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The Influence of Atlantic Warm Pool on panhandle Florida sea breeze

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In this paper we examine the variations of the boreal summer season sea breeze circulation along the Florida panhandle coast from relatively high resolution (10km) regional climate model integrations. The 23 year climatology (1979-2001) of the multi-decadal dynamically downscaled simulations forced by the National Centers for Environmental Prediction-Department of Energy (NCEP-DOE) Reanalysis II at the lateral boundaries verify quite well with the observed climatology. The variations at diurnal and interannual time scales are also well simulated with respect to the observations. We show from composite analyses made from these downscaled simulations that sea breezes in northwestern Florida are associated with changes in the size of the Atlantic Warm Pool (AWP) on interannual time scales. In large AWP years when the North Atlantic Subtropical High becomes weaker and moves further eastward relative to the small AWP years, a large part of the southeast US including Florida comes under the influence of relatively strong anomalous low level southerly flow and large-scale subsidence consistent with the theory of the Sverdrup balance. This tends to suppress the diurnal convection over the Florida panhandle coast in large AWP years. This study is also an illustration of the benefit of dynamic downscaling in understanding the low frequency variations of the sea breeze.