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Wind Stress-Induced Multiyear Predictability of Annual Sea Surface Temperature Anomalies in the Extratropical North Atlantic

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Predictability of sea surface temperatures (SSTs) in the North Atlantic on timescales on several years and beyond is commonly attributed to buoyancy-forced changes of the Atlantic Meridional Overturning Circulation and associated poleward heat transport.

We examine the role of the wind stress anomalies in decadal hindcasts for the prediction of annual SST anomalies in the extratropical North Atlantic. A global climate model (KCM) is forced by ERA-interim wind stress anomalies over the period 1979-2017. The resulting climate states serve as initial conditions for decadal hindcasts.

We find significant skill in predicting annual SST anomalies over the central extratropical North Atlantic with anomaly correlation coefficients exceeding 0.6 at lead times of 4 to 7 years. The skill of annual SSTs is basically insensitive to the calendar month of initialization. We suggest that this skill is linked to a gyre-driven upper-ocean heat content anomaly that leads anomalous SSTs by several years.

Furthermore, another set of model experiments, employing a freshwater flux correction, will be assessed. Freshwater flux correction has been shown to improve the model's mean state of North Atlantic surface properties and of the circulation. We will address the potentially improved predictability and underlying mechanisms.