Geophysical Research Abstracts
Vol. 20, EGU2018-6636, 2018
EGU General Assembly 2018

Predicting Tropical Atlantic Sea Surface Temperature in the Kiel Climate Model with different atmosphere model resolutions

Xuewei Li (1,2), Mojib Latif (1,3), Wonsun Park (1), and Jan Harlaß (1)

(1) GEOMAR Helmholtz Centre for Ocean Research Kiel, Kiel, Germany, (2) Physical Oceanography Laboratory, Ocean University of China, Qingdao, China, (3) Excellence Cluster "The Future Ocean" at Kiel University, Kiel, Germany

The Tropical Atlantic features among others variability similar to the El Niño/Southern Oscillation (ENSO) but with weaker amplitude. In contrast to ENSO, climate models fail to realistically simulate the ENSO-like variability in the Tropical Atlantic due to model bias. We analyse patterns of Tropical Atlantic air-sea interaction and quantify seasonal predictability of sea surface temperature anomalies (SSTAs) in the Kiel Climate Model (KCM) using the linear inverse model (LIM) approach. The role of atmosphere model resolution with regard to the Tropical Atlantic surface wind and SST biases, and the impact of enhancing the Tropical Atlantic climatology on forecast skill is systematically explored.

In perfect model experiments, i.e. when predicting the model SSTAs, there is significant skill over much of the tropical Atlantic at lead times of one to two seasons and up to three seasons in the western Tropical Atlantic for forecasts initialized in boreal summer and fall. In contrast, the predictions of SSTAs in the eastern equatorial Atlantic (ATL3 region) are most skilful when initialized in boreal spring. The LIM-based forecasts are more skilful than persistence over many regions. Overall, we find that skill in predicting Tropical Atlantic SSTAs is enhanced when using high resolution in the atmospheric component of the KCM compared to a version employing coarse atmospheric resolution.

When predicting observed SSTAs over the period 1961-2016, the skill of the LIM derived from observations and the two KCM versions is rather limited. In the ATL3 region, the KCM version employing high atmospheric resolution depicts skill comparable to the LIM derived from observations and the skill is systematically higher skill that in the version with coarse atmospheric resolution. The latter can be traced back to enhanced representation of ENSO-like dynamics in the KCM version with higher atmospheric resolution.