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Synchronous Decadal Climate Variability in the Tropical Central Pacific and Tropical South Atlantic

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The El Niño-Southern Oscillation (ENSO), the strongest interannual climate signal, has a large influence on remote sea surface temperature (SST) anomalies in all three basins. However, a missing map piece in the widespread ENSO teleconnection is the Equatorial Atlantic, where the ENSO footprint on local SST is less clear. Here, using reanalysis data and partially coupled pacemaker experiments, we show that the tropical Pacific SST anomalies, manifested as a Central Pacific (CP) ENSO-like structure, synchronize the tropical South Atlantic (40°W-10°E, 15°S-0°) SST anomalies over the last seven decades, but on a quasi-decadal (8-16 year) timescale. Such a decadal connection is most evident during the boreal spring-summer season, when the CP ENSO-like decadal SST anomalies induce a cooling of the South Atlantic SSTs through atmospheric teleconnections involving both Southern Hemisphere extratropical Rossby waves and equatorial Kelvin waves. The resulting subtropical South Atlantic low-level anticyclonic circulation and easterlies at its northern flank cause local ocean-atmosphere feedback and strengthen the Pacific-to-Atlantic teleconnections. In contrast, the concurrent tropospheric temperature teleconnection is less destructive to the above Atlantic SST response due to the weaker and more west decadal Pacific SST anomalies compared to the interannual ENSO counterpart. Pacific-driven coupled simulations reproduce key observational features fairly well, while parallel Atlantic-driven simulations show little forcing into the Pacific. Our results show that the tropical Central Pacific is an important source of decadal predictability for the tropical South Atlantic SST and the surrounding climate.