FAPESP DAY URUGUAY
November, 13-14th 2025

ANII AGENCIA NACIONAL DE INVESTIGACIÓN E INNOVACIÓN

FAPESP SÃO PAULO RESEARCH FOUNDATION

The South Atlantic Ocean: How our backyard influences the global ocean

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Instituto Oceanográfico da Universidade de São Paulo

- The ocean plays a pivotal role in regulating global climate and influencing climate change.
- The ocean's influence is global and interconnected, disregarding artificial boundaries.
- The South Atlantic Ocean is significantly undersampled...
- ...yet it profoundly affects the global climate.

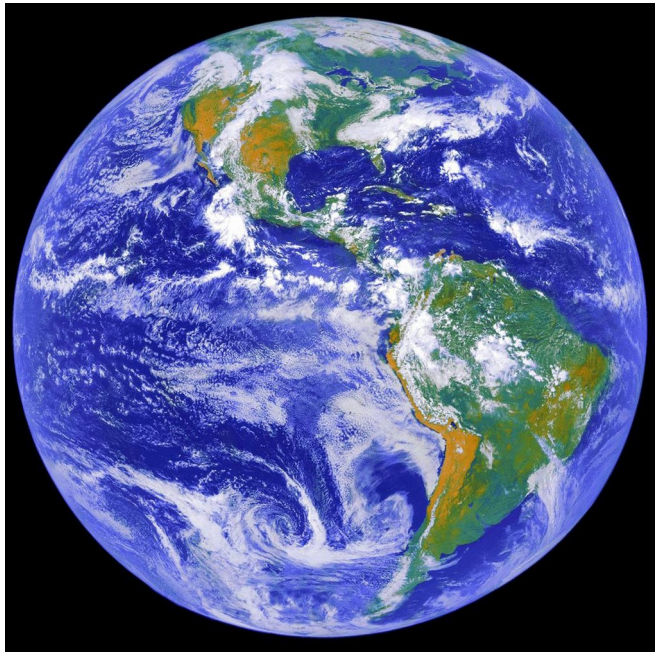
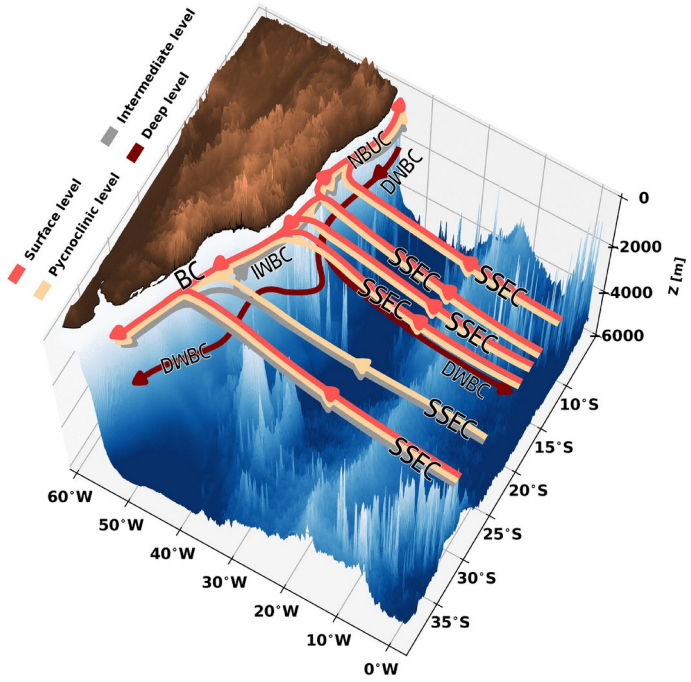


Photo taken by the Geostationary Operational Environment Satellite (GOES-8). Source: NASA (http://nasa.gov).

- The South Atlantic Ocean is characterized by a complex and dynamic current system that influences global oceanic circulation and regional climate patterns.
- Receives significant fluvial discharges from major water systems, including the Amazon, La Plata (or Rio de la Plata), and Congo rivers.
- Features a high population density in coastal and near-coastal regions, leading to intense anthropogenic pressure on marine ecosystems.
- For example, since fish stocks are transnational, they require coordinated sustainable management efforts.



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FAPESP Program PROASA South Atlantic and Antarctica

PROASA (Program for the South Atlantic Ocean and Antarctica)

Mission:

To contribute to the advancement of knowledge about the South Atlantic and Antarctica, and its application in addressing global crises and promoting sustainable development.

GOALS:

Promote strategic partnerships: Strengthen and promote strategic partnerships and integration with the private sector, third sector, and national and international governmental organizations to contribute to fostering PROASA's actions and the use of generated knowledge.

Foster scientific advances: Expand, diversify, qualify, and internationalize research, technology, and innovation, increasing visibility, competitiveness, and scientific, social, and economic impact.

Promote technological advances and innovation: Promote solution-oriented approaches, strengthening the development of transformative technologies and the application of knowledge to societal demands.

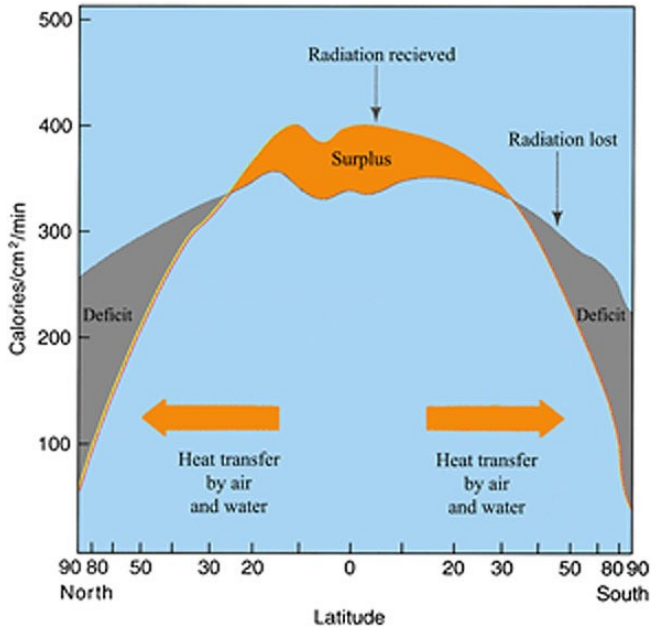
Develop human capital: Expand, diversify, and qualify human resources, strengthening internationalization and creating an attractive environment for young researchers in the state of São Paulo and a highly qualified workforce to overcome sustainability challenges.

Expand academic cooperation: Increase integration among institutions and research groups, strengthening participation in national and international inter- and transdisciplinary knowledge networks.

Strengthen infrastructure: Maintain, expand, modernize, and integrate research infrastructure considering a collaborative multi-institutional network of multi-user facilities.

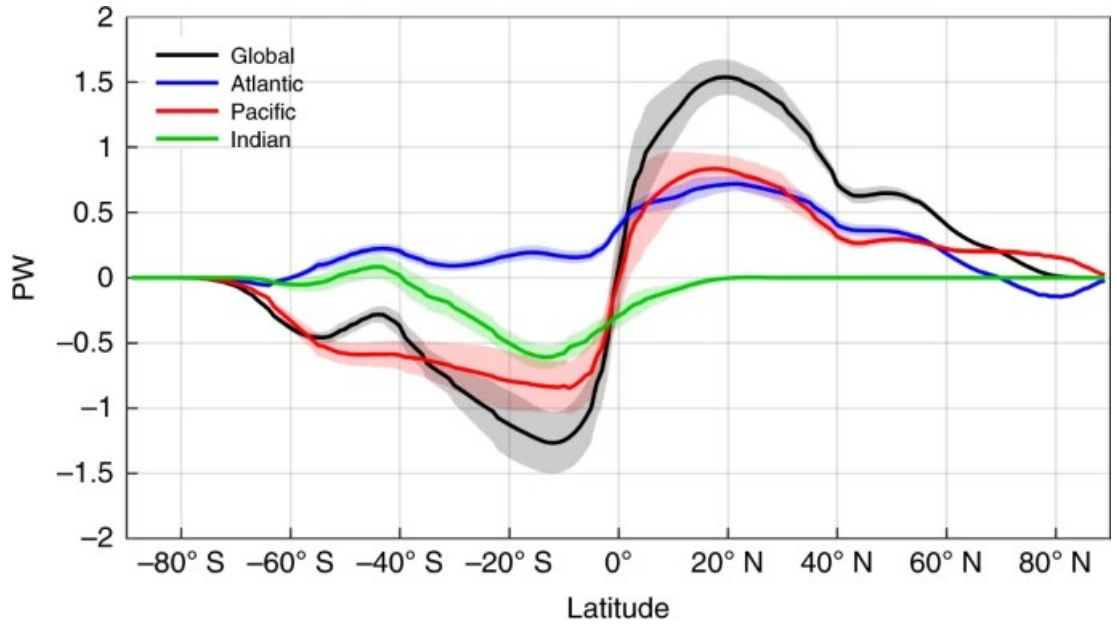
Promote knowledge dissemination: Expand society's understanding of the importance of the Ocean and Antarctica and their role in sustainability, promoting scientific outreach.

The ocean plays a major role in heat transport, advecting its excess in lower latitudes towards higher latitudes.



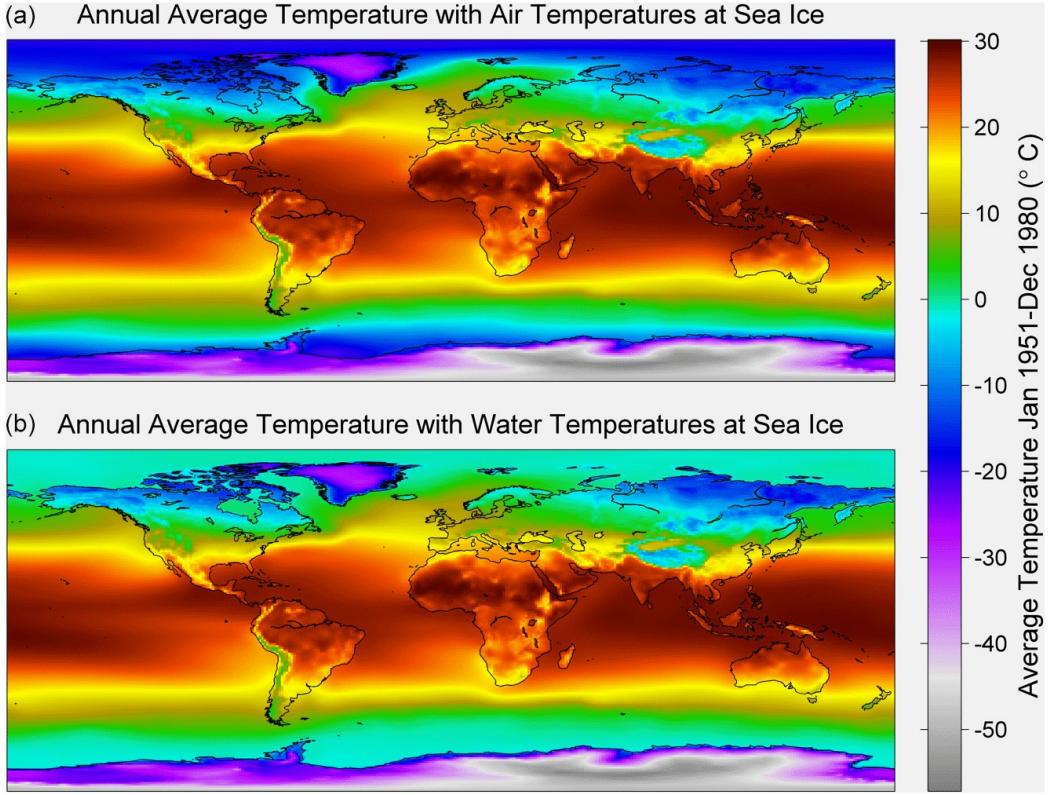
Faizal, M. and Rafiuddin Ahmed, M., 2011. On the ocean heat budget and ocean thermal energy conversion. International Journal of Energy Research, 35(13), pp.1119-1144.

Ocean Heat Transport by latitude



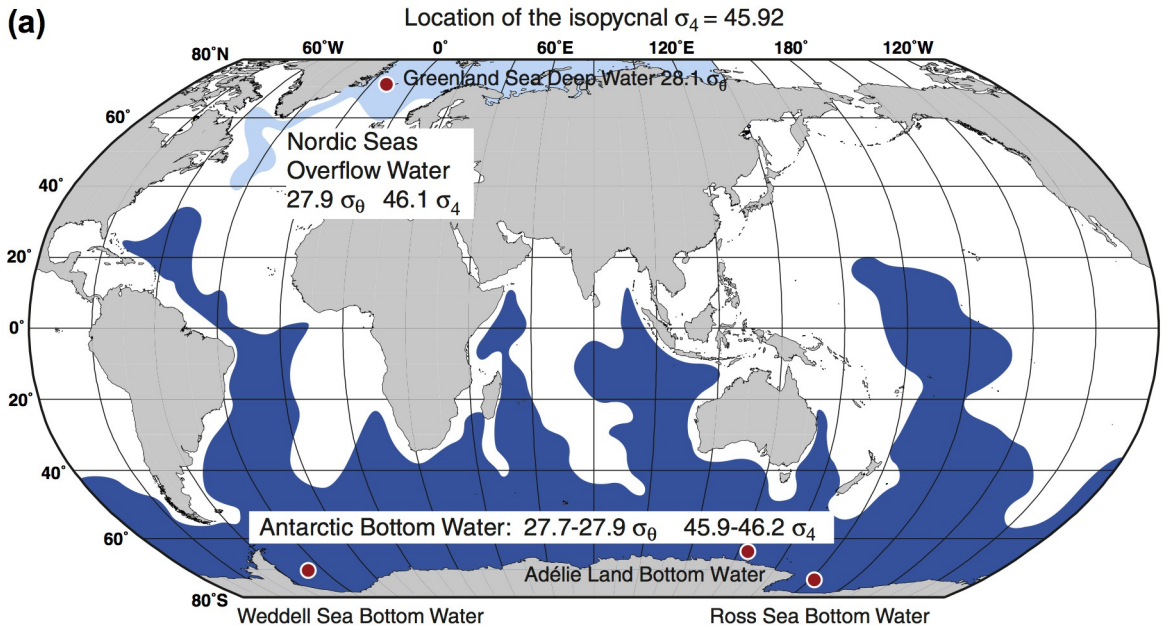
Forget, G. and Ferreira, D., 2019. Global ocean heat transport dominated by heat export from the tropical Pacific. Nat. Geosci., 12, 351–354

Sea Surface Temperature



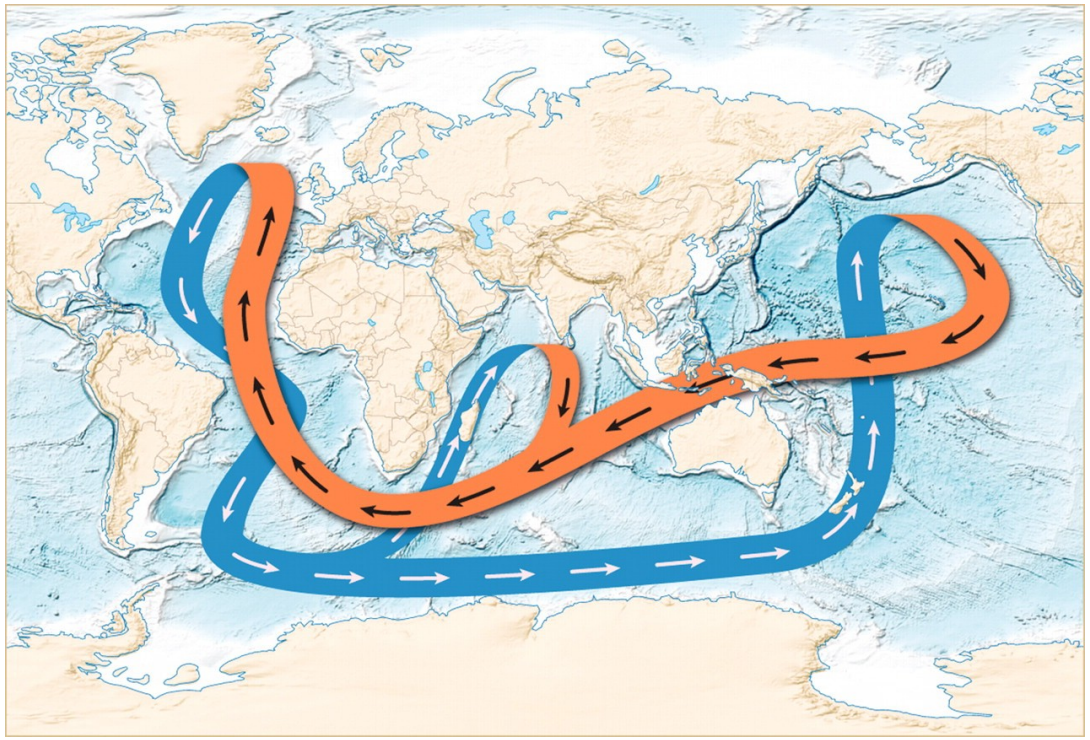
Rohde, R.A. and Hausfather, Z., 2020. The Berkeley Earth land/ocean temperature record. Earth System Science Data Discussions, 2020, pp.1-16.

Deep water



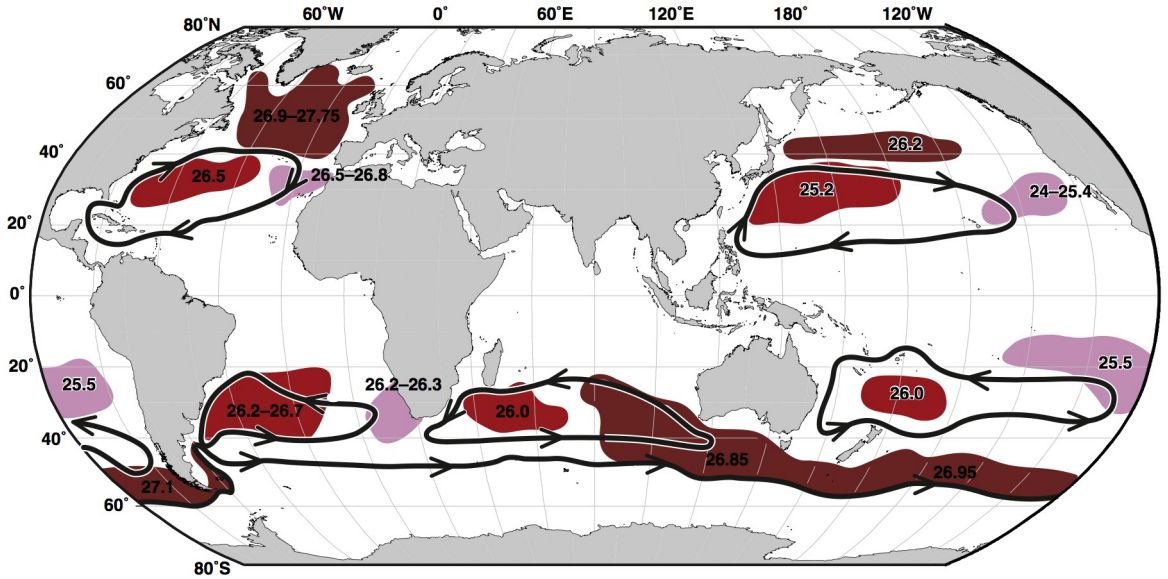
Talley, L.D., 2011. Descriptive physical oceanography: an introduction. Academic press.

Ocean Conveyor Belt (Meridional Overturning Circulation)



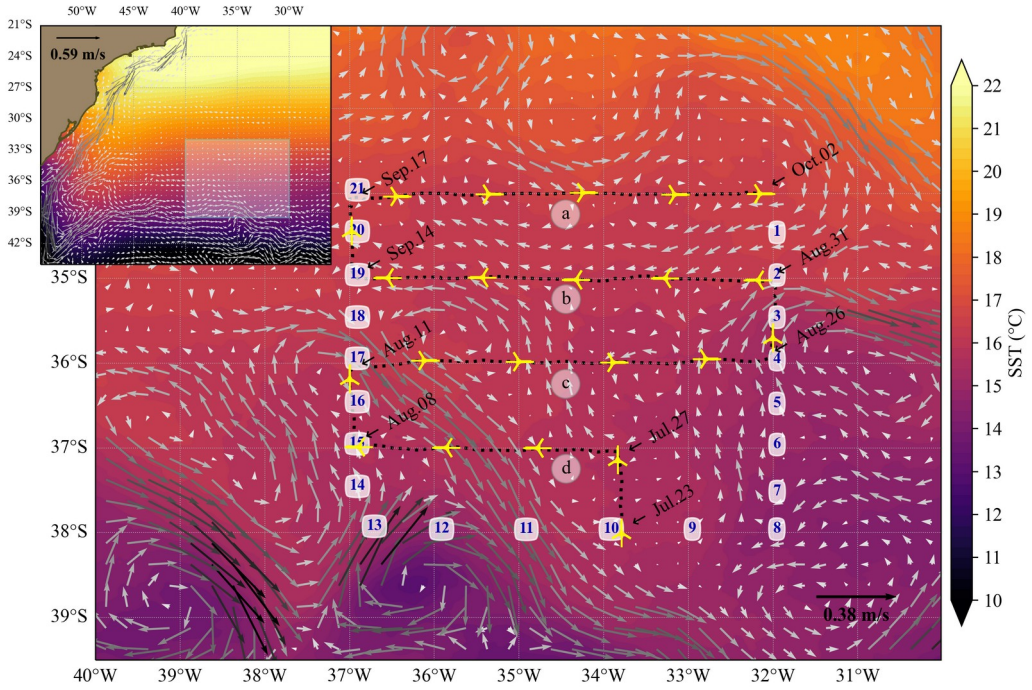
Lozier, M.S., 2010. Deconstructing the conveyor belt. Science, 328(5985), pp.1507-1511.

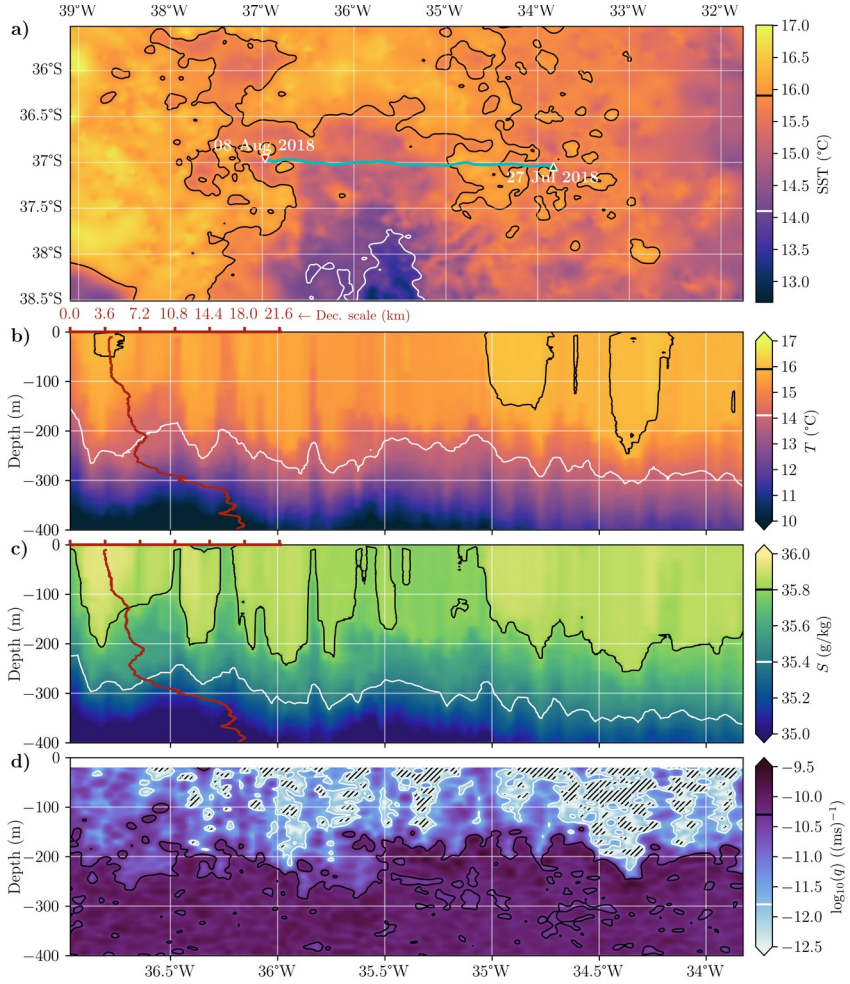
Mode water



Talley, L.D., 2011. Descriptive physical oceanography: an introduction. Academic press.

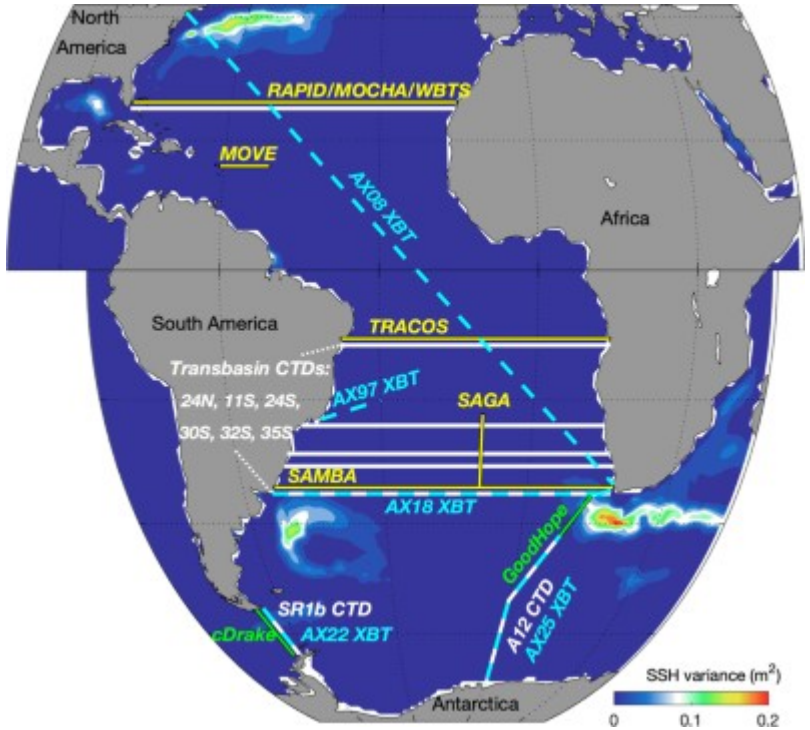
SAMOWA (South Atlantic Mode Water)-FAPESP





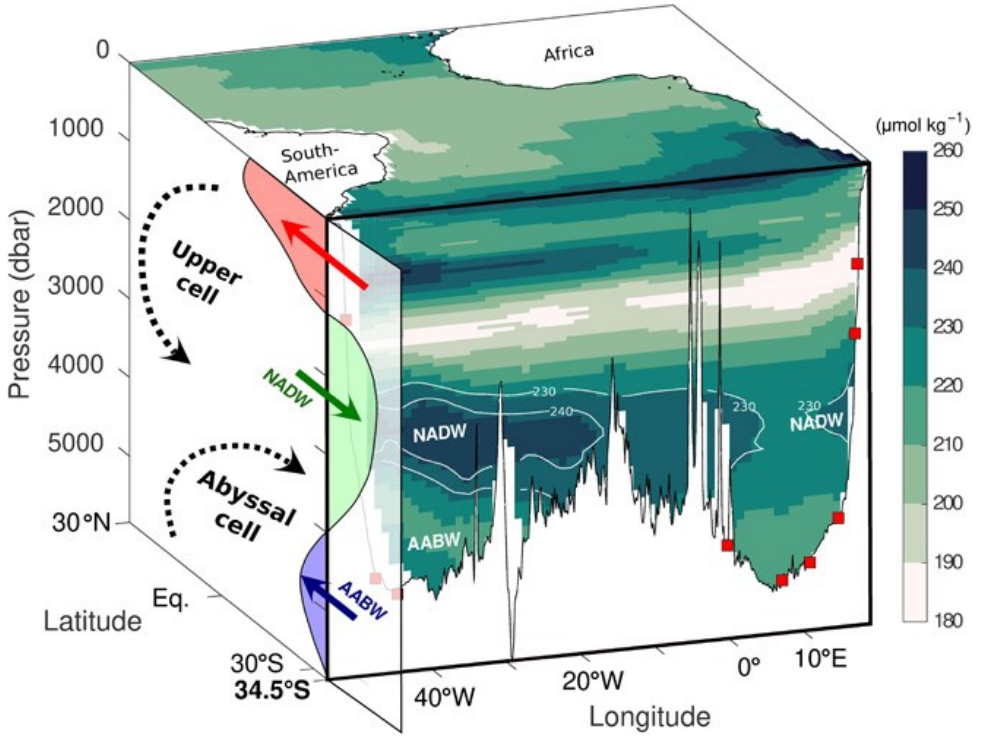
Sato, O.T., Polito, P.S. and Dottori, M., 2024. On the spatio-temporal scales of the subtropical mode water formation in the South Atlantic. Journal of Geophysical Research: Oceans, 129(4), p.e2023JC020759.

SAMBAR/SAMOC (South Atlantic Meridional Overturning Circulation) -FAPESP



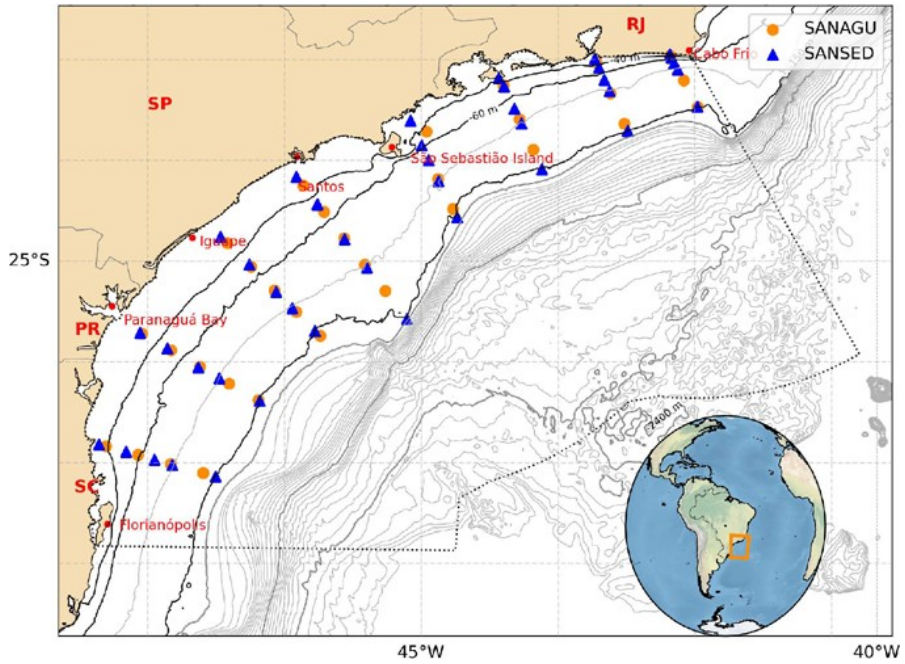
Chidichimo, M.P., Perez, R.C., Speich, S., Kersalé, M., Sprintall, J., Dong, S., Lamont, T., Sato, O.T., Chereskin, T.K., Hummels, R. and Schmid, C., 2023. Energetic overturning flows, dynamic interocean exchanges, and ocean warming observed in the South Atlantic. Communications Earth & Environment, 4(1), p.10.

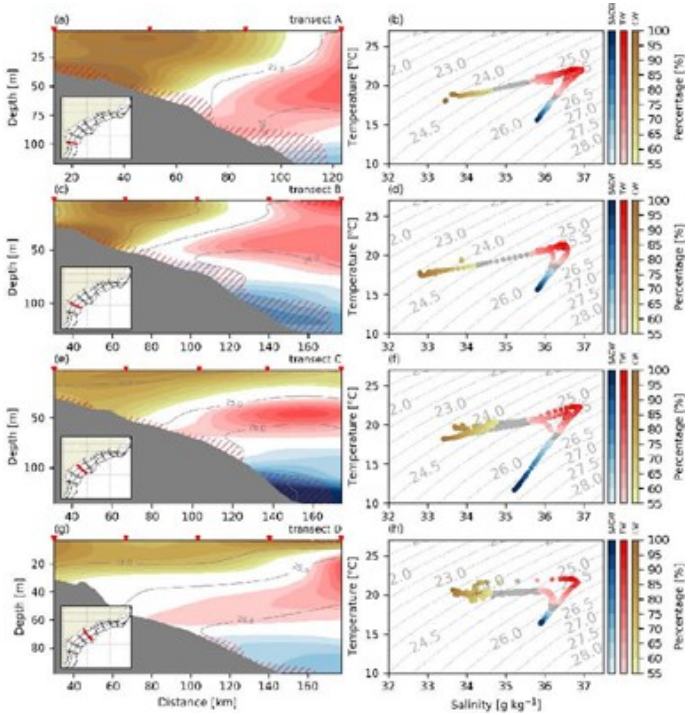
SAMBA-FAPESP



Kersalé, M., Meinen, C.S., Perez, R.C., Le Henaff, M., Valla, D., Lamont, T., Sato, O.T., Dong, S., Terre, T., van Caspel, M. and Chidichimo, M.P., 2020. Highly variable upper and abyssal overturning cells in the South Atlantic. Science Advances, 6(32), p.eaba7573.

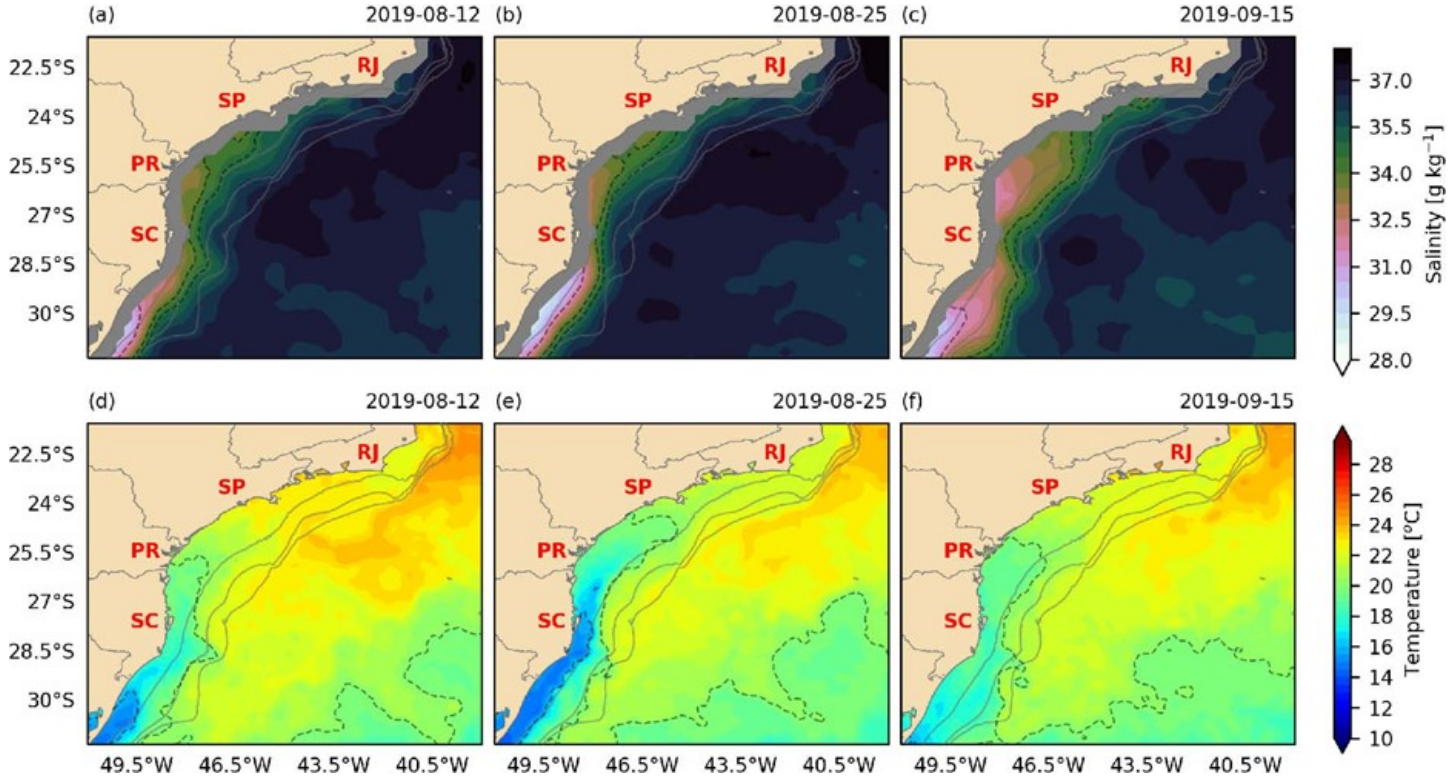
What about coastal processes?





Dottori, M., Sasaki, D.K., Silva, D.A., Del–Giovannino, S.R., Pinto, A.P., Gnamah, M., Santos, A.D., Silveira, I.C.D., Belo, W.C., Martins, R.P. and Moreira, D.L., 2023. Hydrographic structure of the continental shelf in Santos Basin and its causes: The SANAGU and SANSED campaigns (2019). Ocean and Coastal Research, 71(suppl 3), p.e23013.

What about coastal processes?



Dottori, M., Sasaki, D.K., Silva, D.A., Del–Giovannino, S.R., Pinto, A.P., Gnamah, M., Santos, A.D., Silveira, I.C.D., Belo, W.C., Martins, R.P. and Moreira, D.L., 2023. Hydrographic structure of the continental shelf in Santos Basin and its causes: The SANAGU and SANSED campaigns (2019). Ocean and Coastal Research, 71(suppl 3), p.e23013.

- The South Atlantic Ocean (SAO) is a crucial component for understanding and modeling global climate change, particularly due to its unique role in the Atlantic Meridional Overturning Circulation (AMOC).
- This ocean basin is currently critically undersampled compared to other major basins, creating significant data gaps in regional oceanographic and climatic knowledge.
- Robust and sustained monitoring of the SAO is, therefore, an urgent priority for advancing oceanographic, atmospheric, and climate studies worldwide.
- International and inter-institutional collaboration is indispensable for developing and maintaining a comprehensive and successful observation system across the South Atlantic.

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Thank you!