

Air-sea interaction in the Indian Ocean and its impact on climate variability over the Asian monsoon region.

The Indian monsoon directly affects the lives of over one billion people, providing almost 90% of the annual precipitation to the Indian subcontinent. Different mechanisms control the monsoon, air sea interaction of the surrounding oceans being one of them. Arabian Sea and Bay of Bengal on either sides of the Indian sub continent, though having similar features, behave differently and have distinct characteristics. Air-sea interactions in these basins are still under investigation and lots of features are yet to be explained.

Some domains I would like to explore in this study are

- ✍ How is the air-sea interaction in the Arabian Sea and Bay of Bengal carried out?
- ✍ How does this interaction affect the climate variability over the Asian monsoon region / Indian continent?
- ✍ Does the El Niño Southern Oscillation (ENSO) have any role on the air sea interaction in these two basins?

Availability of data from satellites like Tropical Rainfall Measuring Mission (TRMM) during recent years will help in this study to look into variabilities on all time scales from few days to interannual. TRMM Microwave Imager (TMI) observations are an ideal way to observe the interaction between Sea Surface Temperature (SST) and wind because both the parameters can be simultaneously retrieved. With the advent of new satellite based data, variability on low frequency timescales has also been found to interact with the monsoon system and affect the agricultural output from the Indian subcontinent. Recent studies have shown that variability in tropical Indian Ocean in subseasonal timescales link to a variety of shifts in weather patterns that affect humanity. The sub-seasonal monsoon rainfall variations of the monsoon are far larger than the differences from year-to-year and the timing and magnitude of the sub-seasonal variation is critical. All such variations linked to air sea interaction accounts to the state of agriculture and water resources. An emphasis is given to studying such low frequency variabilities over the two basins as few studies have been carried out on this issue due to the unavailability of data previously. I hope to look into these issues in the first year of my research.

Precipitation, outgoing long wave radiation, wind, ocean color and other available data can be used to study how the air sea interaction in the ocean results in the variability of weather pattern over the land. A physical explanation to the dynamics involved, which explains how variability of air-sea interaction in the ocean brings out variability in the monsoon over the land, is sought. It will help in knowing when during the summer active and break periods of monsoon occur and also which part of the large scale area would be above average, normal or below average. Explaining the monsoon and making it more predictable will surely help in bringing up a better life in the Indian subcontinent. Monsoon is also linked with other phenomenon such as ENSO and it is found to have impact on the evolution and changes in ENSO too. A revelation of how these systems work together will surely help in understanding the climate variability and how it affects the world environment on a large scale.

ENSO has found to have a detectable impact on the variability of air-sea interaction over the Indian Ocean and the climate variability over the Asian monsoon region. The role of ENSO on these interactions may also be studied along with this.