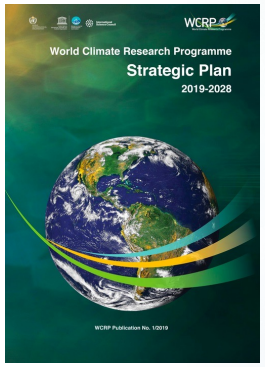
Ocean Extremes and Adaptaion

WCRP - CLIVAR ARP
LHA My Climate Risk



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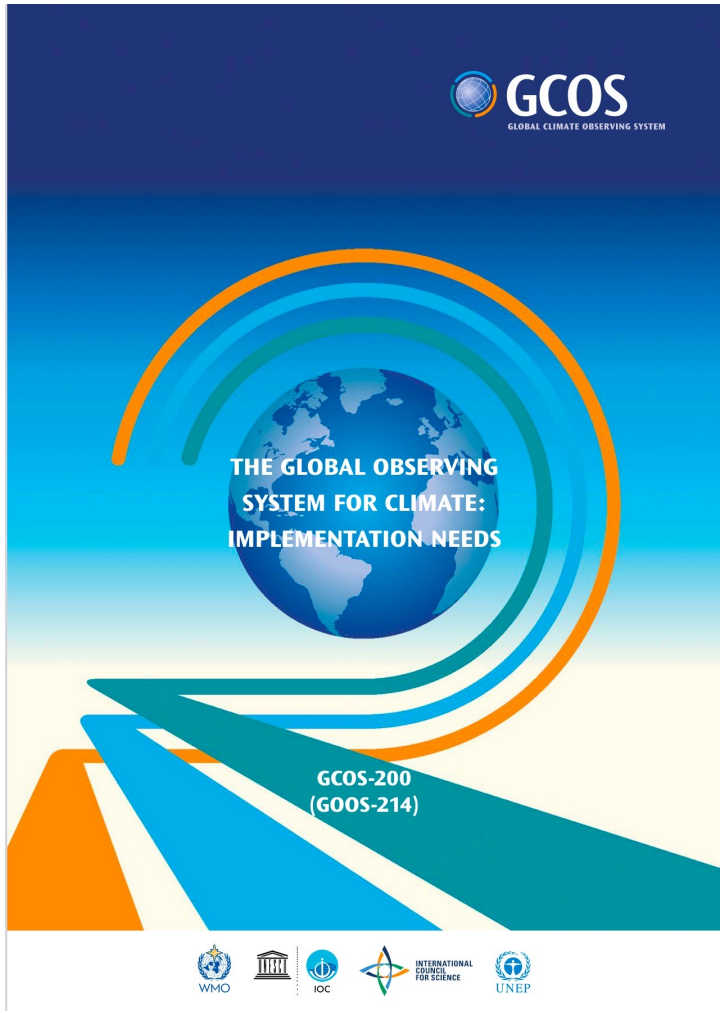
UFSC, Brazil

Ocean Extremes and Adaptation

GCOS Implementation Plan



- ✓ To guide the development a global observing system for climate and sets out what is needed to meet increasing and more diverse needs for data and information, including for improved management of the impacts and consequences of climate variability and current and future climate change.

Ocean Extremes and Adaptation

WCRP perspective

- ✓ The ocean's role in climate variability, change, and transient sensitivity
- ✓ The ocean's role on hydrological cycle and distribution of precipitation at global and regional scales
- ✓ The drivers of regional climate phenomena that provide predictability on different time scales

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WCRP perspective

National Meteorological and Hydrological Services

Regional Sea-level Change and Coastal Impacts

Polar Oceans

✓ Ocean's role on climate and extremes, overwhelmingly on land (droughts, floods, coastal storminess and sea level rise)

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Outside WCRP

Impacts on Marine Ecosystems

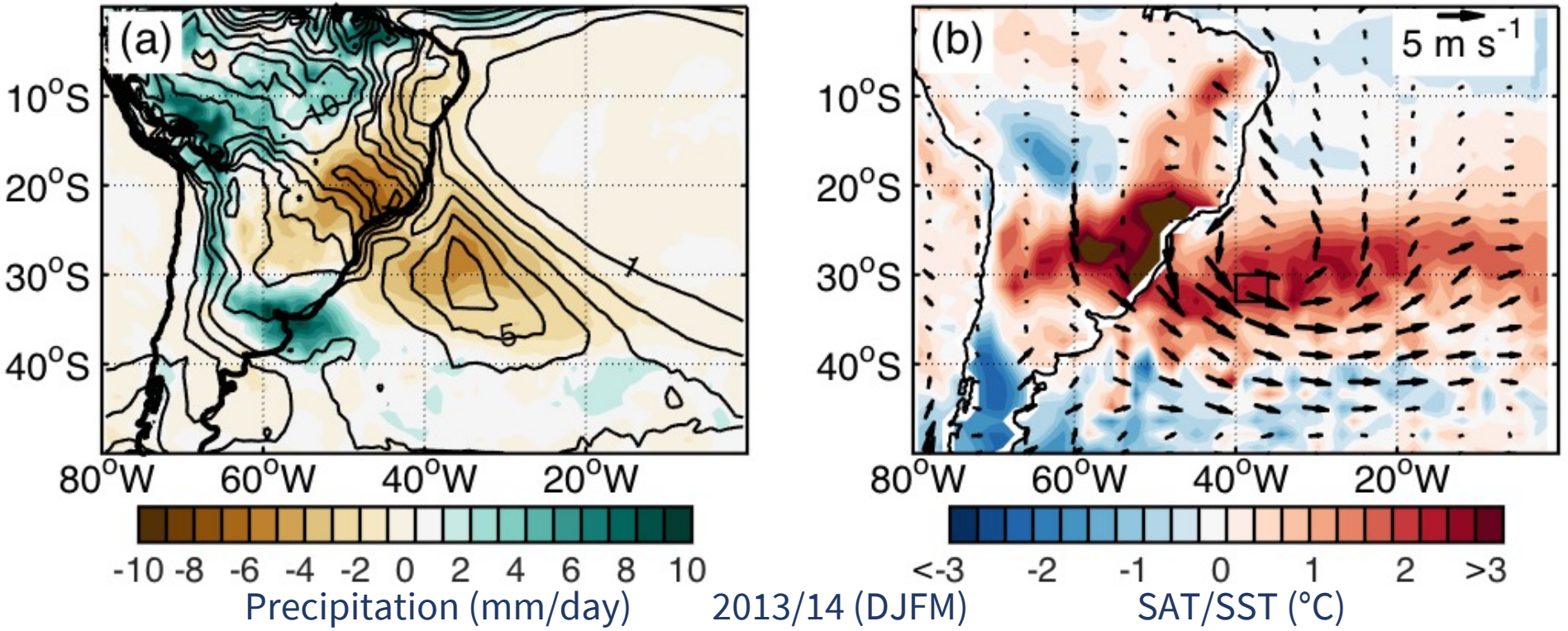
Impacts on Fisheries and Aquaculture

Marine Conservation

✓ There is a disconnect in terms of time and spatial scales

Ocean Extremes and Adaptation

Marine heatwaves – western South Atlantic



✓ Marine heatwaves are associated with droughts and land heatwaves ➔ Compound extreme events

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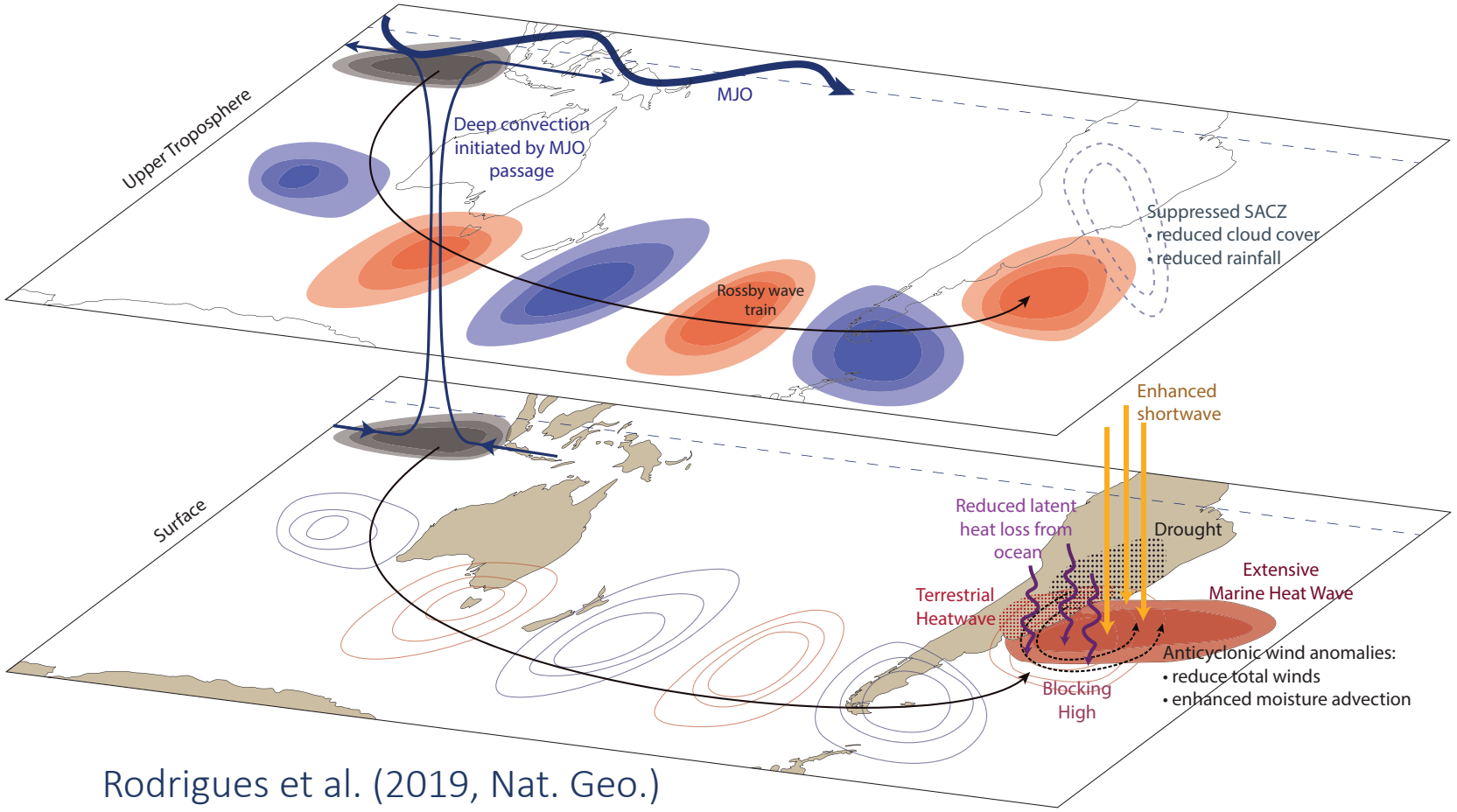
Marine heatwaves – western South Atlantic



Rodrigues et al. (2019, Nat. Geo.)

- ✓ Droughts, marine and land heatwaves have the same cause
- ✓ Persistent high-pressure system (anticyclonic circulation)
- ✓ They can be remotely triggered (convection Indian Ocean – MJO)

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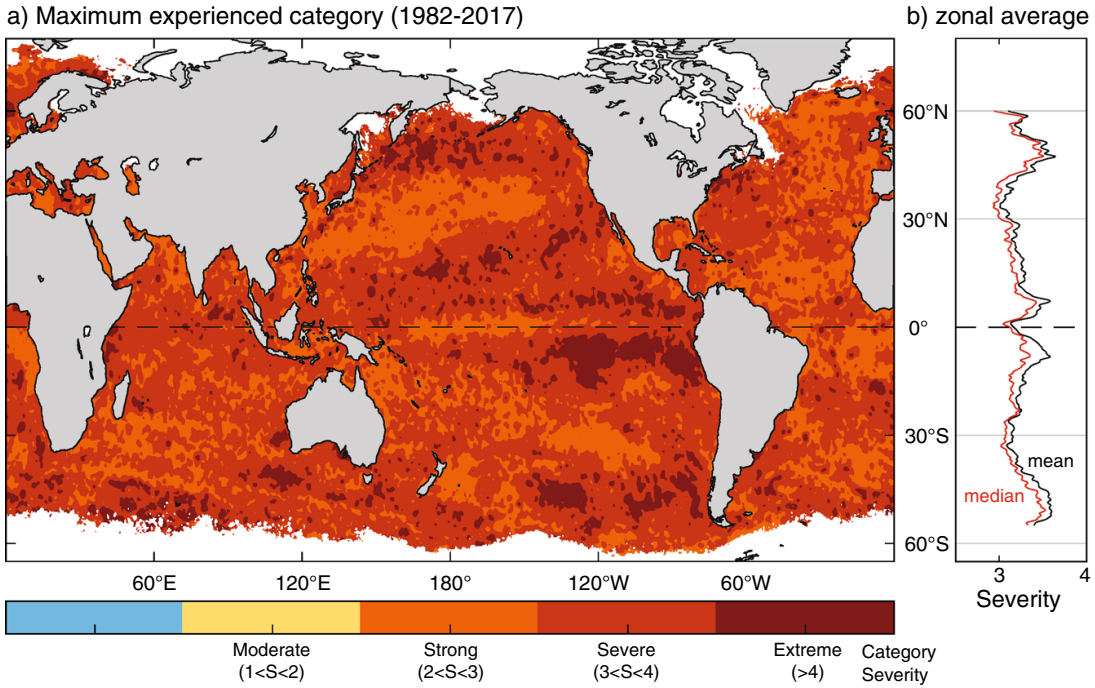
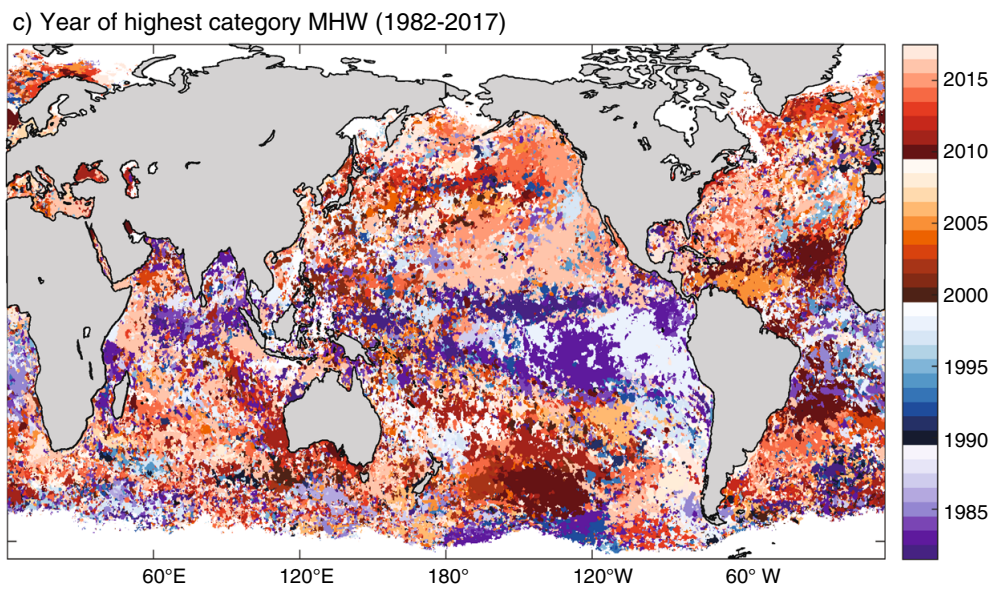
Most extreme marine heatwaves





Sen Gupta et al. (2020, Sci. Rep.)

- ✓ Similar causes linked to various modes of climate variability, such as ENSO
- ✓ Similar impacts on nutrients, chlorophyl and marine ecosystems

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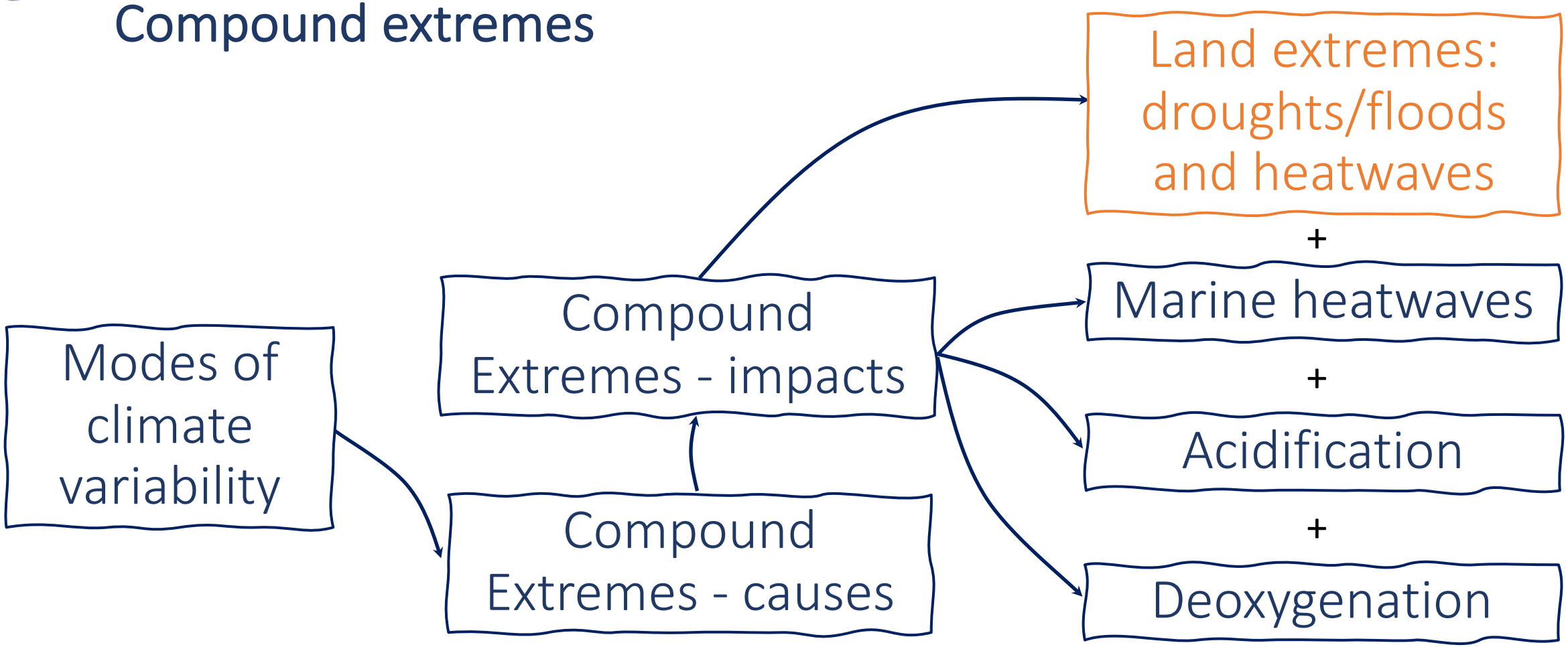
Compound extremes



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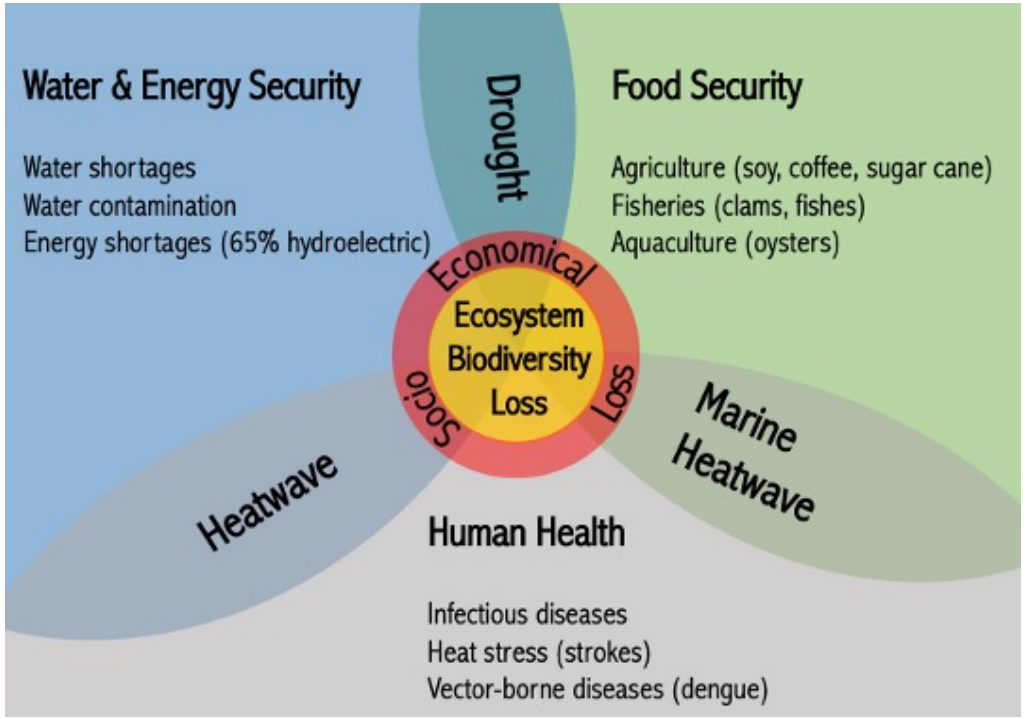
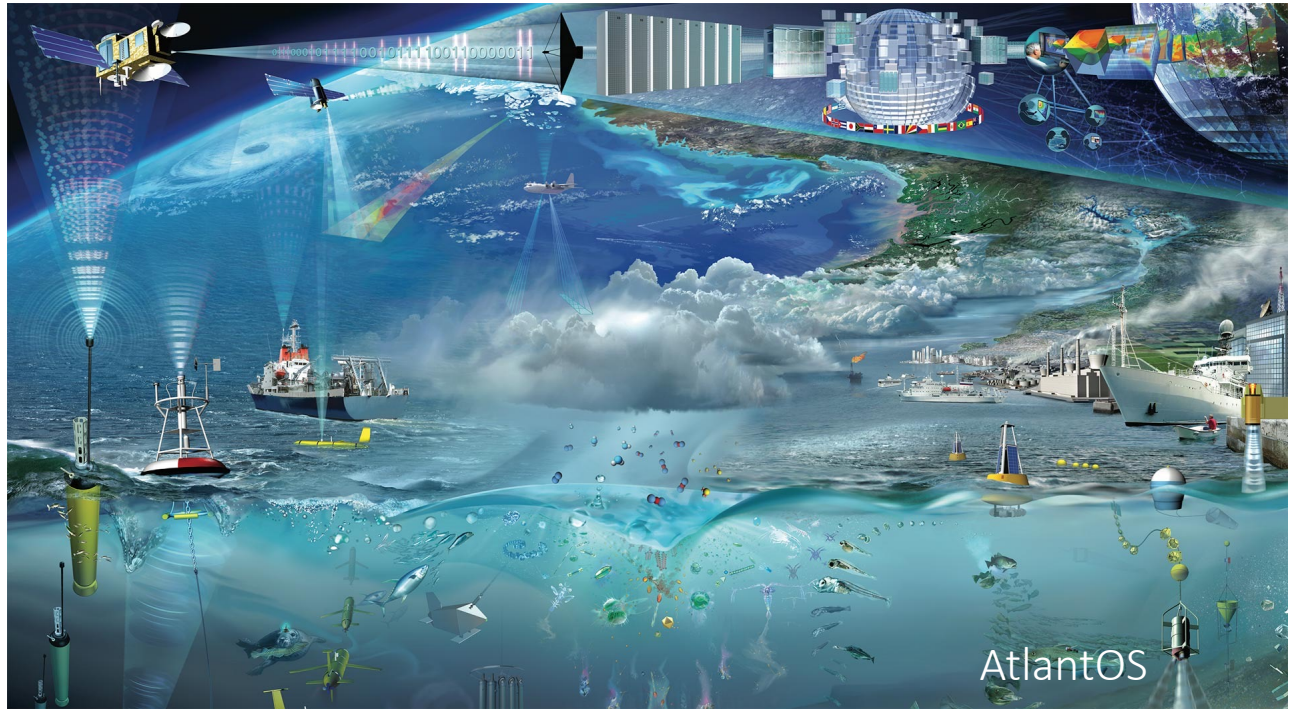
Compound extremes





Impacts

Ocean Observations are measuring ALL

Ocean Extremes and Adaptation

WCRP Lighthouse Activity My Climate Risk

Vision

How models, observations, and process understanding are all used together within a context of deep uncertainty

Goal

To develop a ‘bottom-up’ approach to regional climate risk, which starts from the decision context and enables relevant climate information to be brought into that context

Purpose

By developing a new framework for assessing and explaining the physically plausible climate drivers of regional climate risk, climate information will be made meaningful at the local scale

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Usable climate information

For decades, there has been a call for useable (or actionable) climate information.

The gap between production and use

Yet despite this awareness and global effort, it is widely accepted that there is a significant gap between the production and use of climate information.

Cause

The gap results in part from the focus on better data rather than on better decision-making.

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Top-down approach

Even if user-informed, it adopts disciplinary-based measures of scientific quality, driven by climate scientists.

Bottom-up approach

Climate-change science has to break with the traditional research/ assessment/policy paradigm and bring into existence a community of users.

Small is Beautiful

Rodrigues & Shepherd (2022), PNAS Nexus, vol. 1.

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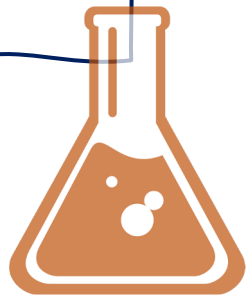
- ✓ Application of the framework to local concerns
- ✓ Framework itself generic, flexible and applicable across various region types
- ✓ Scientific support for the development of OCEAN climate services

CLIVAR ARP - Ocean Extreme Group - Hubs



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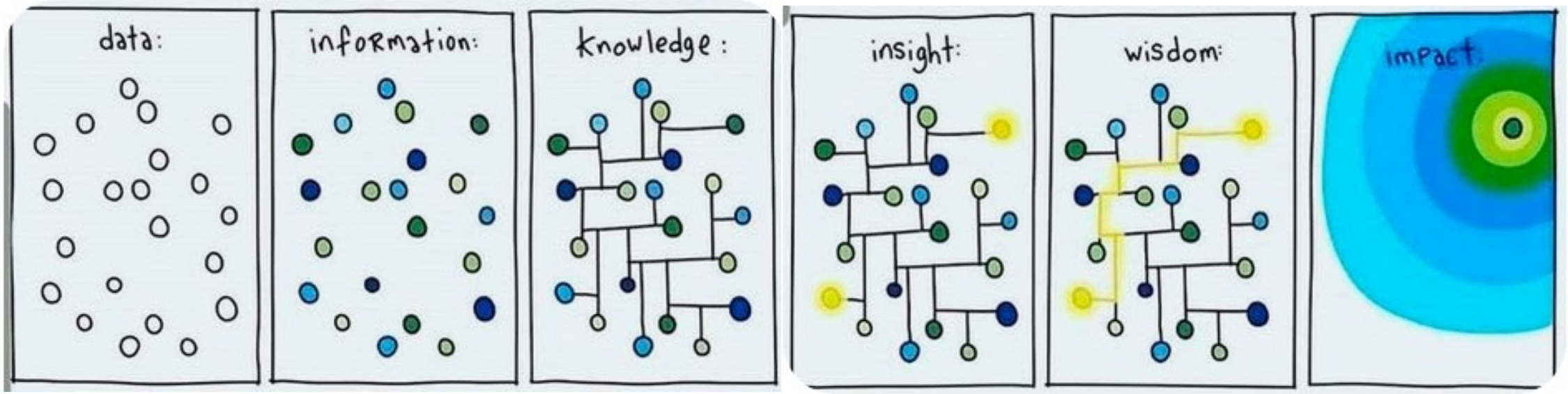
✓ Successful adaptation depends greatly on effective management of knowledge.



2021 Ocean Decade

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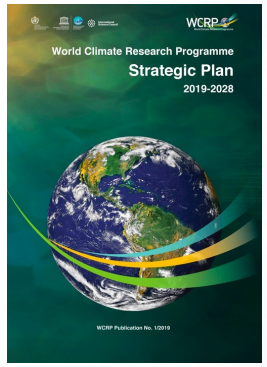

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