

# Diurnal variation of GPS Precipitable Water Vapor over Thailand during GAME–T IOP of 1998

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This study explores the diurnal variation of precipitable water vapor estimated from GPS data (GPS-PWV) with high time resolution at Bangkok and Chiang Mai during the GAME-Tropics Intensive Observation Period (IOP) of 1998. GPS–PWV at one-hour interval are calculated from the total zenith atmospheric delay with the surface temperature and pressure.

There exist diurnal variations of GPS–PWV at both sites in the premonsoon period from mid April to early May, but GPS–PWV at Bangkok reaches the maximum values at around early morning while that at Chiang Mai reaches that at around evening. Such a reverse phase may be due to the geographical location. PWV may affect the sea-breeze induced water vapor fluxes at Bangkok and the mountain-valley induced local circulation at Chiang Mai. Diurnal variations of the specific humidity at the surface level do not show apparent consistency with those of GPS–PWV.

The amplitude of GPS–PWV during the onset period from mid May to mid June, reduced about a half of that during the premonsoon period at both sites. GPS–PWV at both sites has a maximum amplitude in the morning and in the evening. Such a double peak is also found in the deep convection over seas such as ITCZ and SPCZ. Hence the double peak suggests the peak of the other convection such as the shallow one at the different hour. The decrease of GPS–PWV in the evening is consistent with the precipitation events and it could be considered as the conversion of water vapor to the cloud through the convection and finally to the precipitation.

Rainy days and no rainy days are decomposed and the diurnal variations are also examined. The double peak appears in both composite figures but the amplitude of rainy days is larger than that of the no rainy days. This result suggests the double peak occurs irrespective of the precipitation events, and therefore the double PWV peak might link with the double peak of the convection.

In the late monsoon period, the basic feature of the diurnal variation at both points are similar to those in the early monsoon period. No unique characteristics are found in this period, which suggests that the effect of the land surface on the diurnal variation differs so much in the two periods.

The present study reveals the characteristics of the diurnal variation of PWV at Bangkok and Chiang Mai, and they have different phases in premonsoon period while they are the same in early and mature monsoon seasons. Valley-induced local circulation might contribute to this phenomenon but it is not so much significant because the diurnal variation of wind vectors is not consistent with it. Further an intensive observation and a numerical experiment is needed to clarify the mechanism responsible for it.

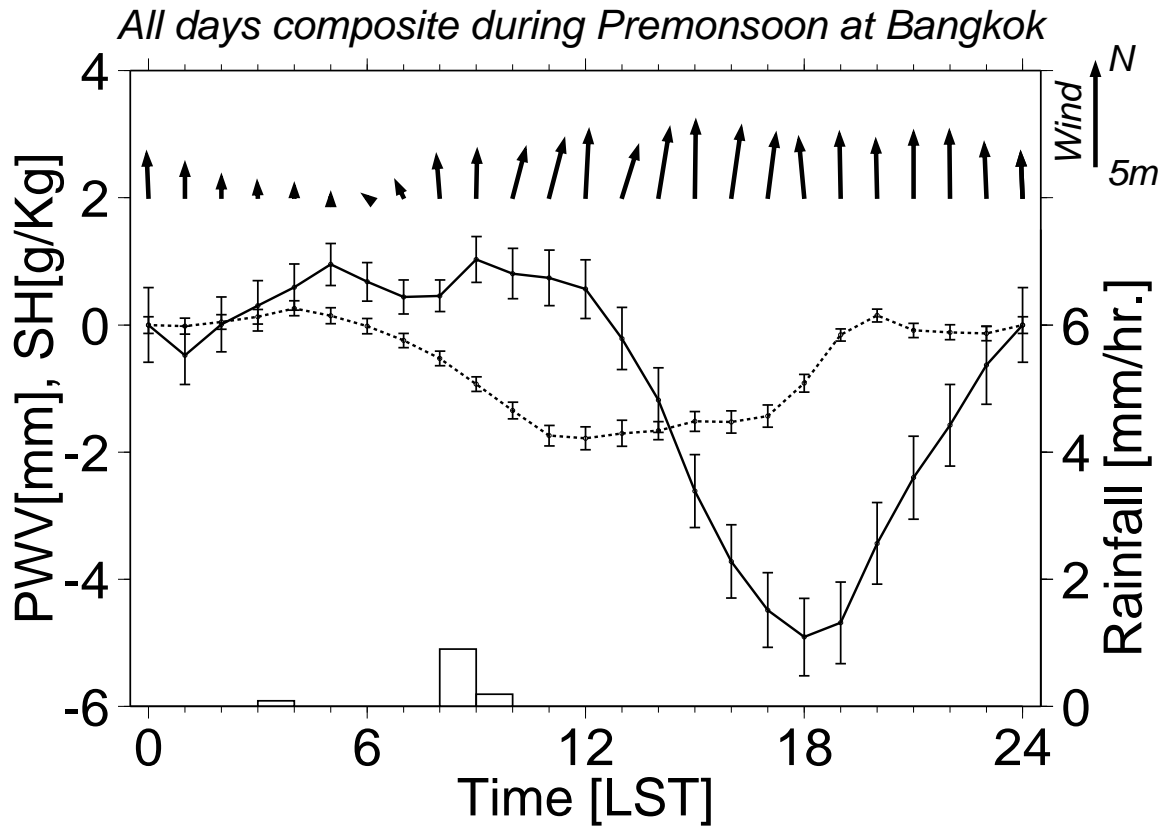


Figure 1: Diurnal variation of GPS-PWV at Bangkok during Premonsoon period of 1998.

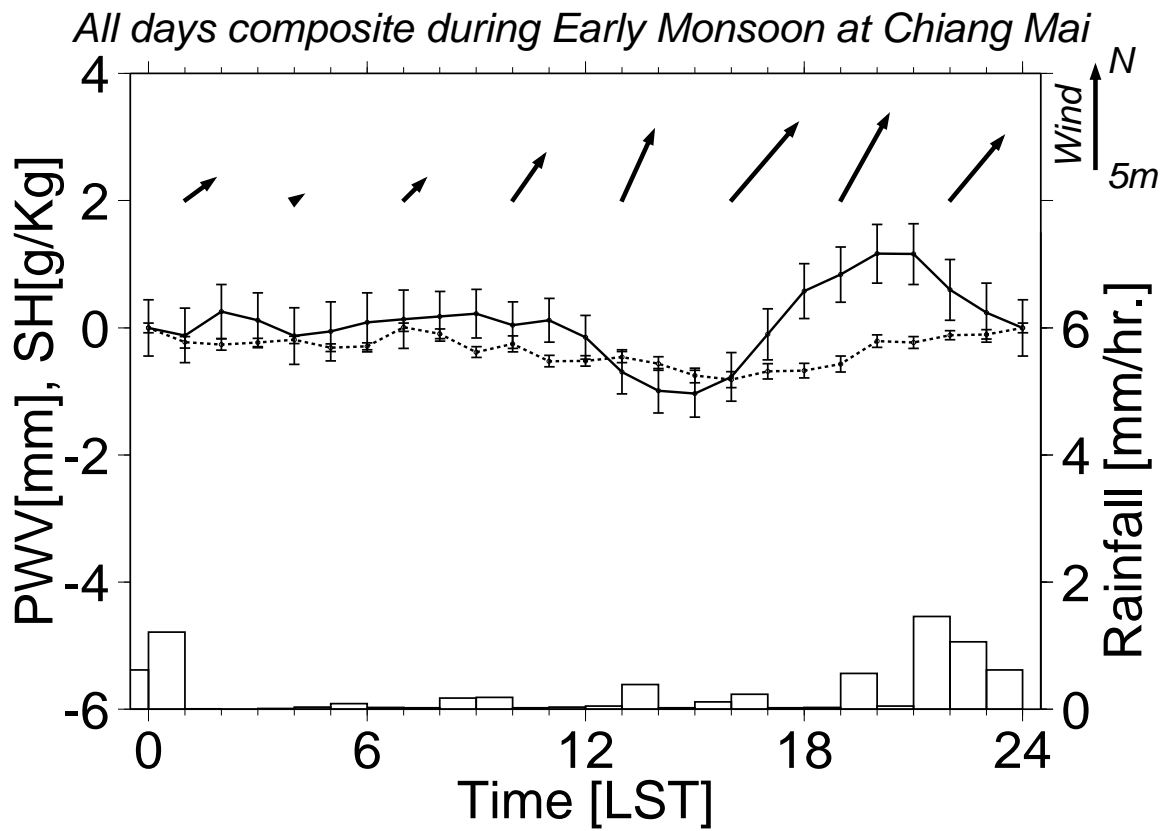


Figure 2: Same as Figure 1 but at Chiang Mai during Early monsoon period.