Continental Tropical Convergence Zone (CTCZ)

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Indian Climate Research Programme (ICRP)

- *CTCZ as a Component of Coupled Land-Ocean-Biosphere Atmosphere System under ICRP.*
- *Proposed for implementation in the Indo-Gangetic plain region of India.*

Objectives

- *To understand the coupled variability of the monsoon with a view to improve its predictability*
- *The role of land-surface processes and biosphere in monsoon variability and their coupling with the atmosphere.*
- Hydrological feed-backs in the monsoon environment on the atmosphere variability at river basin to watershed scales.

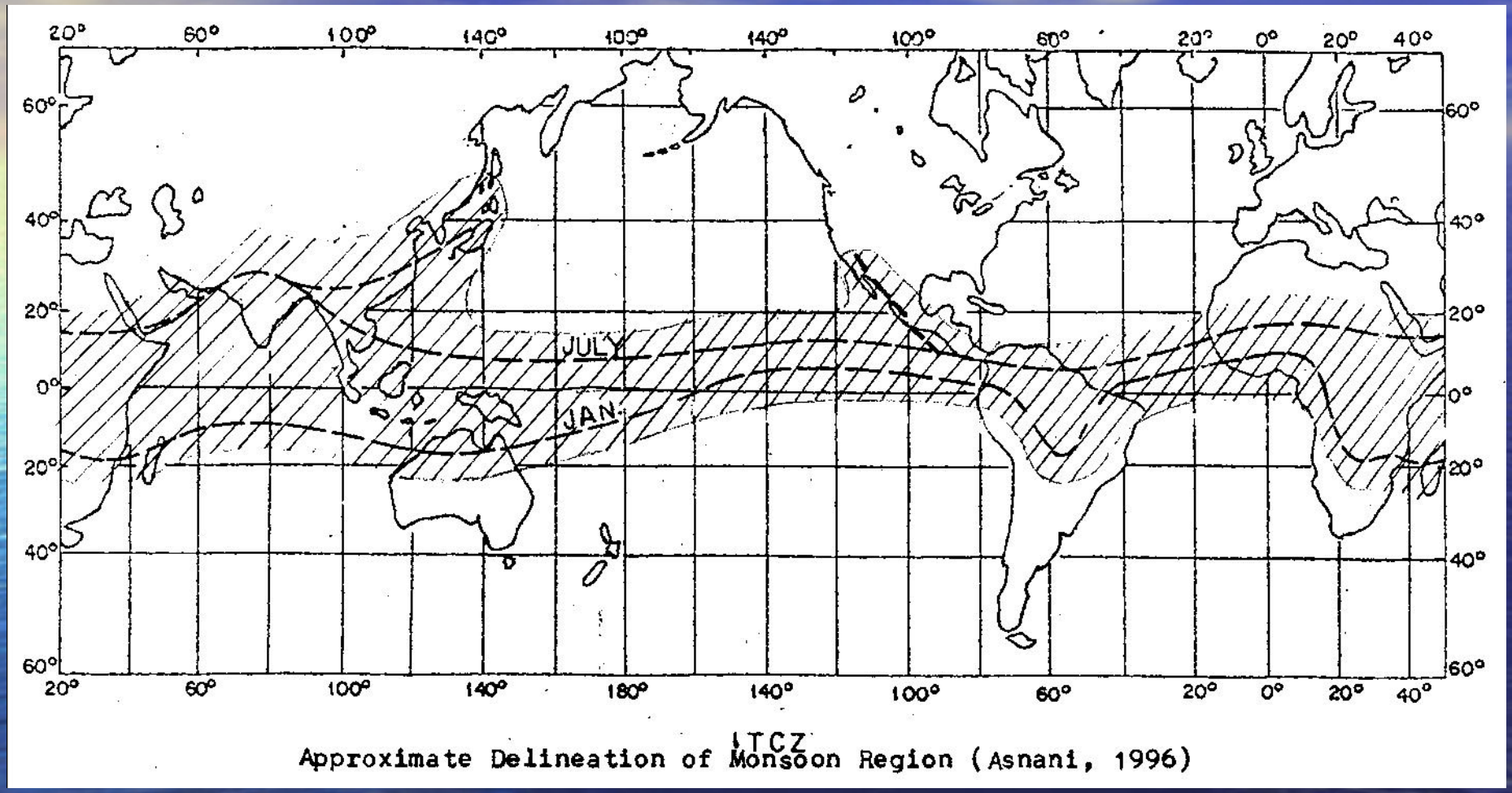
Contd….

- *Large scale dynamics of the atmosphere and its modelling*
- *Mesoscale organization of the rainfall within the large-scale flow.*
- *Organization of cloud systems and development of cloud resolving models.*
- *The role of ocean, coastal zones and atmosphere on the sub-seasonal variability of the monsoon*
- *The possible role of natural and anthropogenic aerosols and chemical weather in the understanding of the monsoon physics.*

Features of CTCZ

- Part of ITCZ over Indian sub-continent
- Characterised by Marked shift over the continent
- Region of cyclonic vorticity/low level convergence
- Dry & wet spells associated with its oscillation
- Oceanic ITCZ over the region of warm SST

ITCZ positions



ITCZ

Approximate Delineation of Monsoon Region (Asnani, 1996)

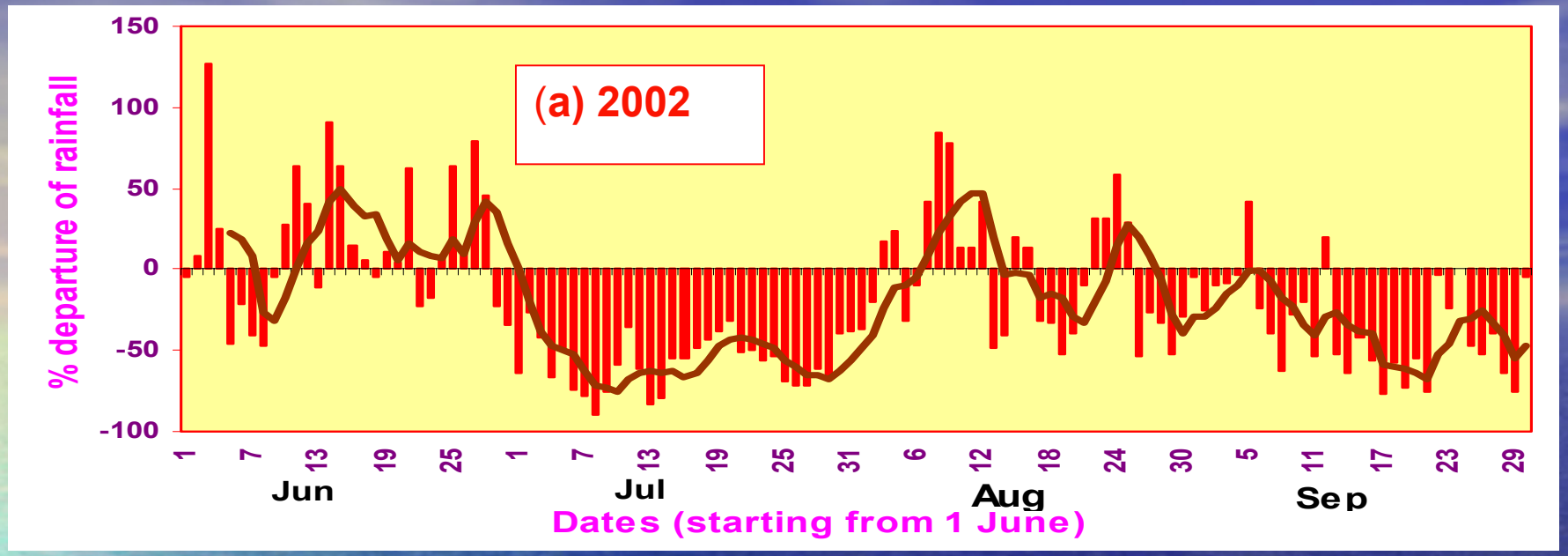
Need to Understand

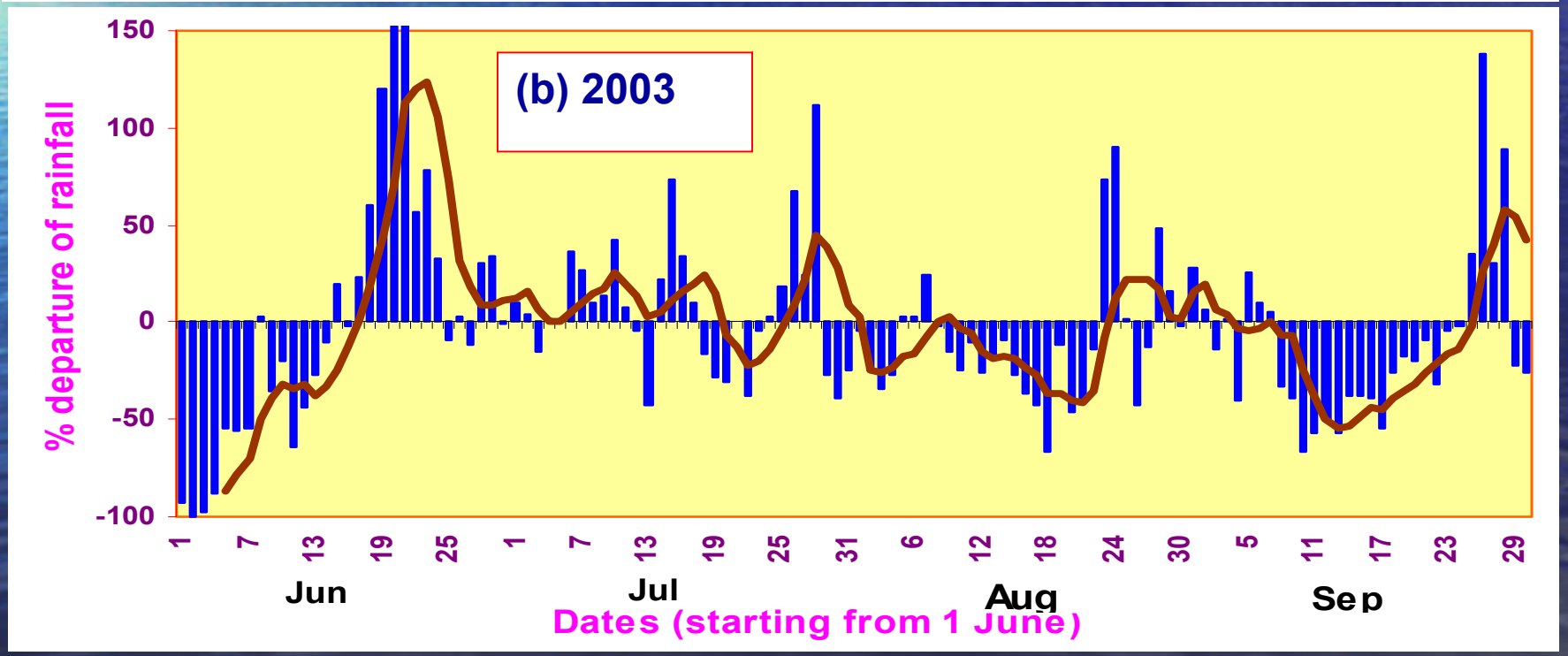
- On the intra-seasonal scale, the mechanisms that need to be understood are primarily concerned with the oscillations of monsoon trough (between the 'active' and 'weak' spells). The major questions, therefore, are:

  - How is the active phase maintained by successive generation of synoptic scale disturbances and their movement along the monsoon trough zone ? Or is it controlled by low frequency oscillation.

  - What are the factors that determine the durations of active and weak spells ?.

  - What are the spatial and temporal modes of active-weak transitions and what are the factors that govern them ?


(a) 2002
% departure of rainfall
150
100
50
0
-50
-100
1
7
13
19
25
1
7
13
19
25
31
6
12
18
24
30
5
11
17
23
29
Jun
Jul
Aug
Sep
Dates (starting from 1 June)


(b) 2003
% departure of rainfall
150
100
50
0
-50
-100
1
7
13
19
25
1
7
13
19
25
31
6
12
18
24
30
5
11
17
23
29
Jun
Jul
Aug
Sep
Dates (starting from 1 June)

Observational Network Proposed

- Additional Doppler Radar - At Patna/Ranchi, Delhi, Chandigarh, & Amritsar/Jammu.
- Micro-meteorological Towers – At Ranchi, Raipur, Delhi, Dehradun, Jodhpur & Anand
- Energy Balance compopnents over the vegetated, forested and croplands
- High resolution GP Sondes & Drop Sondes
- Micro-pulse Lidars
- Instrumented Aircrafts
- Moored Buoys in the Bay of Bengal & the Indian Ocean
- Additional ARGO buoys
- Meso-meteorological network with modern self recording rain gauges in the CTCZ region.

Summary

- Need to have dense observational networks along the CTCZ covering Sutlej-Beas -Jamuna-Ganga basins, which will help to understand the mechanism of its development and oscillations and also help improve understanding of representative monsoon processes.
- Improve understanding of linkage of equatorial Indian Ocean convection with CTCZ
- Assess the skill of current NWP models and improve simulation of large-scale monsoon rainfall.
- Need to generate and improve rainfall-runoff-stream flow on different scales using Hydrological models.

THANKS