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Editorial: The role of the South Atlantic on the interbasin and pole-to-pole connections

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Editorial on the Research Topic
The role of the South Atlantic on the interbasin and pole-to-pole connections

This Research Topic aimed to improve our understanding of the physical and biogeochemical processes linking the South Atlantic to other ocean basins and within the Atlantic as a whole through oceanic or atmospheric teleconnections. The South Atlantic plays an essential role in the climate of the adjacent continental areas and actively contributes to the Atlantic Meridional Overturning Circulation (AMOC), hence modulating the world's climate. The Atlantic, Pacific and Indian basins interact with each other in a two-way fashion, mainly through the tropics at the seasonal to multidecadal scales. Although not fully understood at present, the physical and biogeochemical processes involved in this interbasin interaction are essential to be addressed when we aim to increase our ability to predict the planet's weather and climate. The present volume of Frontiers in Marine Science contains ten original research articles put together by 42 different authors from 12 countries in Europe, the Americas, Asia and Africa. The articles represent state-of-the-art research aimed at understanding the variability and distributions of different properties and variables of the South Atlantic in different temporal and spatial scales. The study used *in situ* observations, satellite and modeling data and gave special attention to the characterization of the AMOC and its relations with the North Brazil Undercurrent (Liu et al., 2021), its sources and circulation pathways (Xu et al., 2022) and the feedback mechanisms between the AMOC's transport and the South Atlantic freshwater transports and content (Haines et al., 2022).

The papers by Bueno et al. (2022); Ioannou et al. (2022); Dossa et al. (2022) and Guerra et al. (2022), on the other hand, focused on the observation and characterization of ocean rings and eddies of the Atlantic Ocean, bringing relevant and new information, respectively, on the impact of these structures on the volume and heat transport within the North Brazil Current; the connectivity between eastern and western basins of the Atlantic; the role of the Atoll das Rocas

and Fernando de Noronha islands favoring eddy occurrence in the South Atlantic; and the transport of mode waters from the Cape Basin towards the Southwestern Atlantic through the Agulhas Leakage. The climate variability of the eastern Tropical Atlantic was studied by Roch et al. (2021), who, using Argo floats, determined a trend of warming and freshening of the oceans' mixed layer in the study area from 2006 to 2020. Koungue et al. (2021) investigated the 2019 Benguela Niño. The authors found that this event was generated by a combination of local and remote forcing in contrast to the more frequent, classical Benguela Niño events. Risaro et al. (2022) investigated the interannual variability and trends of the sea surface temperature in the southeastern Pacific and southwestern Atlantic oceans from 1982 to 2017, pointing out that regions north (south) of 50°S presented a warming (cooling) trend of about 0.4°C (−0.3°C) per decade.

This special issue widens our knowledge of the South Atlantic variability, which still falls behind other ocean basins. The authors used all existing observing systems in the South and Tropical Atlantic Ocean: PIRATA ocean-atmosphere mooring array, Argo and other autonomous drifting ocean sensors, and satellite products reprocessed over the last four decades. They also took advantage of up-to-date ocean and atmospheric reanalyzes and dedicated numerical simulations. Even though this special issue lacked papers that directly linked the Atlantic to other ocean basins on short scales, the contribution is of paramount importance and paved the way for new research. We expect that this special issue will inspire future generations of scientists interested in studying the South Atlantic and the role of the tropical and South Atlantic on interbasin climate variability in support of the Climate and Ocean – Variability, Predictability, and Change Program (CLIVAR).

Author contributions

All authors listed have made a substantial, direct, and intellectual contribution to the work and approved it for publication.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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