 306 W/m^2 at 14:00 on 14 February and minimum value of -52 W/m^2 at 8:00 on 15 February.

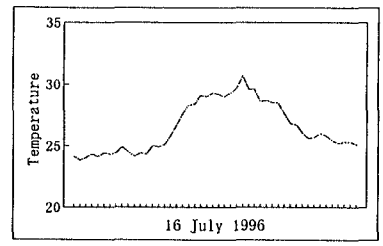

Fig.2 Diurnal change of temperature (℃)

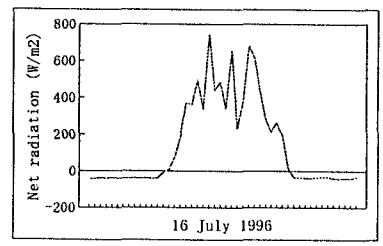

Fig.3 Diurnal change of net radiation (W/m^2)

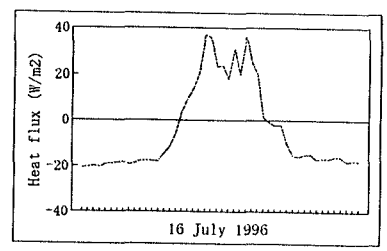

Fig.4 Diurnal change of heat flux in the ground surface

4. Discussions

The runoff analysis of the Tank model shows that soil moisture effect is very small and almost of runoff consist of surface and subsurface runoff in the Lam Phra Phloeng river experimental basin.

Result of the hydrological observation at the station is following. Temperature change is small through the day and the difference of night and day was about 5 ℃. Net radiation have the maximum value in the morning. Heat flux is small value of 1/20 of net radiation.

The evapotranspiration on the top of the tower in the Mae Klong watershed shows the value of 306 W/m^2 on February in the dry season and sensitive heat flux also have similar value.

5. References

T. Kishii and Y. Kuzuha : Proceedings of the international workshop on the change of Tropical forest ecosystems by El Nino and others . 1995.