

**Time-Space Characterization of Precipitation in
the Ganges-Brahmaputra-Meghna River Basin
for Projecting Riverbank Erosion in the
Bangladesh Outlet**

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Introduction

- Riverbank erosion is a perennial hazard in Bangladesh
- 80% of annual rainfall occurs in GBM river basin during monsoon
- Thousands of hectares of land eroded by GBM basin annually
- Loss of lives, homes, lands, and property

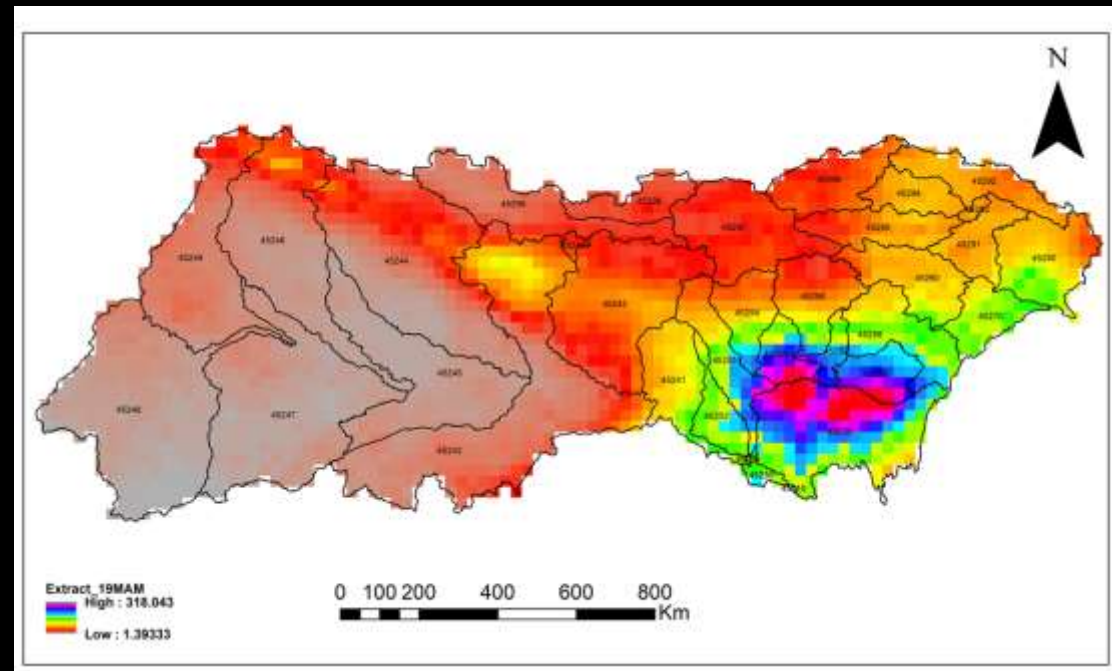
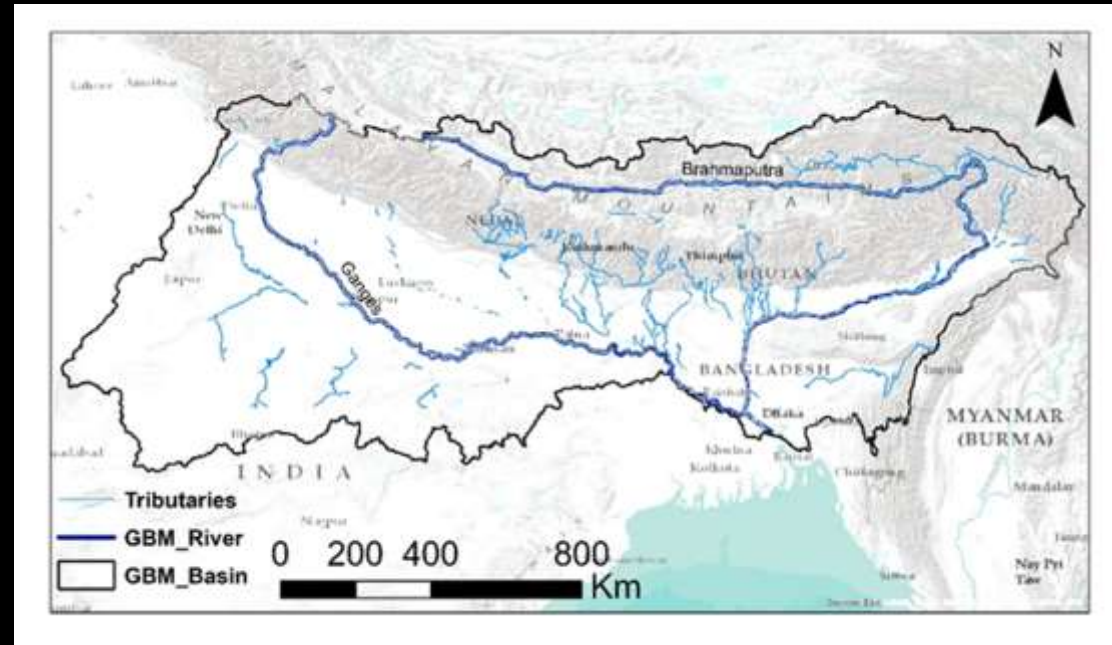


Ganges-Brahmaputra-Meghna (GBM) River Basin

- World's third largest river basin,
- Covers 1.7 million km²
- Transboundary river basin
- 32 hydrological sub-basins

Data

- Precipitation Estimation from Remotely Sensed Information Using Artificial Neural Networks-Climate Data Record (PERSIANN-CDR)
- Relevant, high-resolution, and long-term precipitation data for hydrological and climate studies
- Provides rainfall data every 3 hours from 1983 to present



Research Questions

- To what extent does the variability of precipitation in time and space within the GBM relate to annual riverbank erosion in the Bangladesh outlet?
- What is the relative importance of localized daily precipitation extremes versus basin-scale seasonal precipitation for riverbank erosion in the study area?
- Are climate teleconnections, e.g. ENSO, helpful in understanding these patterns of precipitation to potentially provide seasonal predictions of riverbank erosion?

Methodology

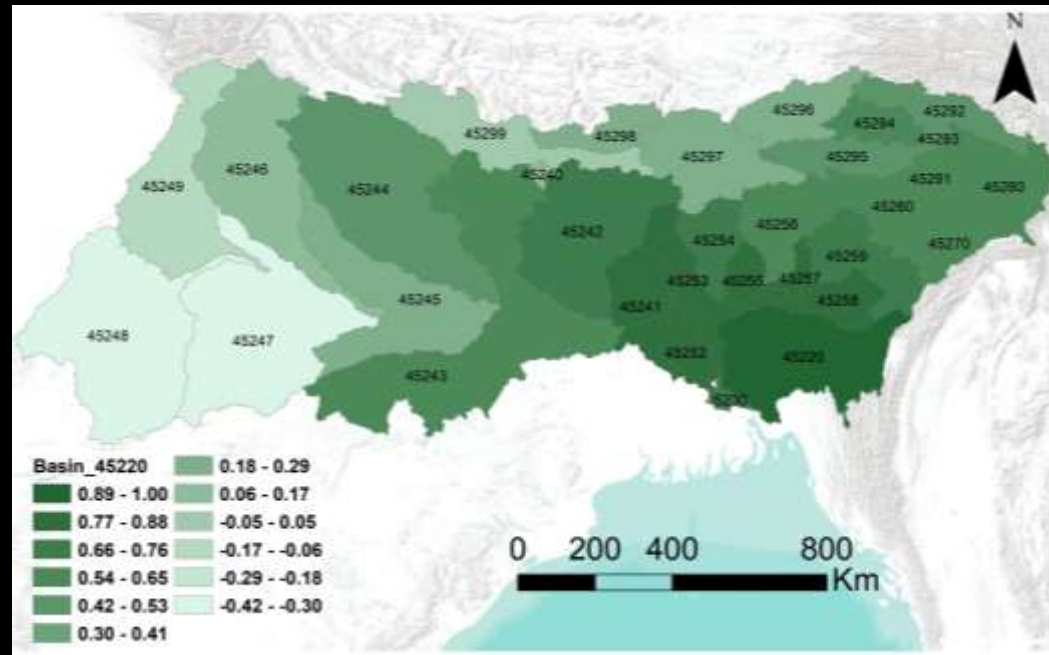
1. Average PERSIANN-CDR Pre-monsoon and Monsoon Precipitation in ArcGIS
2. Extremes local daily Precipitation
3. Flow distance
4. ENSO

1. GBM Intra basin relationship of precipitation
2. Relationship between pre-monsoon and monsoon precipitation
3. Calculate Flow length to the outlet for every PERSIANN-CDR grid cell
4. Relationship between ENSO and precipitation

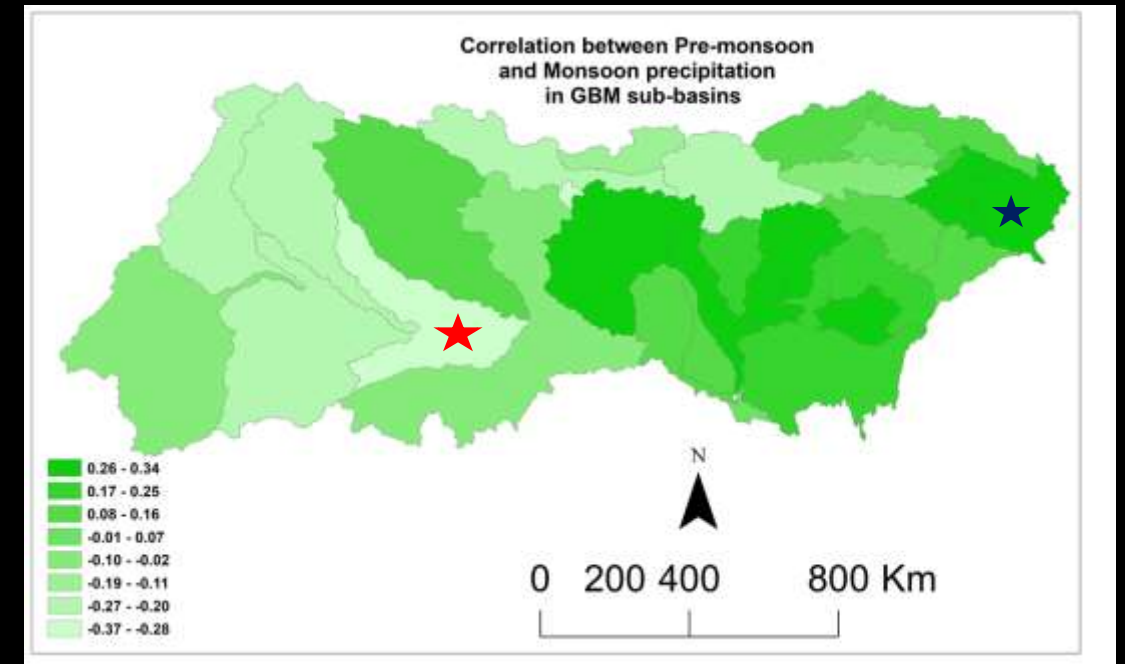
Correlation between shoreline change data, seasonal precipitation and local daily precipitation extremes in the GBM basin

Preliminary Result

- Dividing into sub-basins helps to study precipitation in finer detail
- Study focuses on 32 hydrological sub-basins of GBM to examine the pre-monsoon and monsoon precipitation



Correlation of monsoon precipitation between 45220 sub-basin with all sub-basin in GBM



Correlation of pre-monsoon and monsoon precipitation in sub-basins of GBM

Future Work

- Calculate flow length to the outlet for every PERSIANN-CDR grid cell
- Study the relationship between ENSO and precipitation
- Correlation between shoreline change data and seasonal precipitation and local daily precipitation extremes in the GBM basin

References

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Thank You

Dr. Scott Curtis

