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Title: Importance of Ocean Atmospheric Coupling in the seasonal prediction of South Asian Monsoon
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Abstract:
The accurate prediction of monsoon in spite of its wide range of variability ranging from diurnal to multi-decadal is important for proper planning for socio-economic well-being of India and other South Asian countries. Lorenz (1969) had studied the weather predictability which is limited to about 2 weeks time. Many earlier works starting from Blanford (1884) suggested use of surface boundary conditions to predict the summer monsoon rainfall over India. Charney et. al., (1977), Shukla and Misra (1977), Shukla (1975) Hahn and Shukla (1976) Charney and Shukla (1981) point out the importance of boundary conditions at Earth's surface for the prediction of Monsoon Rainfall. All those earlier work were based on two tier modelling strategy where the atmosphere and the ocean are treated separately. Later Wang et. al., (2004) identified an important limitation of the two tier modelling strategy that SST anomalies in the Indian Ocean and the adjoint western pacific ocean are either forced by the atmosphere or evolve as a strongly coupled ocean atmosphere process. Both dynamics and thermodynamics may take part in this coupling process. Keeping these facts in mind the primary objective of this work is to Identify the regions of strong dynamic coupling between Ocean and Atmosphere related to the seasonal prediction of South Asian Monsoon.

Studies using the observational data and operational model output are not sufficient to understand the relative role of Ocean dynamics of different basins in forcing the interannual variability of South Asian Monsoon. The proposed studies are based on some sensitive experiments using CFSv2 model with some modification in the ocean-atmosphere coupler module by introducing a slab ocean to provide the SST while removing the ocean dynamics of a particular basin. The output from the sensitive run is then compared with the control run to isolate the sensitivity of ocean dynamics on the South Asian Monsoon. We have setup a sensitive experiment with some modification in the latest operational version of CFSv2 model. Climate forecast System version 2 (CFSv2) model would be used for this study. CFSv2, which is having GFS atmosphere part and MOM4 ocean part with dynamic sea ice and multilayer land components is one among the best model available for this kind of study. Coupling is the mechanism by which one component interact with another component within the ESMF. First of all we have to identify the key spots of strong involvement of ocean dynamics in coupling with the atmosphere. Inorder to identify the key regions of strong Ocean-atmosphere coupling two slab ocean, one of 50m uniform depth and another of monthly varying climatological mixed layer depth, both are forced in hourly time step with the atmospheric flux of the control run. Both slab oceans are having a time step of one hour intervel which is the time step of the CFSv2 coupler slow loop.
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