Tropical and South Atlantic Climate-Based Marine Ecosystem Prediction for Sustainable Management

https://triatlas.w.uib.no

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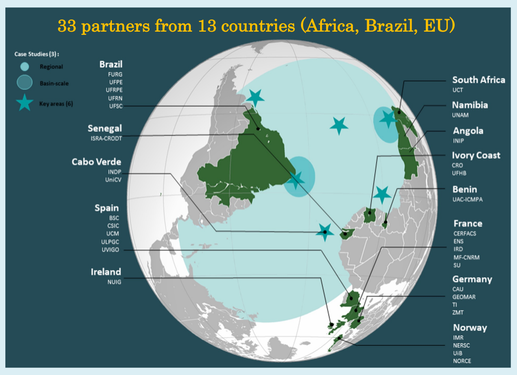
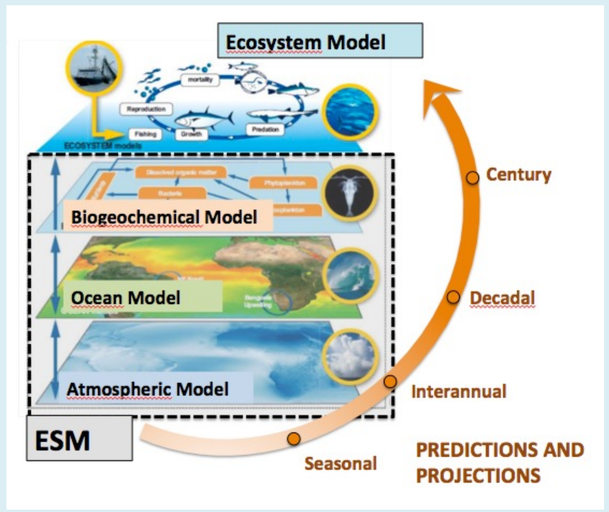
Our mission

To Develop the understanding and the capacity (observational, modelling, and human) to best predict changes in the south and tropical Atlantic marine ecosystem and its societal impacts.



To build an Atlantic climate and marine ecosystem research community

Integrated Earth System – Marine ecosystem Prediction System



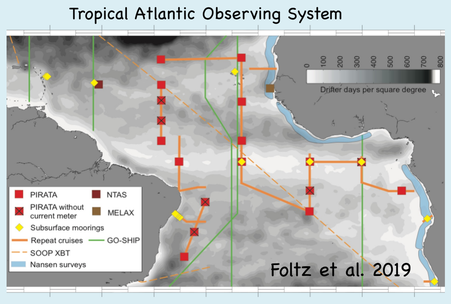
Predictions for the next season to several years in advance are of great interest to managers

Courtesy: Roland Séférian, Météo-France

Integrated observations from "physics to fish" needed to close knowledge gaps

Contributing to international observational networks

Tropical Atlantic Observing System



Many new interdisciplinary cruises
- SOS-Mar cruise NE Brazil (2019)
- Trans-Atlantic equatorial cruise-2 (2022)
- M158 (2019), M181 (2022)
- AMAZOMIX (2021), N-AMAZON (2020-2021)

Contributions to national and international programs and projects

- Moored arrays, SAMOC/SAMBA (34.5S), PIRATA (23W), TRACOS (11S)
- Cape Verde Observatory
- Underwater vision profilers (UVP) on BGC Argo floats
- Eastern boundary upwelling programs (TRAFFIC)
- Northeast/Southeast Brazil (ABRACOS)

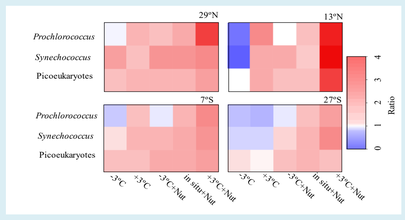
New data sets are revealing insights in biophysical interactions

Courtesy: Heino Fock, Thünen Inst.

- All Atlantic mesoscale eddies grided data set (Ioannou et al., 2022).
- Moored observatory in the central equatorial Atlantic at 0°N, 23°W (Tuchen et al., 2022)
- Underwater vision profilers (UVP5, 6) and Acoustic Doppler Current Profilers
- Compilation of historical trawling and fisheries data

⟸ Database of biological parameters across the Atlantic – across trophic levels

Consistent phytoplankton responses to changing temperature and nutrient availability across the Atlantic ⟹

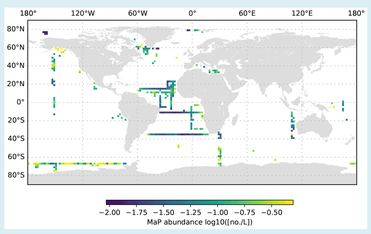


Response ratio of surface plankton assemblages in microcosm experiments to temperatures and nutrient treatment changes

Fernández-González et al. 2022

New measurement devices and applications

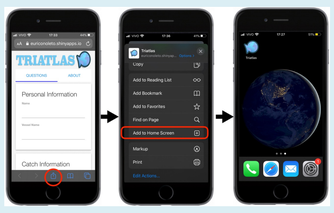
Macroscopic particle distribution 200 – 1000 dbar



Underwater vision profiler providing new data on particle distributions

Kiko et al. 2022

New, flexible and open-source fisheries self-reporting app: The Shiny4SelfReport



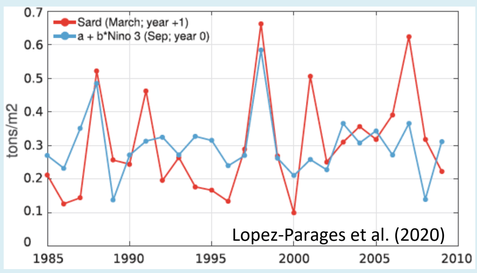
Noleto-Filho et al. 2021

Climatic and societal drivers and pressures

Remote climatic influences

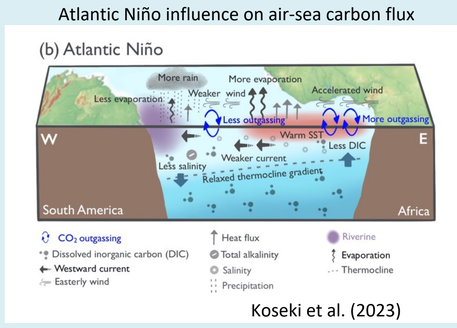
El Niño Southern Oscillation (ENSO) provides a basis for predictability

Sardinella distribution on the West African coast and ENSO



Local climatic influences

Atlantic Niño influence on air-sea carbon flux



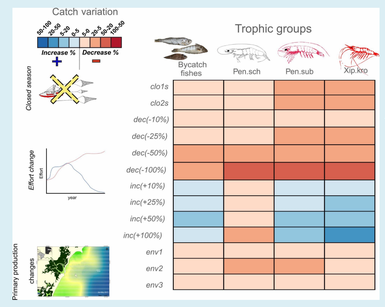
Koseki et al. (2023)

Socio-economic drivers

Sustainable management of shrimp fisheries of North East Brazil (Barra of Sirinha´em)

Modelling (Ecopath) the impact of trawling changes and environmental factors on shrimp fisheries

(Lira et al. 2021)

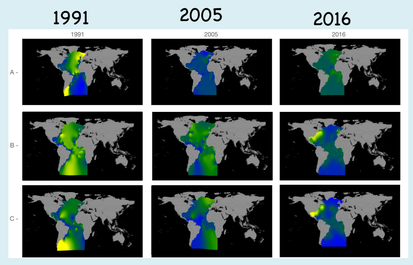


10% reduction in trawling maintains high shrimp catch

Global warming reduce shrimp catch

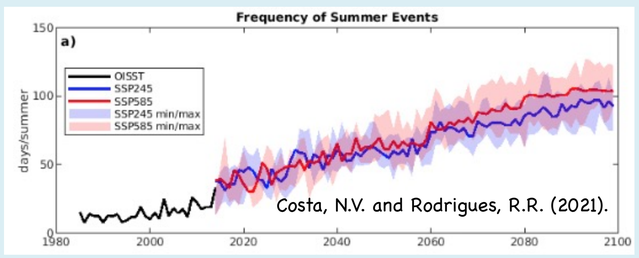
Economics: Bayesian modelling of tuna price changes at basin and global scales

Courtesy: Eurico Noleto-Filho

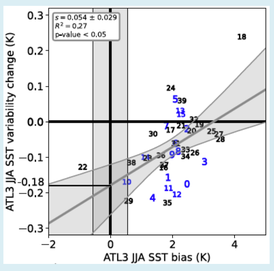


Climate and marine ecosystem modelling

Marine heatwaves increase in intensity, frequency and duration



At the same time the Atlantic Niño will become weaker

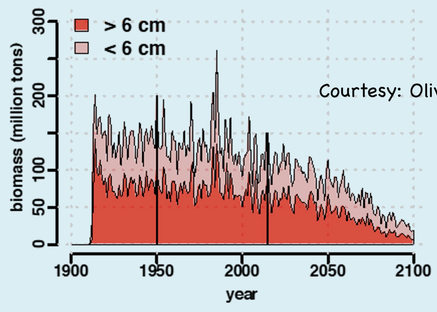


Projected changes by 2100 in Atlantic 3 compared to model biases (CMIP5/CMIP6)

Crespo et al. (2022)

And there will be a long-term decline in small pelagics

APECOSM – Benguela region, SSP585 run for small coastal pelagics



Courtesy: Olivier Maury

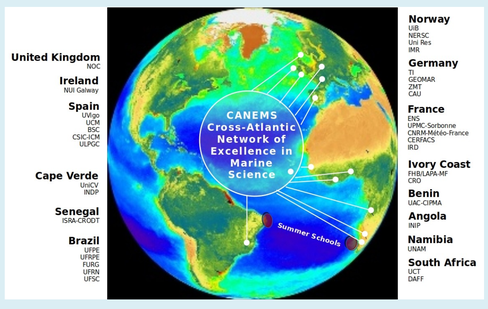
TRIATLAS marine ecosystem models are assessing climate change impacts as part of the ISIMIP3b protocol to Fish-MIP

Stakeholder feedback and building capacity

Involving stakeholders in developing regional socio-economic scenarios for marine-ecosystem projections

The Cross-Atlantic Network of Excellence in Marine Science (CANEMS)

- A TRIATLAS initiative to combine summer schools, student exchange programmes, sea-going training and academic teaching in a highly interdisciplinary and sustainable context through institutional collaboration
- CANEMS is intended to support young researchers as a network with a multi-year perspective so that several steps of their careers can be accomplished within the CANEMS community. Unique long-term concept.
- It is a frame for South-South-North collaboration around the Atlantic to establish the foundation for a longer lasting science cooperation which has been established in parts of the North Atlantic and Pacific.



See video of our recent interdisciplinary summer school: https://youtu.be/tZEpOLR2h0c

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BUILDING AN ALL ATLANTIC OCEAN COMMUNITY
Implementing the Belém Statement