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Surface chlorophyll-a concentration (CHL-a) remotely observed by satellite shows a marked seasonal and interannual variability in the Tropical Atlantic, with potential consequences on the marine trophic web. Seasonal and interannual CHL-a variability peaks in boreal summer and shows maxima in the equatorial Atlantic region at 10˚W, spreading from 0 to 30˚W. In this study, we analyze how the remotely-sensed surface CHL-a responds to the leading climate modes affecting the interannual equatorial Atlantic variability over the 1998-2018 period, namely the Atlantic Zonal Mode (AZM) and the North Tropical Atlantic Mode (NTA, also known as the Atlantic Meridional Mode). The AZM is characterized by anomalous warming (or cooling) along the eastern equatorial band. In contrast, the NTA is characterized by an interhemispheric pattern of the sea surface temperature (SST), with anomalous warm (cold) conditions in the north tropical Atlantic region and weak negative (positive) SST anomalies south of the equator. We show that both modes significantly drive the interannual Tropical Atlantic surface CHL-a variability, with different timings and contrasted modulation on the eastern and western portions of the cold tongue area. Our results also reveal that the NTA slightly dominates (40%) the summer tropical Atlantic interannual variability over the last two decades, most probably because of a positive phase of the Atlantic multidecadal oscillation. For each mode of variability, we analyze an event characterized by an extreme negative sea surface temperature (SST) anomaly in the Atlantic equatorial band. Both modes are associated with a positive CHL-a anomaly at the equator. In 2002, a negative phase of the NTA led to cold SST anomaly and high positive CHL-a in the western portion of the cold tongue, peaking in June-July and lasting until the end of the year. In contrast, in 2005, a negative phase of the AZM drove cool temperature and positive CHL-a in the eastern equatorial band, with a peak in May-June and almost no signature after August. Such contrasted year to year conditions can affect the marine ecosystem by changing temporal and spatial trophic niches for pelagic predators, thus inducing significant variations for fisheries and ecosystem functioning. A next step will be to diagnose such surface CHL-a variability with PIRATA CHL-a in situ time series using liquid chromatography procedure (HPLC-procedure).
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