



Intraseasonal and interannual variability of rainfall over Bangladesh during the summer

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Introduction

◆The heaviest rainfall areas in the world

•Low altitude and flat land \rightarrow flood and infection disease

Intraseasonal variation (ISV):

10 – 20-day ISV is dominated during summer. In 1995:Ohsawa et al (2001); In 2004:Mutara et al. (2008) <u>Multi-year analysis is needed.</u>

Interannual variation (IAV):

Few studies address the IAV of rainfall over Bangladesh. (e.g. Kripalani et al. 1996; Cash et al. 2008) Reliable rainfall data set are needed.

Effects of ISV on IAV:

30 – 60-day ISV activity affects IAV over India, Indian Ocean (e.g. Goswami and Mohan 2001; Hoyos and Webster 2007) <u>No study in Bangladesh</u>

Objective of this study

To show spatiotemporal structure in ISV of Bangladesh rainfall, interannual variability of the ISV and effects of the ISV activity on the IAV of summer monsoon rainfall over Bangladesh

Data

Daily rainfall data from 25 stations over Bangladesh (from BMD) from 1981 to 2000 (20yrs)

These data are simply averaged in each day: All Bangladesh Daily Rainfall (ABDR)

Daily interpolated OLR data with 2.5 latitude-longitude grid (proxy for large-scale convection)

>JRA25 with 1.25 latitude-longitude grid, Daily

Geographic features around Bangladesh and Rain-gauge stations



Time series of ABDR (black bar) and 7 – 25-day filtered anomalies (Solid line) in 1993



●Intraseasonal variation on 10 – 20-day time scales

The 20-year ensemble spectrum of ABDR (upper figure)

•A peak around 14 days period exceeds the 95% confidence level. (from 15 May to 15 September)

Interannual variation of ABDR spectra (bottom figure)

●7 –25 day range: Pronounced peaks in most of years

•30 – 60-day range Peaks in some years



Relationship between IAV of JJA total rainfall and intraseasonal rainfall variance for JJA



- IAV of JJA rainfall is well correlated with that of 7 25-day variance (CC:0.65)
 30 60-day variance is very small.
- The activity of intraseasonal variation controls monsoon rainfall over Bangladesh





Spatial pattern related to interannual variation of monsoon (JJA) total rainfall over Bangladesh

Regression map of stream function and moisture flux



Spatial structure of IAV is similar to that of ISV over NE India and Bangladesh
No correlation in OLR between Bangladesh and areas from India to the BOB



High amplitude active peaks are frequently observed in Wet years

Summary

≻7 – 25 –day ISV is dominant over Bangladesh during the summer.

>The ISV strongly affects monsoon (JJA) rainfall over Bangladesh.

Spatial structures of circulation and convection anomalies of IAV is also influenced by the ISV.

➔in order for the climate models to reproduce the observed seasonal monsoon rainfall structure, the model need to simulate better the intraseasonal activity

>Large amplitude active peaks are frequently (infrequently) observed in WET (Dry) years.

Future works: What does control the amplitude/activity of ISV??



1Day lag composite of 7 – 25 days anomalies from day -4 to day +3

OLR, 925-hPa streamfunction and moisture flux vector anom.

Blue: Active convection Red: Suppressed convection

Day 0: active extreme of convection over Bangladesh



