

Team MIROC: Multi-year predictability of tropical Atlantic climate variability

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Rainfall variability associated with changes in position and strength of the Atlantic intertropical convergence zone (ITCZ) under the global warming has large impacts on agriculture, water resources, and flood risk management over the equatorial Atlantic and the surrounding continents. Changes in the Atlantic ITCZ are caused by internally generated variability in the coupled ocean-atmosphere system and external forcing such as global warming. Using an atmospheric general circulation model thermodynamically coupled with a simple ocean model, previous studies achieved successful predictive skills for tropical Atlantic rainfall at lead time less than one year, but they neglected the influence from the anthropogenic global warming. Here we perform ensemble hindcast experiments for the past half century using a state-of-the-art climate model with natural and anthropogenic forcings. Our hindcasts greatly enhance predictive skills in tropical Atlantic sea surface temperature (SST) variability and the related change in Atlantic ITCZ migration up to three years in advance. The long-term predictability over the tropical Atlantic can be exploited to improve rainfall and tropical cyclone forecasts.