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Several studies have indicated a teleconnection between the boreal summer Atlantic Niño (ATL3: 3°S-3°N, 0°-20°W) and the subsequent Pacific El Niño Southern Oscillation (ENSO) when the Atlantic leads the Pacific by about 6-month. It has been shown that this teleconnection, which involves the Walker circulation, is strong during the first and last decades of the twentieth century. We show that a second Atlantic Niño in boreal fall/early winter (October-December, hereinafter called winter Atlantic Niño) is also negatively connected with the following year ENSO (Niño3: 5°S-5°N, 90°W-150°W), with a multidecadal modulation of the lead time. The nearly 1-year leading influence of the winter Atlantic Niño on ENSO is strong in the mid-twentieth century, i.e., when the summer Atlantic Niño is weakly correlated with ENSO. This connection leads to early development of ENSO and widely coincides with the high persistence of the Atlantic Niño from summer to winter. On the other hand, previous studies have shown a close connection between the summer Atlantic Niño and the South Atlantic Ocean Dipole (SAOD), where the SAOD is defined as the difference of the sea surface temperature anomalies averaged within the northeastern pole (NEP: 0°-15°S, 10°E-20°W) and the southwestern pole (SWP: 25°S-45°S, 10°–60°W). Interestingly, in boreal summertime, the NEP and the SWP are significantly negatively correlated during the first and last decades of the 1905-2018 study period and weakly correlated in the mid-twentieth century. These results also indicate that the persistence of the Atlantic Niño from summer to winter should be related to the association between the NEP and the SWP in the south Atlantic Ocean. Our study suggests the relevance of the south Atlantic Ocean variability for the ENSO teleconnection and predictability.
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