

# Defining parameters to calculate monsoon onset in Bangladesh using the Marteau *et al.* method\*

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## \*References

### *Original method:*

Marteau, R., V. Moron and N. Philippon. 2009.  
Spatial coherence of monsoon onset over Western and Central Sahel (1950–2000).  
*J. Clim.* 22, 1313-1324.

### *Parameter definition:*

Moron, V. and A.W. Robertson. 2014.  
Interannual variability of Indian summer monsoon rainfall onset date at local scale.  
*Int. J. Climatol.* 34, 1050-1061.

### **Original monsoon onset *agronomic* definition proposed by Marteau *et al.*:**

“The onset date is defined as the first wet day of 1 or 2 consecutive days receiving at least 20 mm without any 7-day dry spell receiving less than 5 mm during the following 20 days counted from the onset.”

### **However, Moron and Robertson state that:**

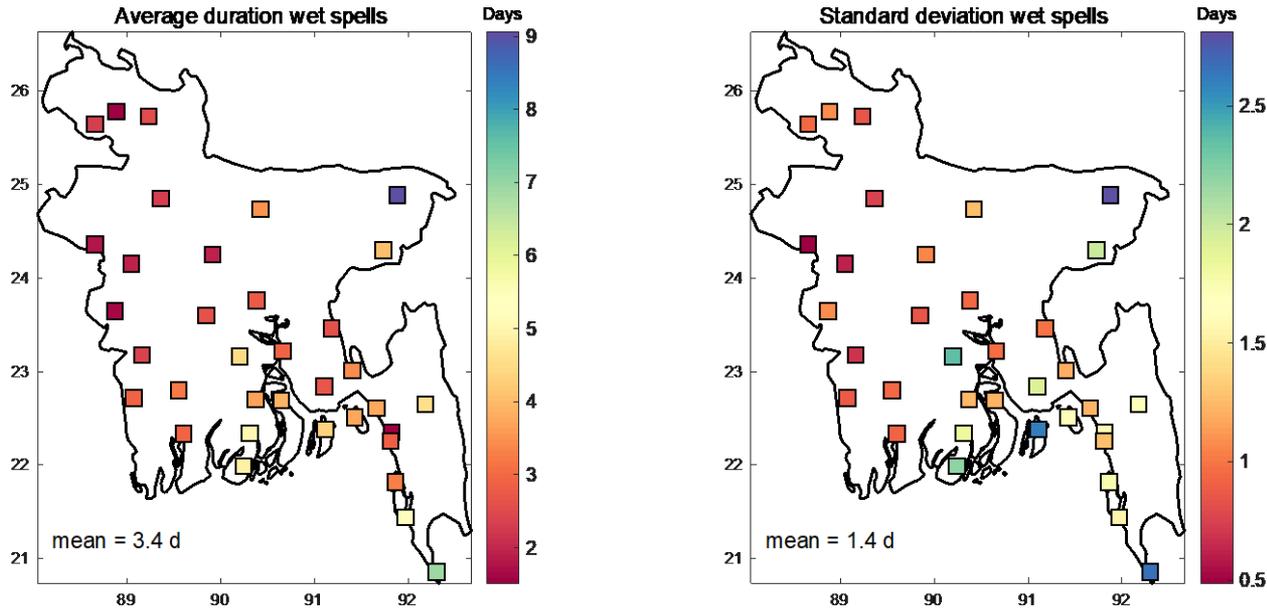
“Ideally, the *agronomic* onset date would be tuned to take into account local-scale climatic conditions (such as the average timing, length and amount of the initial wet spell), specific soil properties, including the soil water holding capacity, as well as specific crop water requirements during the early stages of growth.”

### **So, according to Moron and Robertson, the following parameters have to be defined locally:**

“The local-scale *agronomic* onset date of the monsoon is defined in terms of four parameters that characterize the local-scale daily rainfall evolution: **(1)** the duration of initial wet spell; **(2)** the amount of rainfall received during the initial wet spell; **(3)** the length of post onset dry spell to avoid *false starts* of the monsoon related to pre-monsoon rainfall and **(4)** the maximum amount of rainfall received during the post-onset dry spell.”

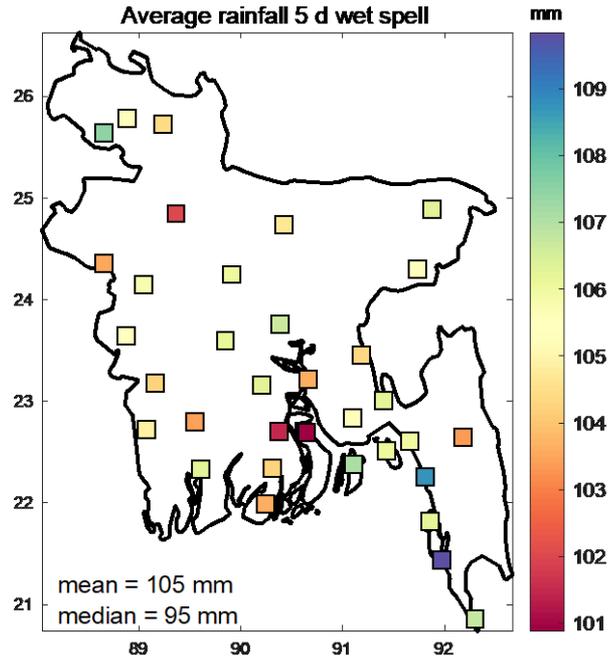
## Parameter 1: the duration of the initial wet spell

The average length of wet spells (rainfall > 1 mm/d) in April-October equals **3.4 days** (with an average **standard deviation of 1.4 days**). An initial wet spell lasting at least **5 days** will include most of the observed situations.



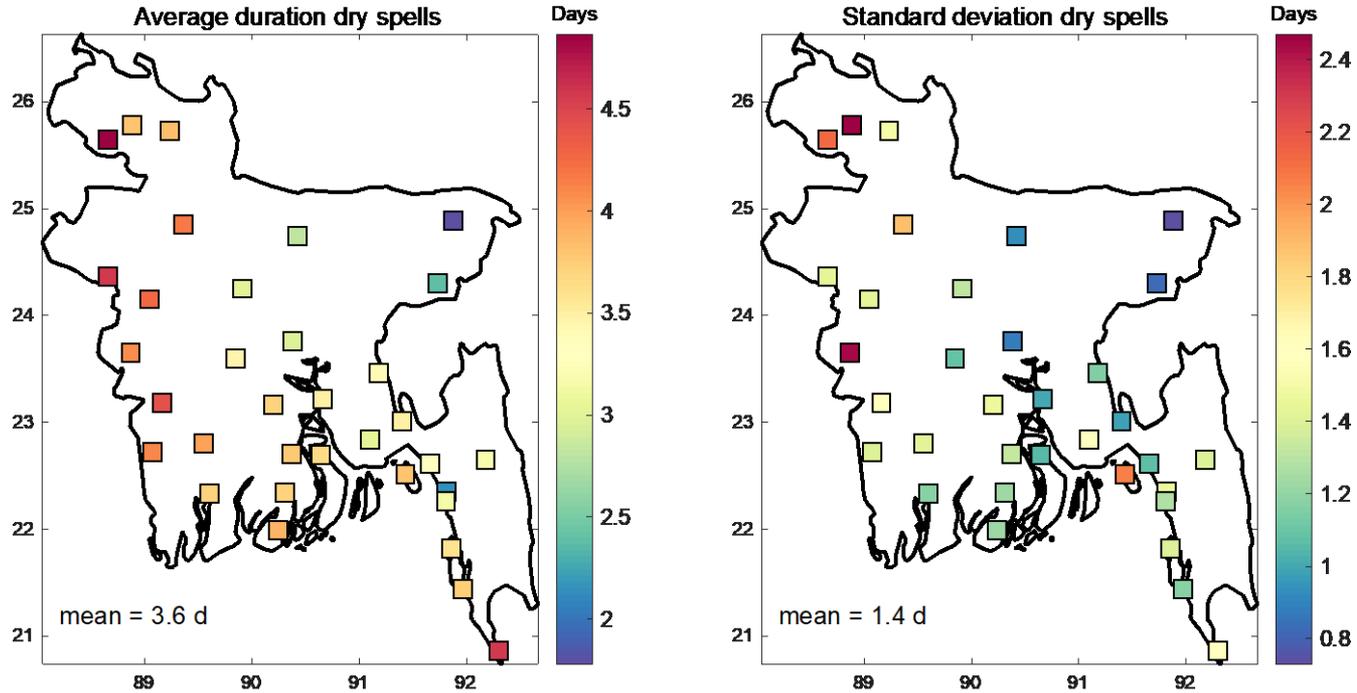
## Parameter 2: the amount of rainfall received during the initial wet spell

The average and median 5 days wet spell rainfall amount for BMD stations during the monsoon equals 95 and 105 mm, respectively. Thus, an initial rainfall amount of **100 mm** in 5 days appears to be sufficient for sowing at most locations, and hence to provide an agronomically meaningful definition of monsoon onset.



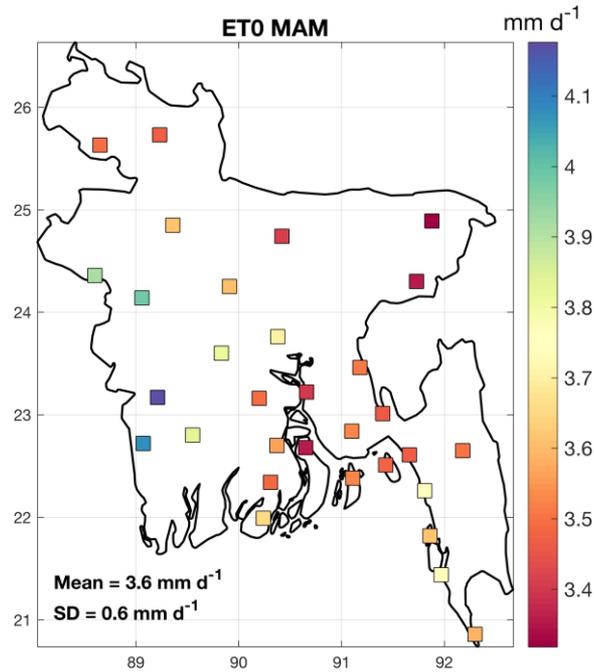
### Parameter 3: the length of post-onset dry spell to avoid false starts of the

The mean length of dry spells equals **3.6 days** (with a standard deviation of **1.4 days** across stations) from April to October. In that context, a post-onset dry spell of **5 days** seems to be a reasonable choice, to avoid *false* starts.



#### Parameter 4: the maximum amount of rainfall received during the post-onset dry spell

The average ETO for MAM equals 3.6 mm/d with an average standard deviation of 0.6 mm/d. Thus, 20 consecutive dry days would deplete the water stored in the soil after an initial wet spell receiving in mean 100 mm. The maximum amount of rainfall during the post-onset dry spell is set to **5 mm/d**.



Thus, for Bangladesh, monsoon onset date is defined as the first wet day ( $\geq 1$  mm) of the first **5 days** wet sequence from April 1st that receives at least the **100 mm** without being followed by a **5 days** dry spell (receiving less than **5 mm**) in the following **20 days** from the onset.

### Interannual mean monsoon onset date for Bangladesh using the Marteau *et al.* method

