Terrestrial and Oceanic Rainfall Linkage
- Monsoon Hydrology and Biogeochemistry

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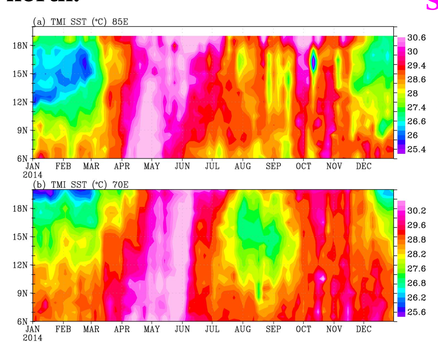
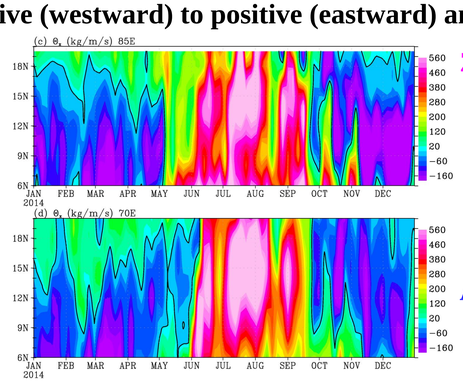
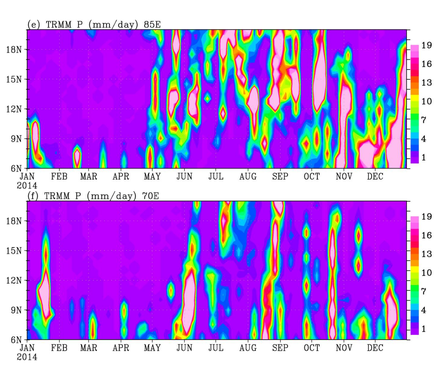
Summer monsoon associated with northward migration of convection

Summer monsoon onsets in both the Arabian Sea and the Bay of Bengal are preceded by the rise of sea surface temperature above deep convection threshold and the extension from the equatorial ocean up north.



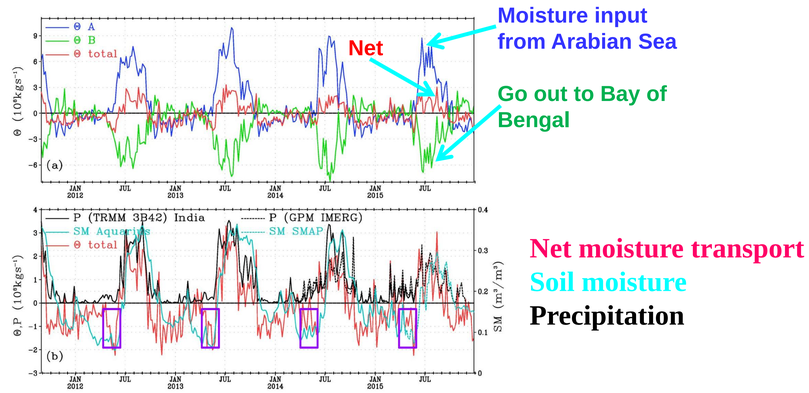
The temperature rise always proceeds the start of summer monsoon (southwest) wind, as represented by the change of the zonal component of the integrated moisture transport from negative (westward) to positive (eastward) and the start of rain.

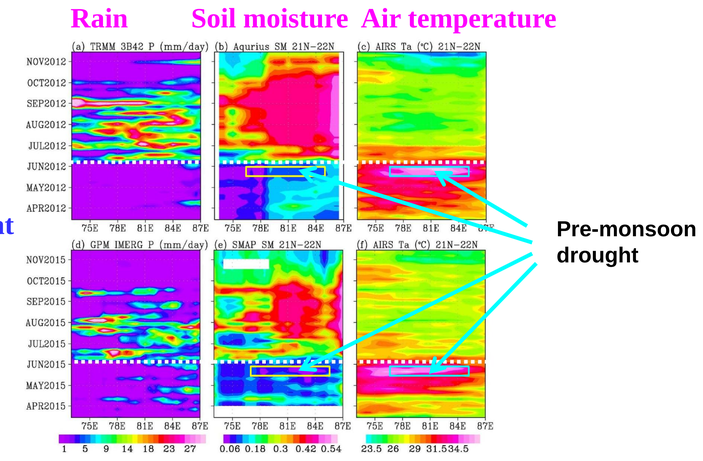


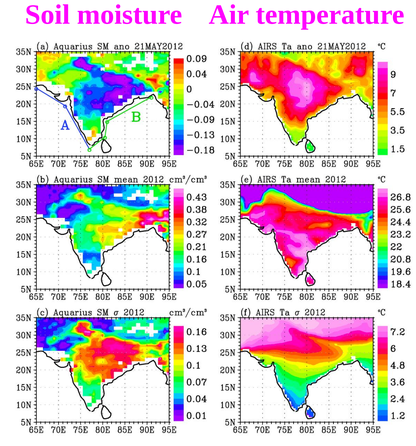


We reveal that the temperature, wind, and rain changes start earlier in the Bay of Bengal than in the Arabian Sea.

The time difference of summer monsoon onsets between the two coasts causes moisture being drawn out of the subcontinent to the Bay of Bengal before they could be replenished from the Arabian Sea.

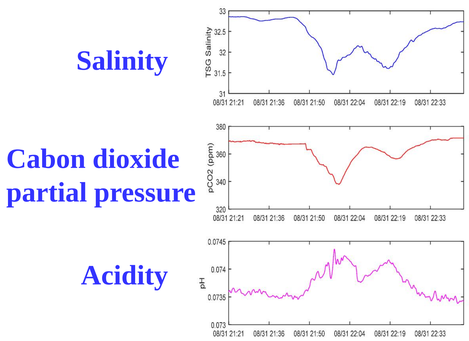






Geographical variation of drought and heat wave. (a) Soil moisture anomaly (deviation from annual mean) for the 5-day average from May 21-25, 2012, (b) annual mean of 2012, and (c) standard deviation of 2012. (d)-(f) are the same as (a)-(c), except for air temperature.

The 2-3 weeks of moisture deficit always coincides with the driest period in the central and eastern part of the subcontinent. There is report of suffering and death while people wait for monsoon rain every year.

Future Work – Ocean biogeochemistry influenced by rain

While the migration of ocean heat source influence monsoon onset, monsoon rain may change the biochemistry ocean at various scales. Here is an example of the instant response of salinity, carbon dioxide fagacity and pH (acidity) to 30 minutes of rain episode in SPURS-2 (courtesy of Julian Schanze and Eric Chan).