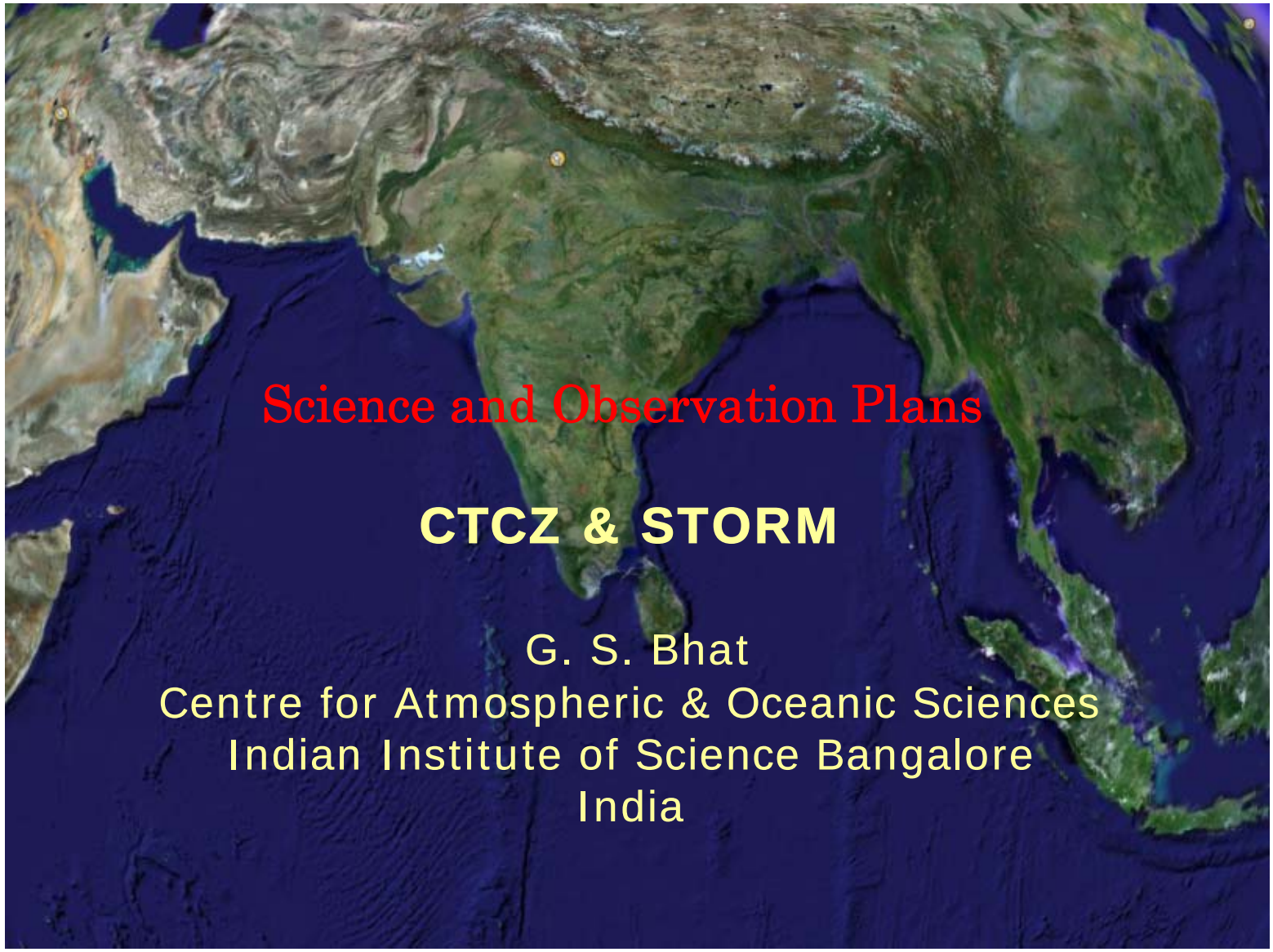


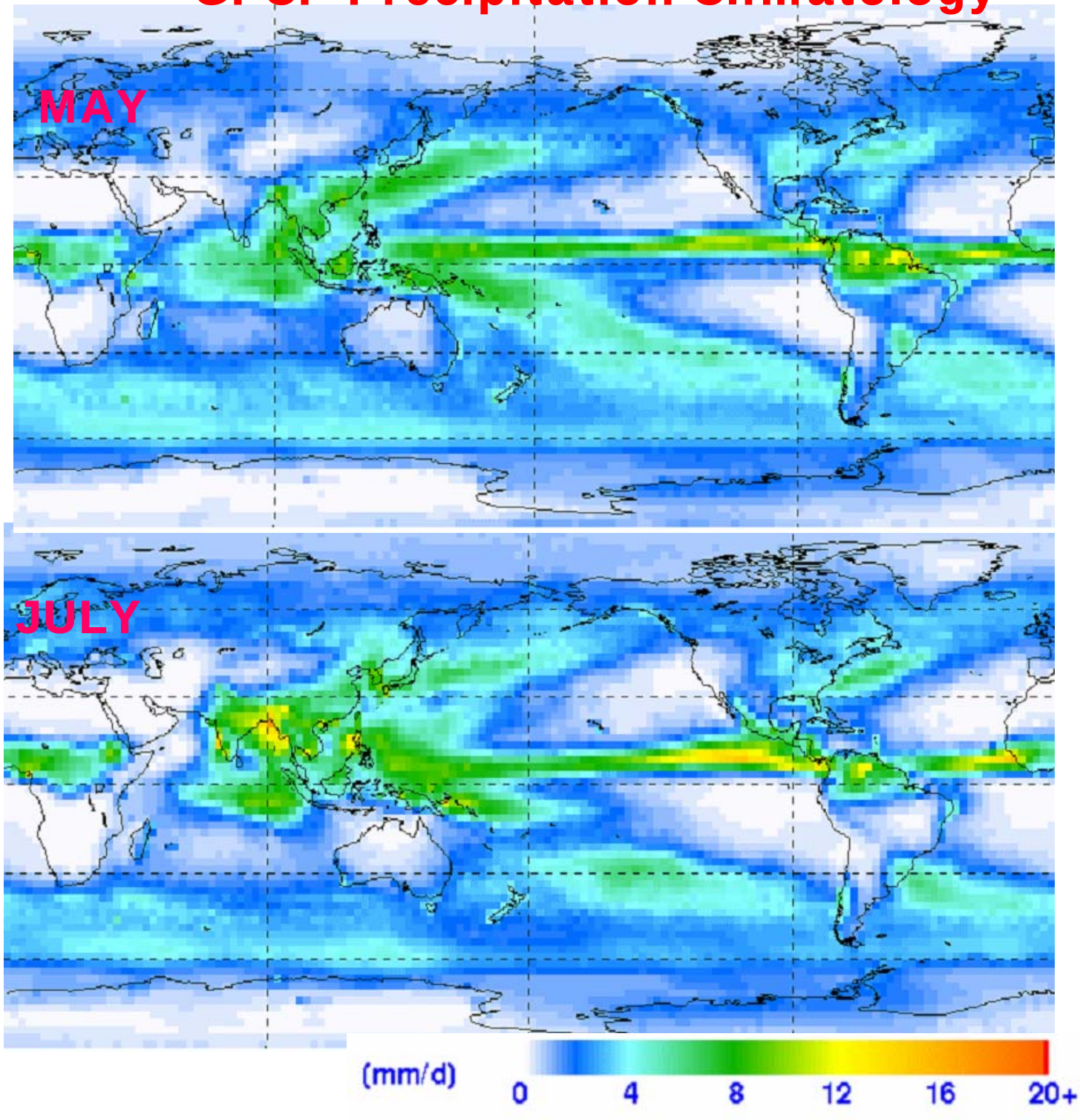
Science and Observation Plans

CTCZ & STORM

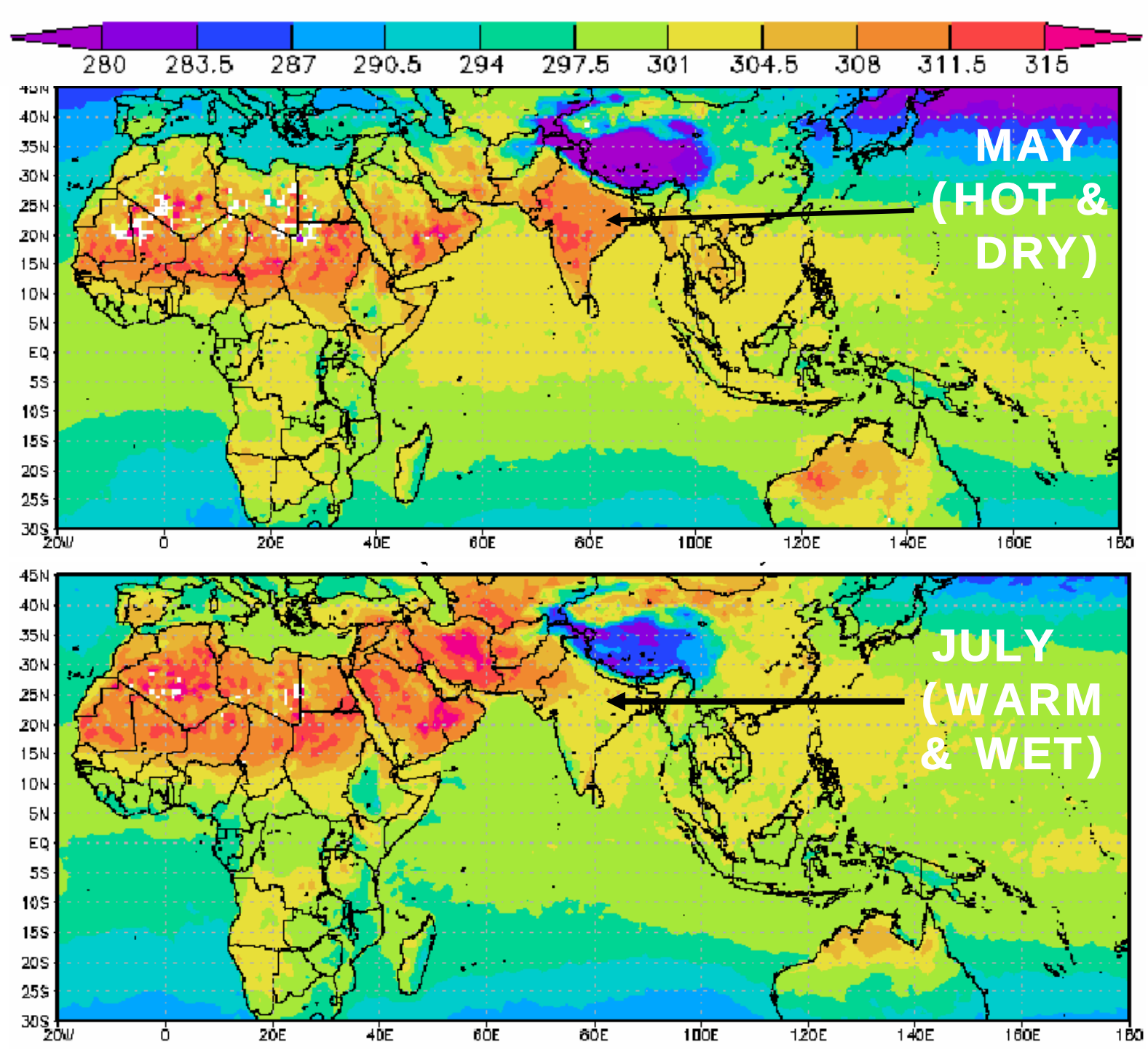
G. S. Bhat
Centre for Atmospheric & Oceanic Sciences
Indian Institute of Science Bangalore
India

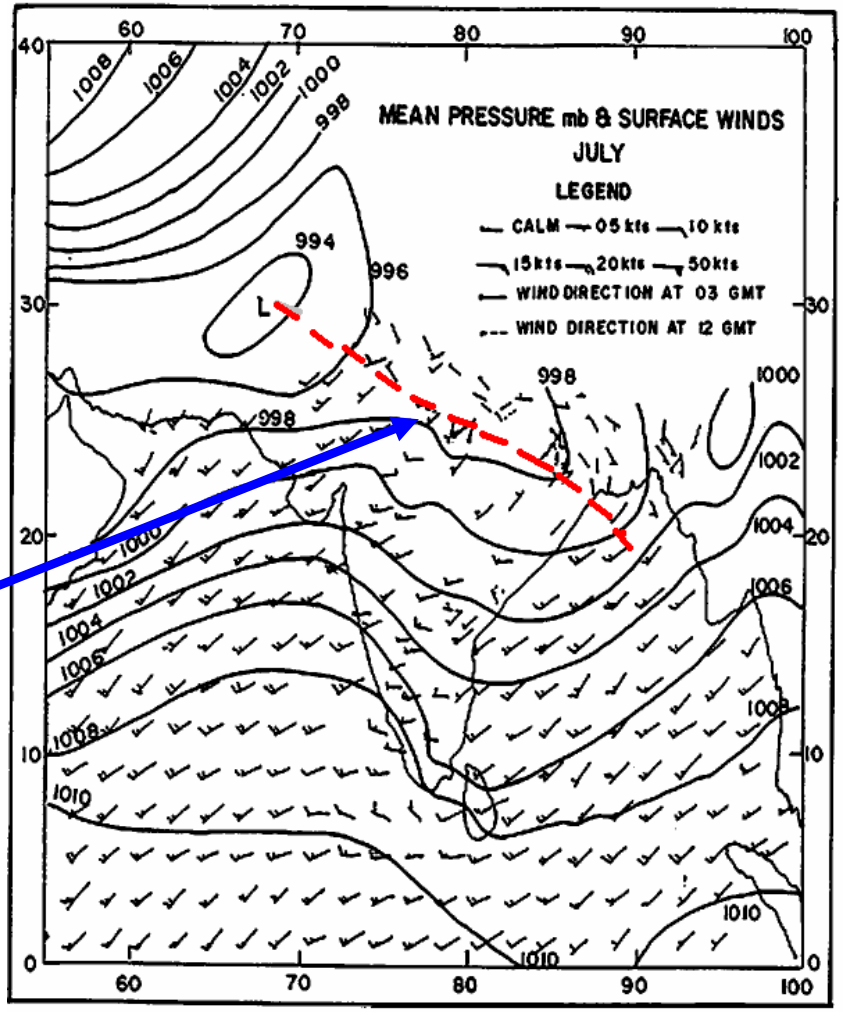
CTCZ
Brief Background

GPCP Precipitation Climatology



Surface temperature during May & July (AIRS/NASA)





Low pressure area

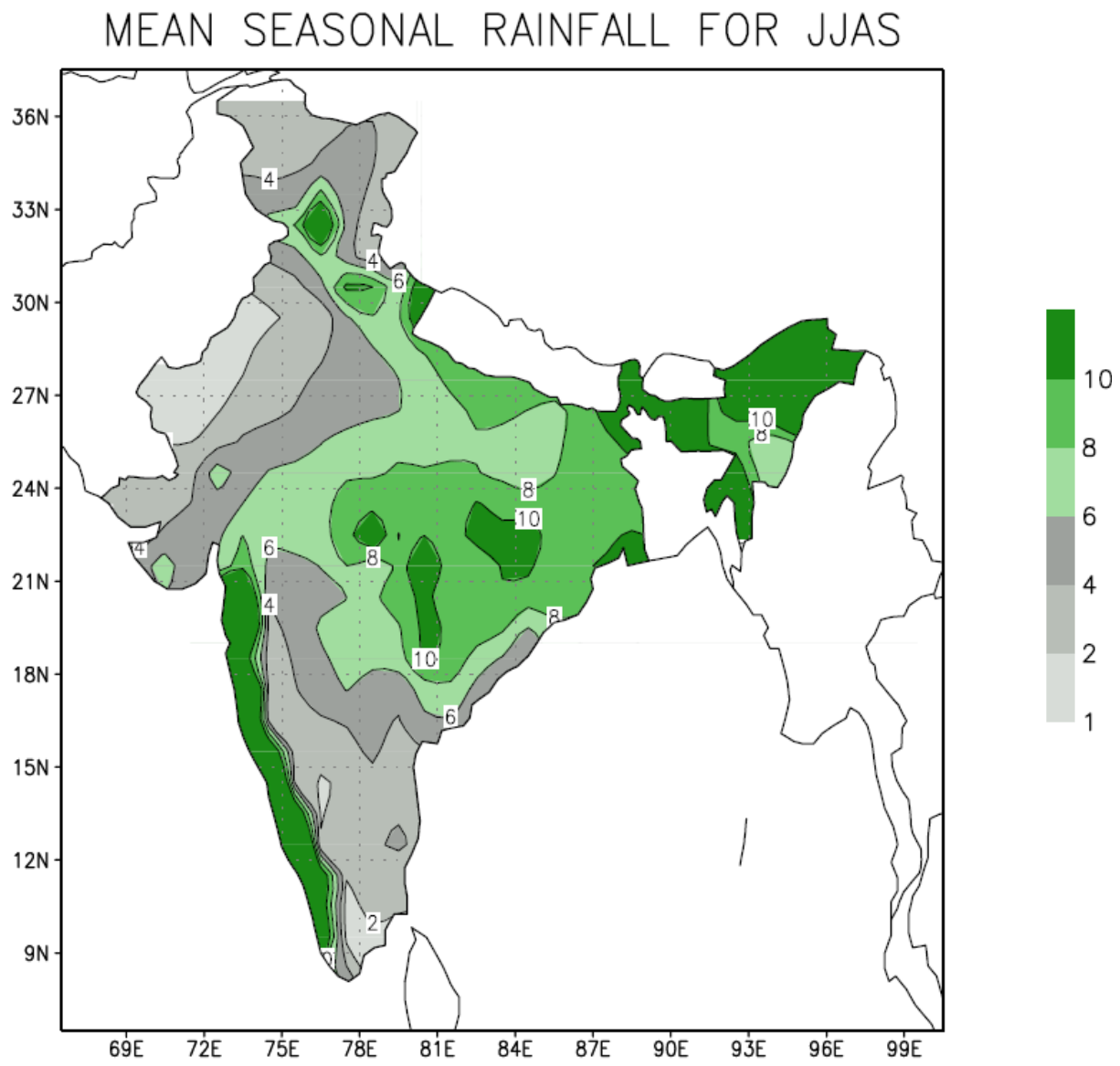
Monsoon Though MT

(Heat Low

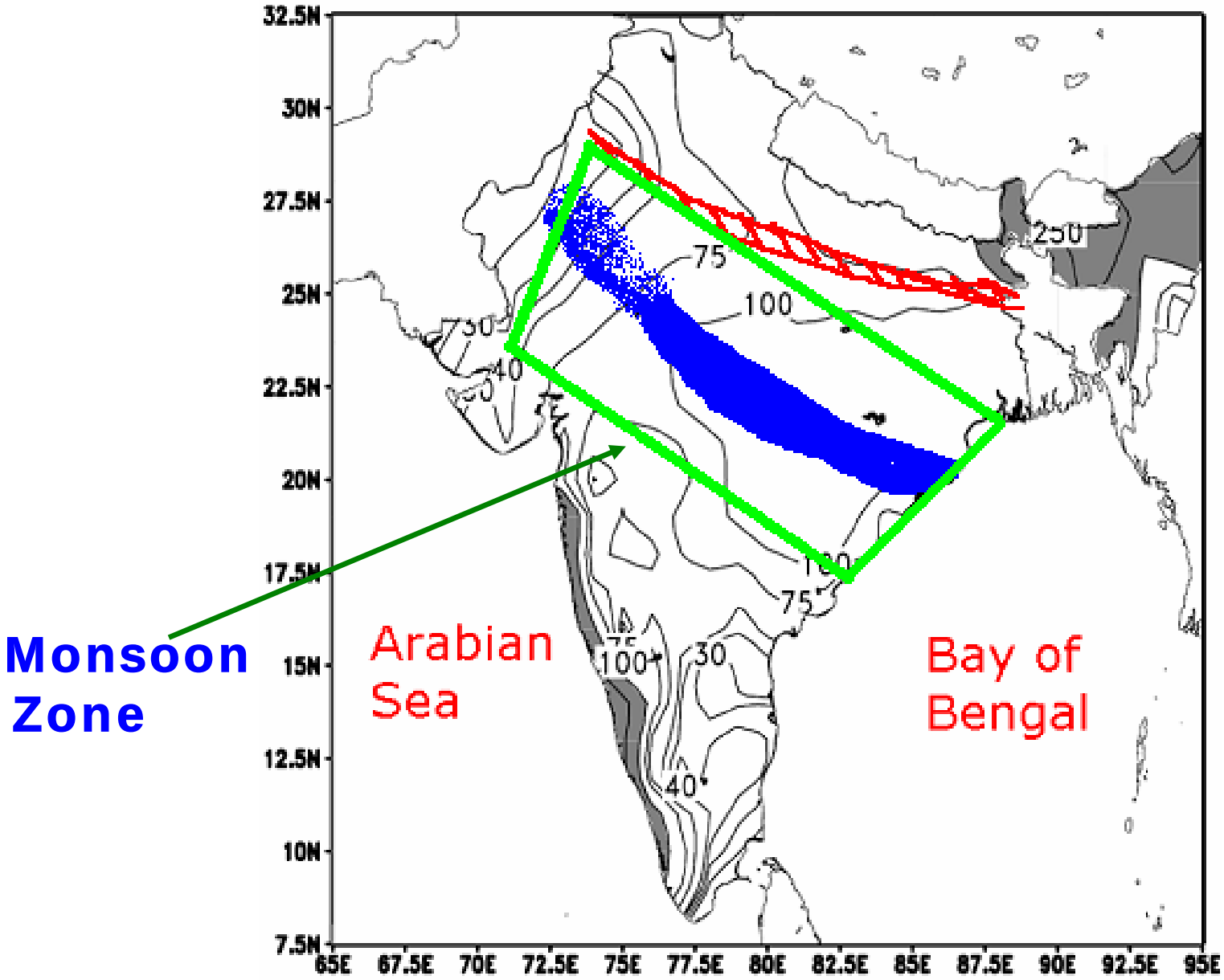
Dynamic Low)

Mean SLP & Surface winds during July

Axis of maximum rainfall - southward of MT



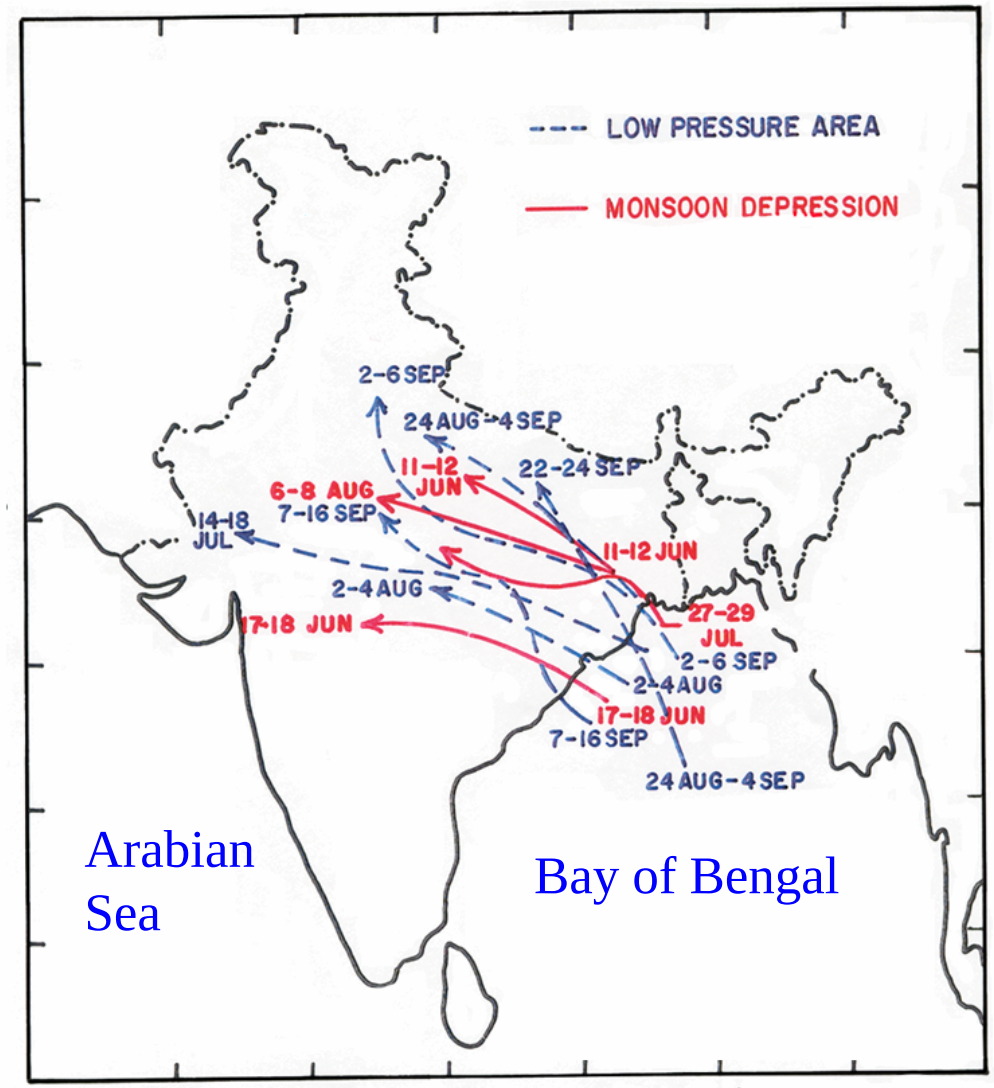
Summer monsoon rainfall over India (June-September)



Mean June–September rainfall over the Indian region south of 30 N

Rain mainly results from the propagation of Monsoon systems (lows & depressions)

Monsoon systems form over the surrounding North Indian Ocean & move over land



Observations – Rainfall results from Propagation of monsoon systems

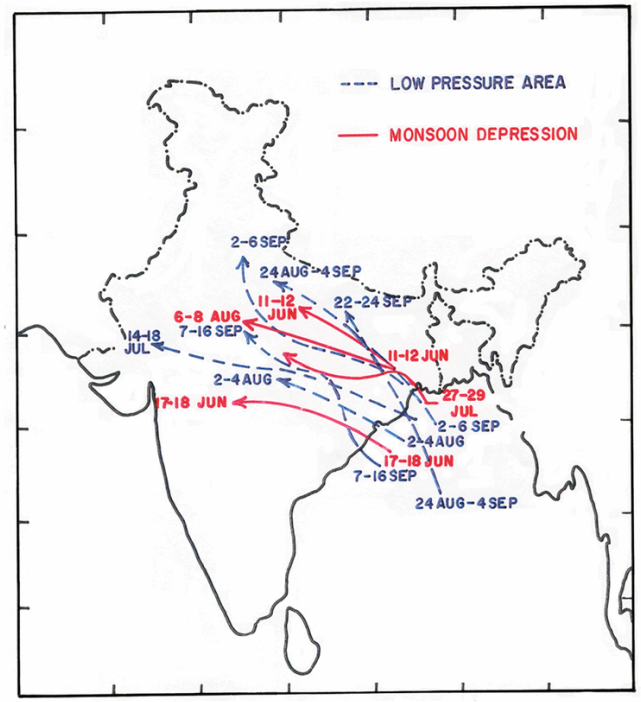
Models - unable to simulate this propagation in the monsoon zone

Monsoon rainfall simulation - Poor

CTCZ - ?

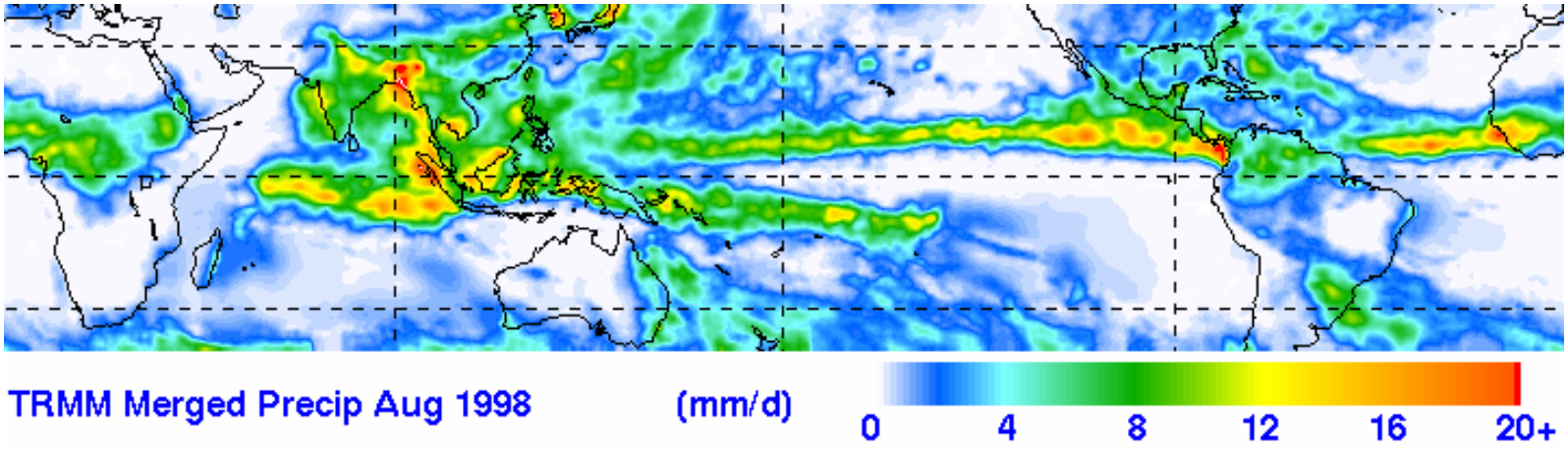
Can we understand the mechanism of propagation in nature?

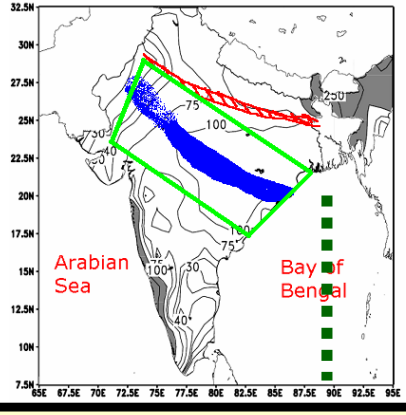
➡ **Better prediction of Monsoon rainfall**



Major Issues to be Addressed

- Clouds & Cloud systems
- Hydrological Feedbacks
- Aerosols (including along FH of Himalayas)
- Surface Fluxes
- Large scale Water & Energy balance
- Role of Equatorial IO on monsoon
- Diurnal & Intraseasonal variations





Observations include

- **Over land**

  AWSs (~200), Flux towers (~10),

  DW Radar network (IMD+IAF)~5-10

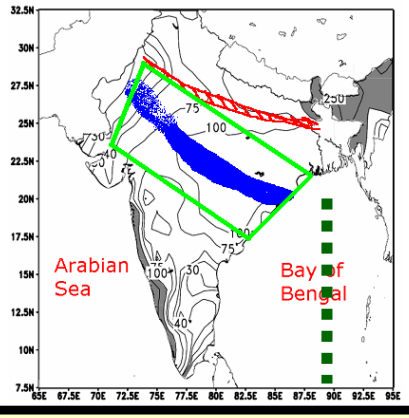
  Aerosol measurements (~10)

  High resolution GPS radiosondes (5-10)

  CCN & Cloud Microphysics

- **hydrology** **2 Water sheds (Eastern India, Hymalaya foothill)**
- **Ocean** **- 2 to 3 ships**

  buoy network (~90E line, 10S to 20N)



2008 - Pilot

- **Over land**
  - **AWSs (~25-50), SRGs ~100**
  - **Flux towers (~5)**
  - **DW Radar network ~3-4**
  - **Aerosol measurements (~10)**
  - **High resolution radiosondes (3-4)**
  - **CCN & Cloud Microphysics**
- **hydrology** **1 Water shed (Hymalaya foothill)**
- **Ocean** **- 1 ship**
  buoy network (~90E line)

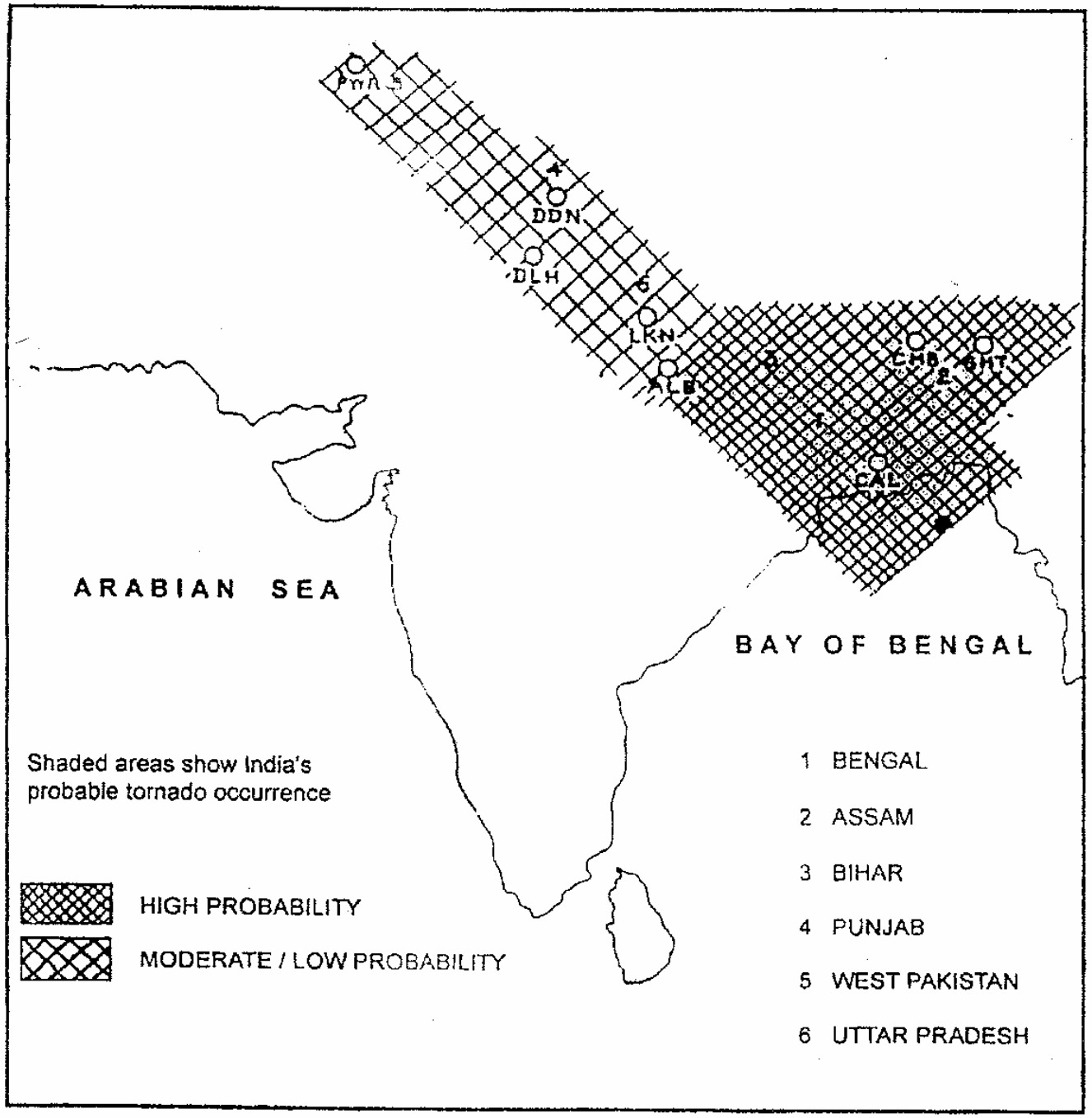
STORM Programe

Severe Thunderstorms – Observations & Regional Modeling

March – May (Pre-monsoon)

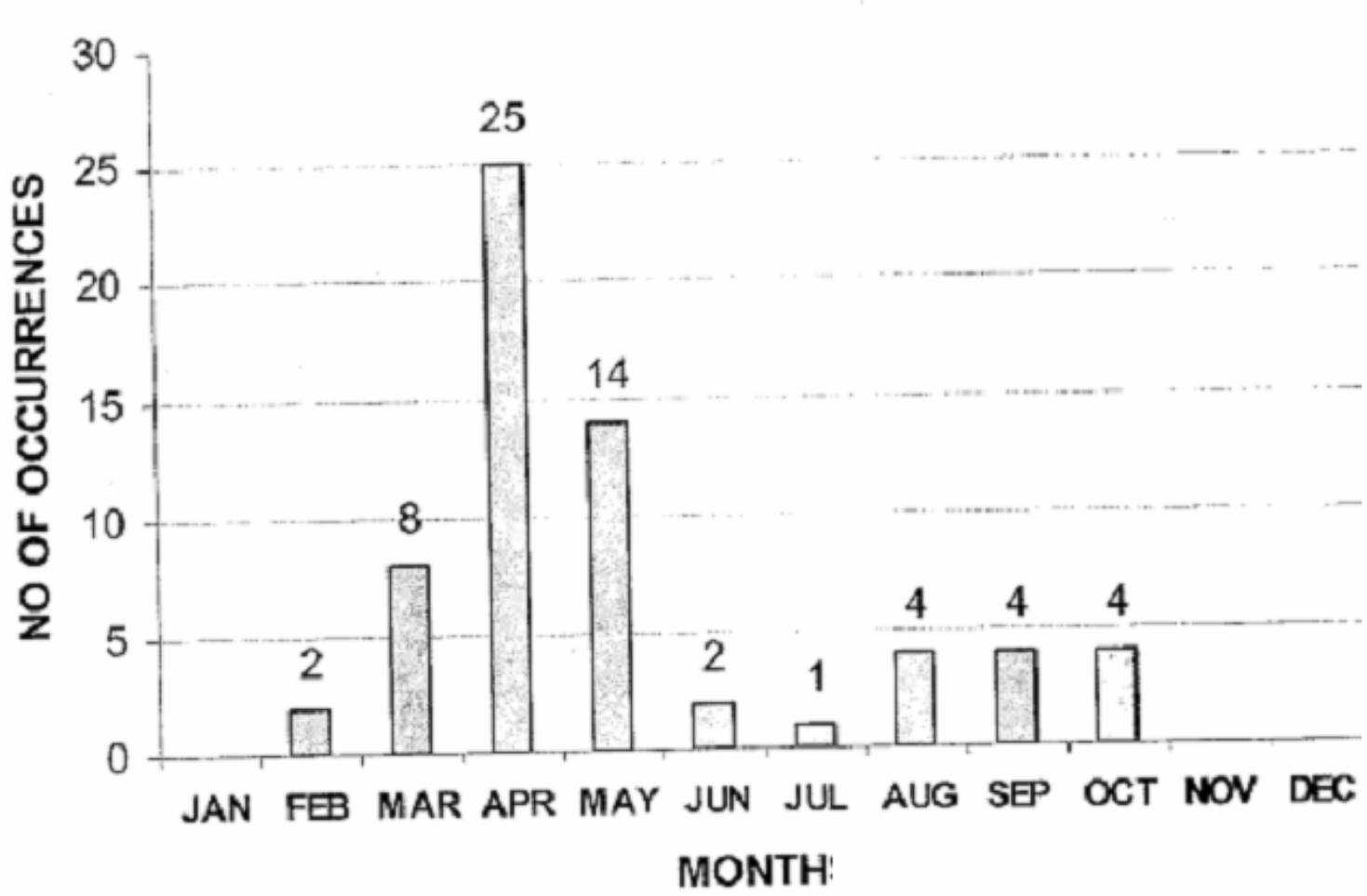
Severe Thunderstorms & Tornadoes

NW-SE traveling systems



Occurrence of Severe thunderstorms over India
Very frequent over Northeast India

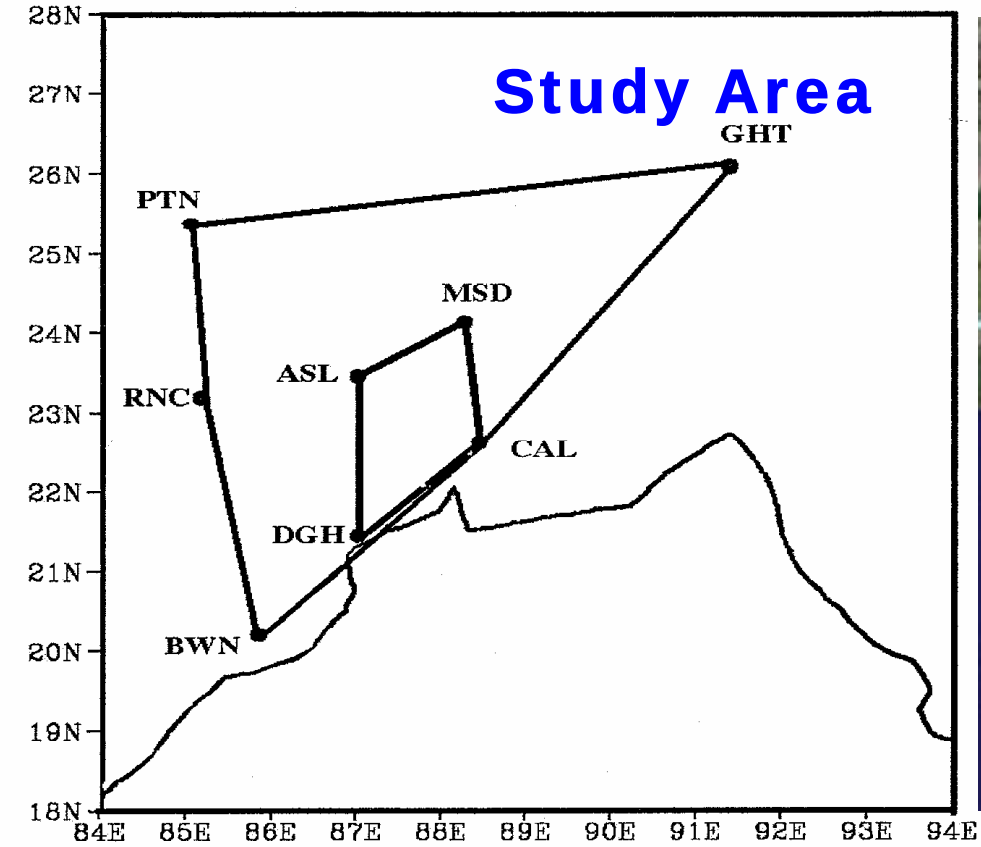
Cloud top exceeds 65000 feet!



Monthly Thunderstorm Occurrence

Peak: April-May

STORM: March-May



PILOT: 2006
Main : 2007-08

Radiosonde network
a. Mesoscale
b. Synoptic grid

AWSs ~ 40
Flux towers - 3
Cloud Electrical characteristics &
Lightning detectors ~ 10 locations
DWRs - 2

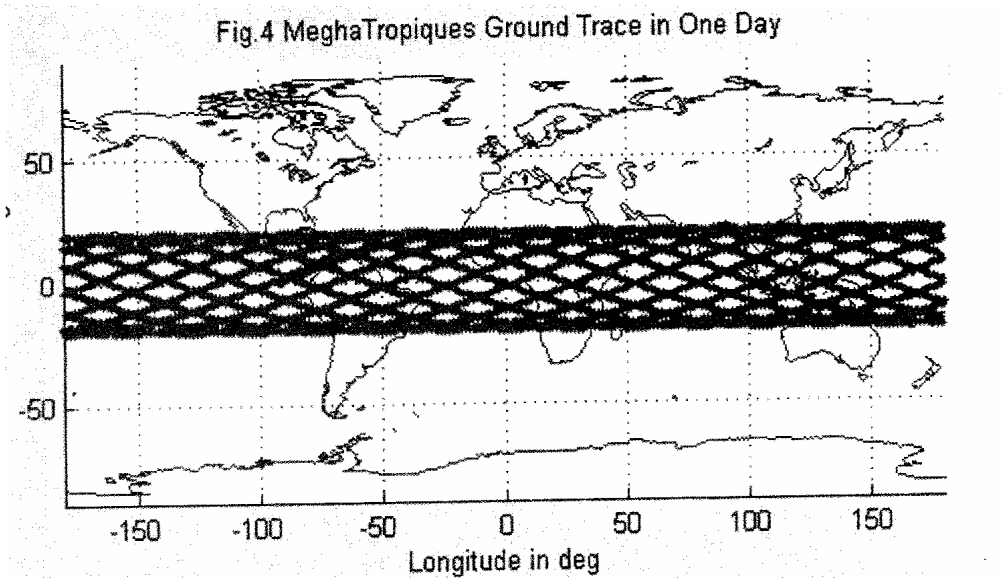
Megha-Tropiques:

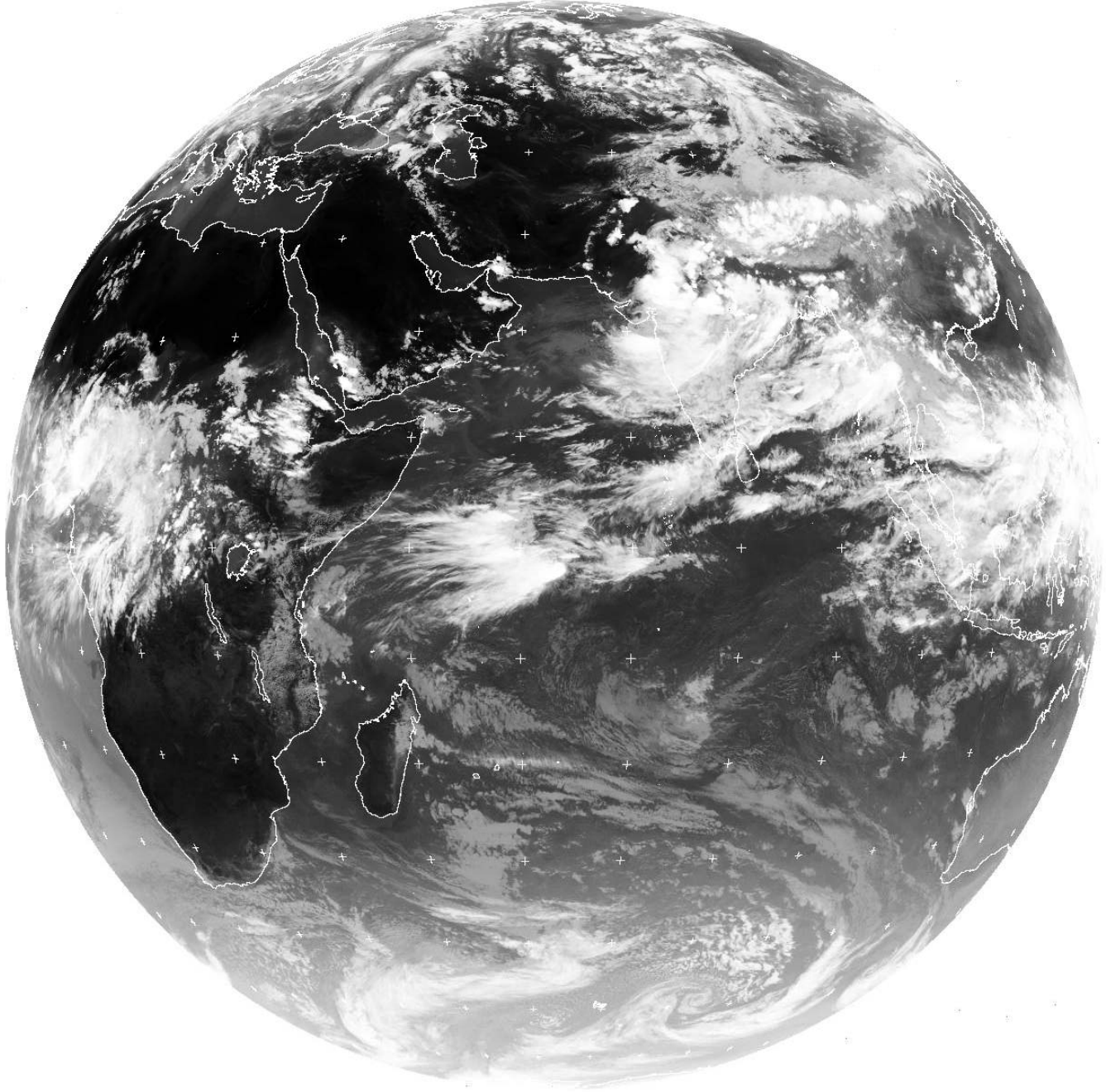
Satellite focusing on Tropical Clouds & Water

Indo-French Collaboration
Low inclination satellite (~TRMM)
Launch year – 2009

Payloads:

MADRAS (Microwave Analysis and Detection of Rain & Atmospheric Structures)
SAPHIRE: Microwave Humidity sounder & Radiometer
SCARAB:

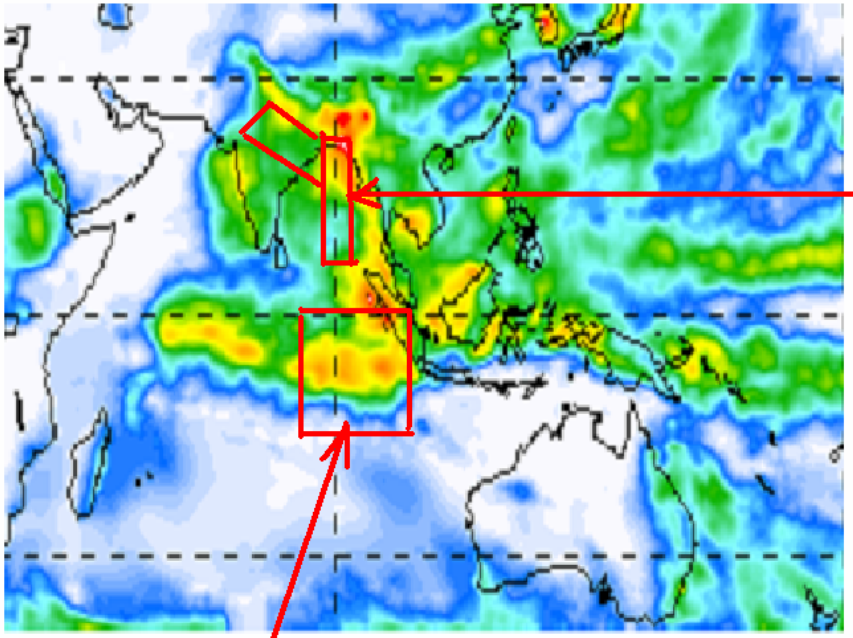




Indian Monsoon - Planetary Scale Circulation

Strong links with east Asia & west Pacific

MAHASRI Region very critical



India
(MoES)
(DST)

International
Collaboration

Weather knows no national boundaries

India is very keen to collaborate with other Asian countries in monsoon research

CTCZ & STORM: India's contribution to MAHASRI

Some data in 2008 but more extensive in 2009

Celebrating the Monsoon, July 24-28 2007

Indian Institute of Science Bangalore

http://caos.iisc.ernet.in