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The Influence of El Nino on the Upper-Ocean Circulation in the Tropical Atlantic in an Ocean General Circulation Model and Recent Ocean State Estimates

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Insight into interannual variability in the Tropical Atlantic in recent ocean state estimates is given with the focus on the shallow subtropical-tropical meridional overturning circulation and its connection to the Pacific ENSO phenomenon. Equatorial upwelling, poleward Ekman transport, off-equatorial subduction, and subsurface return flow form Subtropical and Tropical Cells (STCs and TCs) which are 3-dimensional in space and highly variable in time. Wind induced changes in the zonally integrated transport of the shallow cells reveal a distinct relation to local SST variability in the east equatorial Atlantic basin in both the ocean state estimates and a recent study with an ocean general circulation model (OGCM). Weak (strong) cell transport in either hemisphere coincides with warm (cold) SST anomalies in the Atlantic Nino region. On the interannual scale, significant correlation between SST and shallow cell variability is confined to 5 degrees about the equator, which is the extent of the TCs. Transport changes in the shallow overturning in the northern and southern Tropical Atlantic in relation to SST variability in the Pacific Nino region are accompanied by a phase locking with the seasonal cycle. Regression analysis reveals strong cell transport together with warm ENSO events and vice versa, with pronounced correlation between El Nino and northern (southern) TC variability in boreal summer (spring) suggested by both the ocean state estimates and the OGCM.