Impact of NTA SST on ENSO in a seasonal prediction model

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Recent studies researched that North Tropical Atlantic (NTA) sea surface temperature (SST) play a role in trigger of ENSO events. In this study, we investigate the impact of SST on ENSO events in seasonal prediction model. NCEP Climate Forecast System (CFS) is a seasonal forecasting model which has reforecasts data for 9 months from initial data. We use 20 ensembles for 27 years (1982 ~ 2008yr) and February initial data which integrate prediction from March to November (9 months). Before analyzing CFS data, we eliminate trend, seasonal cycle and ensemble mean. Same as preceding research, in CFS, there are positive anomalies during boreal spring (March-May, MAM) over the NTA and it brings Gill-type Rossby-wave response over the subtropical eastern Pacific which causes northerly flows with cold anomalous SST. Following month, easterly is over the western Pacific and westerly is over the eastern Pacific during boreal summer (the JJA season). From these, cold SST anomalies develop over the central Pacific like La Nina pattern. As mentioned above, CFS perform about ENSO prediction from NTA well. Even when CFS works well, there are NTA SST difference comparing with observation data. From NTA SST error, we calculate corrected NTA SST and verify that it is improved over the central Pacific on ENSO prediction.

Keywords: North Tropical Atlantic, CFS, ENSO, Seasonal prediction model

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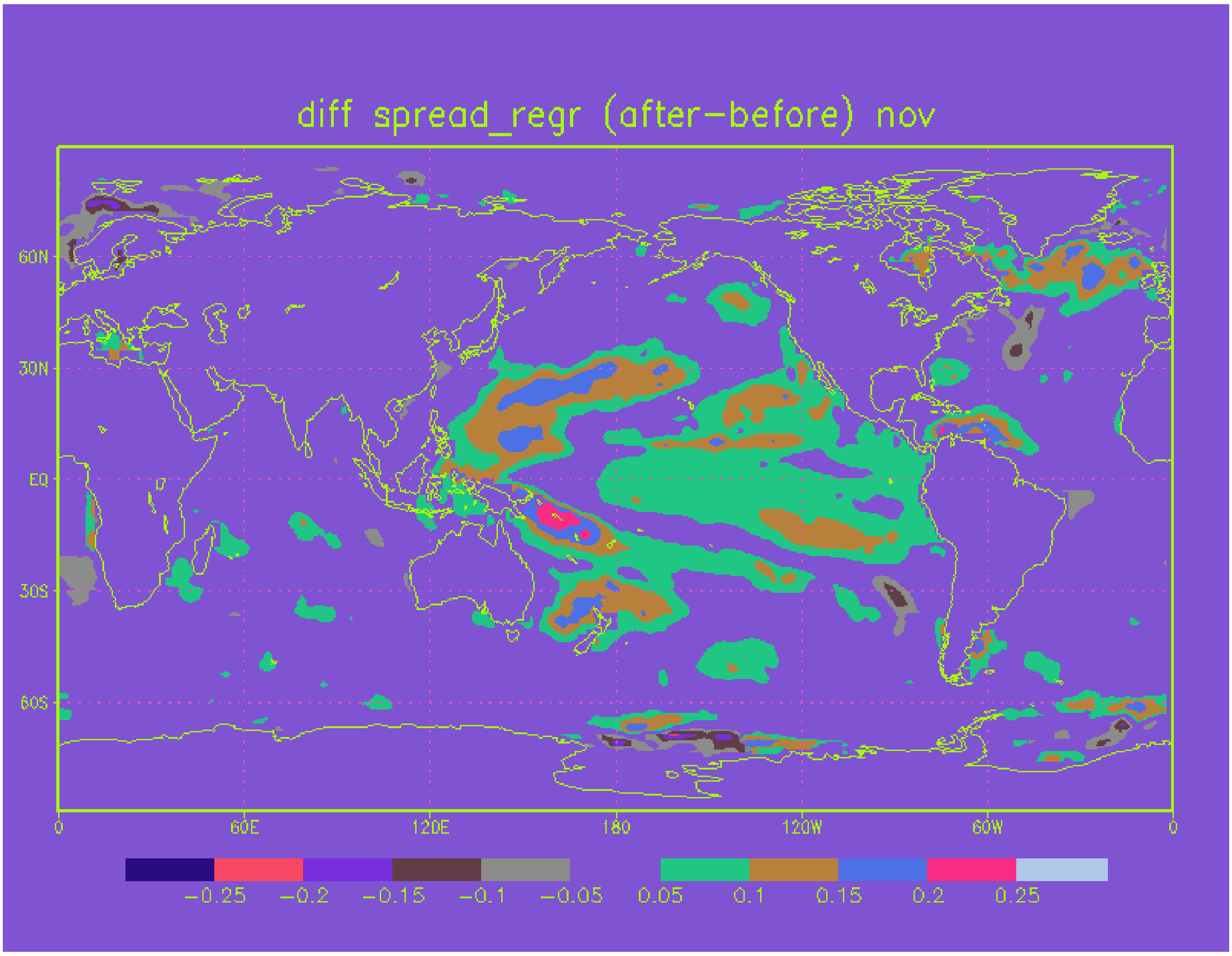

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On the influence of GCM biases on seasonal prediction skill in the tropical Atlantic

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The link between mean state biases and the ability of models to reproduce surface wind and precipitation anomalies in the tropical Atlantic is examined using customized sensitivity tests with the SINTEX-F general circulation model (GCM) and atmosphere-only experiments from the Coupled Model Intercomparison Project Phase 5 (CMIP5). The control experiment (CTRL) for the SINTEX-F sensitivity test is a run in which SSTs are strongly restored to the optimally interpolated (OI) sea-surface temperature (SST) for the period 1982-2014. In the sensitivity experiment, called "Atl_bias", the OI SST climatology is replaced with that of a 500-year free running control simulation with SINTEX-F. Thus the anomalies are the same as in OI SST but the climatology is that of the free-running coupled SINTEX-F model. Despite the substantial warm SST bias in Atl_bias the anomaly correlation coefficients (ACCs) of equatorial surface zonal wind and precipitation deteriorate only moderately, with some months even seeing an increase in ACC. Comparison of spatial patterns in CTRL and Atl_bias suggests that the ACC of surface zonal wind tends to increase where climatological precipitation does, regardless of whether the precipitation increase improves the bias or not. Atmosphere-only runs from the CMIP5 archive with prescribed SST warming patterns of about 4 K confirm that ACC is relatively robust to mean state SST changes. The results suggest that, in the context of atmosphere-only simulations, improving SST and precipitation biases does not necessarily improve the ACC of surface wind and precipitation. The root mean square error (RMSE), on the other hand, deteriorates significantly as warmer SST in the eastern tropical Atlantic engenders more vigorous convection and unrealistically high variability.

Keywords: GCM biases, tropical Atlantic, prediction skill

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Understanding the SST anomaly patterns in equatorial and southern Atlantic Ocean

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Several patterns of equatorial and South Atlantic Ocean (SAO) interannual sea surface temperature (SST) anomalies have been described: the equatorial Atlantic Niño and SAO dipole (SAOD) peak in boreal summer while the South Atlantic subtropical dipole (SASD) supposedly peaks in winter. Here we present the analysis observations showing that the Atlantic Niño, SASD and SAOD may largely represent one mode of ocean-atmosphere interactions reminiscent of the SAOD pattern most pronounced during summer. Indeed, summer is the only season in which the inverse correlations between the northern and southern poles of both the SAOD and SAOD are statistically significant. Heat budget calculations suggest that the interannual SST anomalies are primarily driven by heat flux anomalies and that the southern extratropics plays important roles. On the decadal time scale, a 12.5 yr marginal peak of the Atlantic Niño index appears mainly explained by the South Atlantic variability in context of the SAOD. Our results suggest that the SAOD may provide a framework for understanding large-scale and long-term SST variability in equatorial and southern Atlantic Ocean.

Keywords: Tropical Atlantic, South Atlantic, Climate prediction

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New Climate Warmed, Ocean-Atmosphere Interaction and their Effects on Extreme Events in North Atlantic

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Global Warming has now reached the energetic phase of H_2O's return to the ground after the saturation of the atmosphere in evaporation since the 80s and 90s of the last century, which were characterized by severe droughts, mainly in Africa.
This phase is the result of the accumulation of thermal energy exchanges in the Earth-Ocean-Atmosphere system that resulted in the thrust reversal of the energy balance toward the poles. This situation is characterized by a new thermal distribution: above the ocean, the situation is more in surplus compared to the mainland, or even opposite when the balance is negative on the land, and in the atmosphere, warm thermal advection easily reach the North Pole (planetary crests), as well as cold advection push deep into North Africa and the Gulf of Mexico (planetary valleys).
This "New Ground Energy Balance" establishes a "New Meridian Atmospheric Circulation (MAC)" with an undulating character throughout the year, including the winter characterized by intense latitudinal very active energy exchanges between the surplus areas (tropical) and the deficit (polar) on the one hand, and the atmosphere, the ocean and the continent on the other.
The excess radiation balance increases the potential evaporation of the atmosphere and provides a new geographical distribution of H_2O worldwide: the excess water vapor is easily converted by cold advection (polar vortex) to heavy rains that cause floods or snow storms that paralyze the normal functioning of human activities, which creates many difficulties for users and leaves damage and casualties, but ensures water availability missing since a long time in many parts of the world, in Africa, Europe and America.
The new thermal distribution reorganizes the geography of atmospheric pressure: the ocean energy concentration is transmitted directly to the atmosphere, and the excess torque is pushed northward. The Azores anticyclone is strengthened and is a global lock by the Atlantic ridge at Greenland, which imposes on the jet stream a positive ripple, very strongly marked poleward, bringing cosmic cold advection of polar air masses winter over from Europe to North Africa. Hence the enormous meridian heat exchanges north-south, and south-north.
This new spatial thermal provision therefore imposes on the jet-stream a positive ripple on the North Atlantic (Greenland) and eastern Pacific (Alaska); this is the cause of the heat and drought of California, followed by negative waves in eastern US, and Europe.
This is the "New Atmospheric Circulation" predominantly "Meridian", due to the "New Climate" caused by Global Warming.

Keywords: New Climate, Warmed Climate, New Meridian Atmospheric Circulation (MAC), North Atlantic, Global Warming

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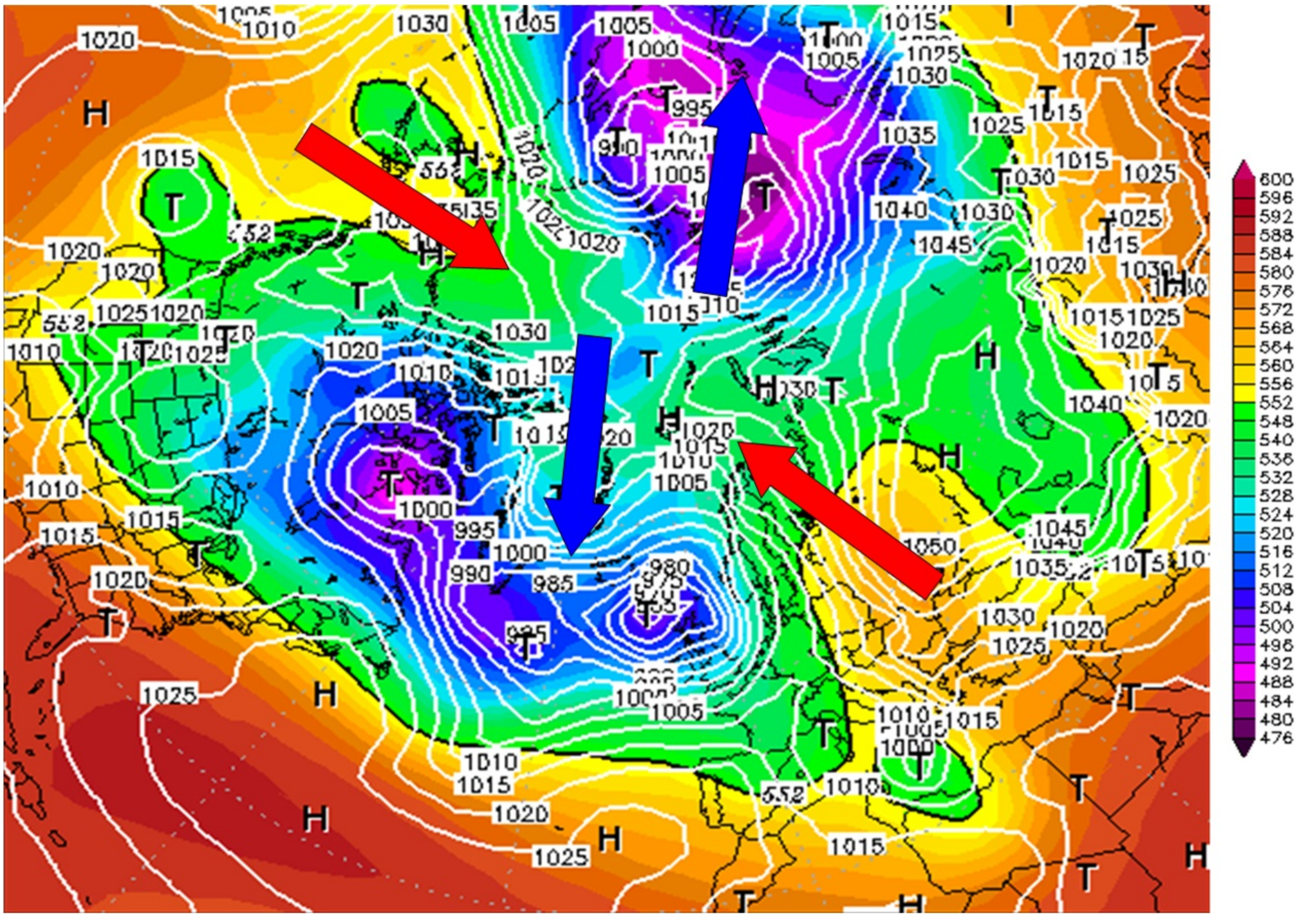

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