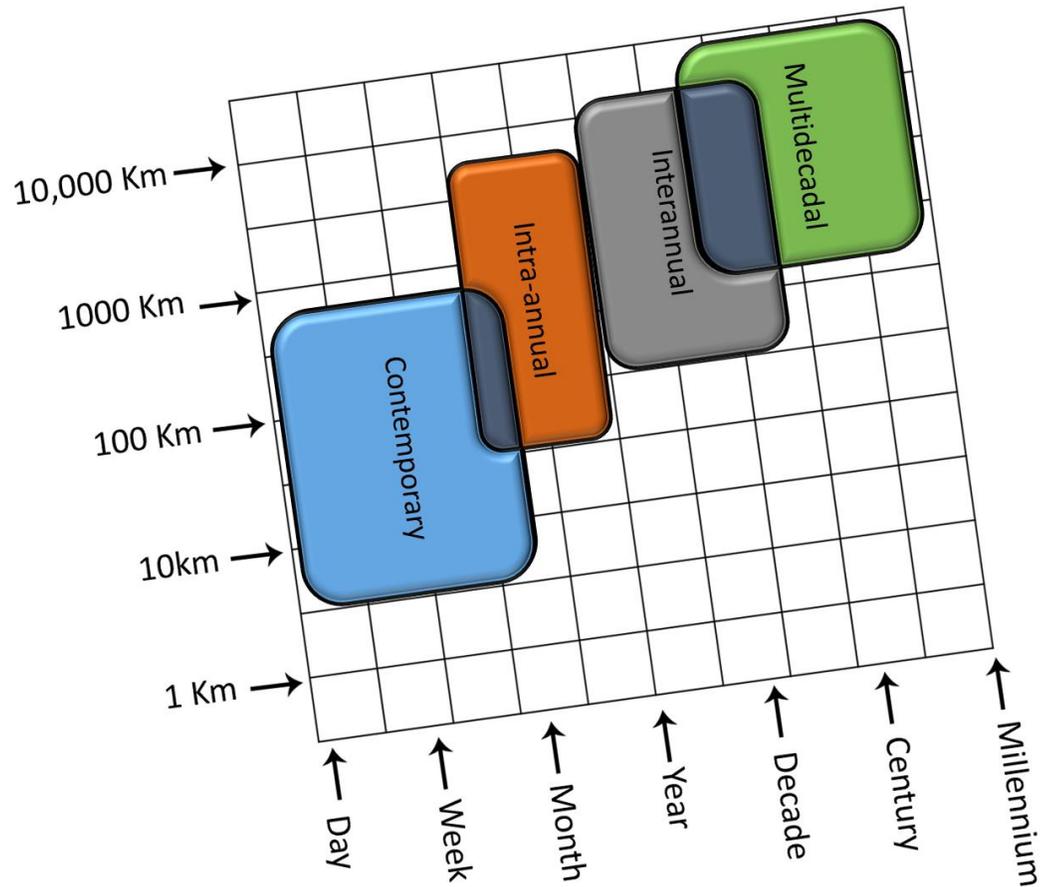


Beyond static spatial management: scientific and legal considerations for dynamic management in the high seas

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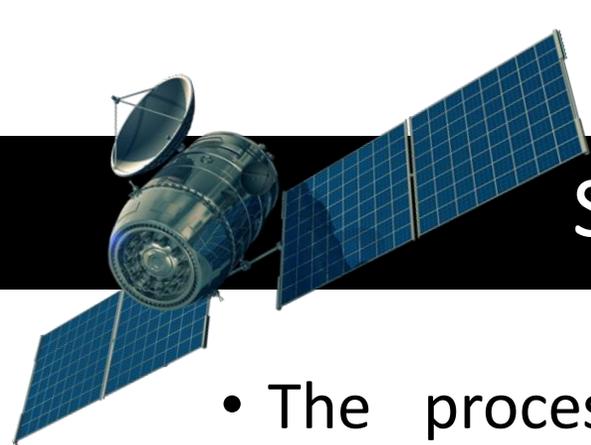
One Ocean Symposium, 24 August 2019





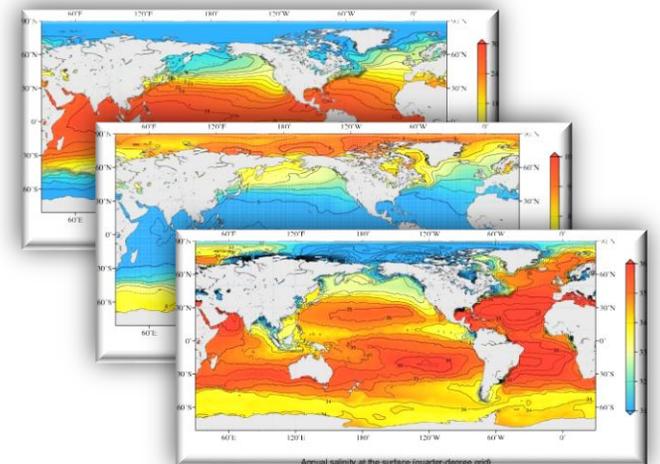
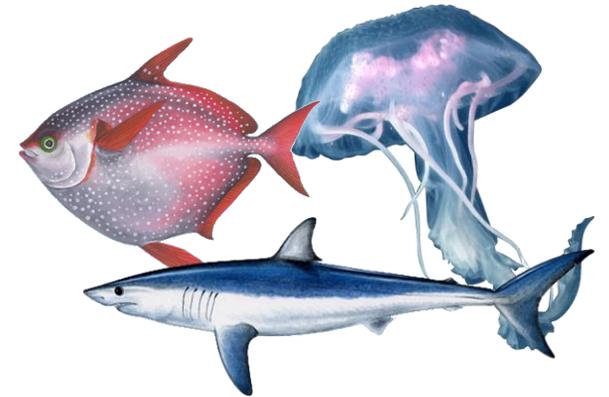
Overview

- The oceanography of the high seas changes across a wide range of temporal scales.
- Outline of temporal scales that may be relevant to ABMTs
 - Ephemeral
 - Intra-annual
 - Inter-annual
 - Multi-decadal
- Suggestions for text to ensure the BBNJ ILBI is future-proof.

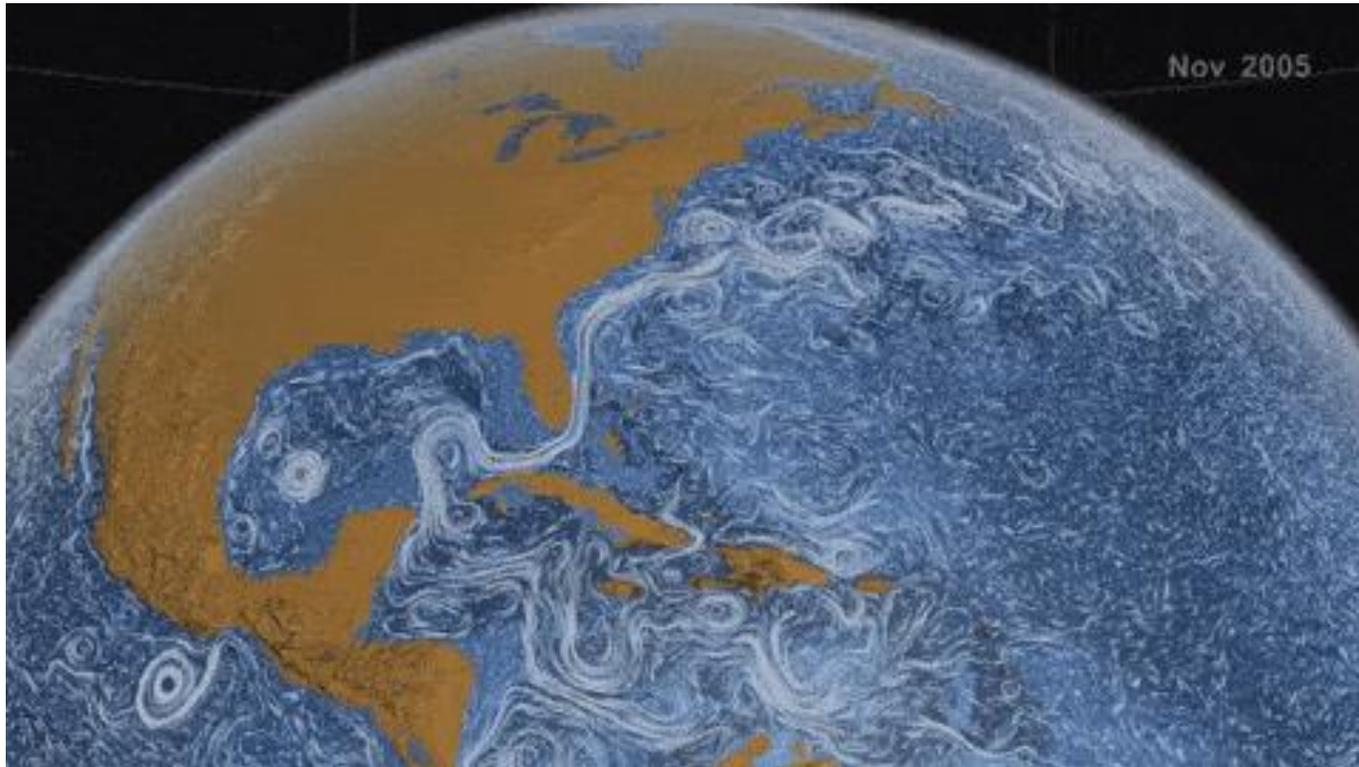


Significant advancements and opportunities since UNCLOS

- The processes at each temporal scale have **unique** impacts on the distribution, abundance, composition and size of BBNJ.
- Technological and computational advancements allow us to map, monitor and predict the distribution of humans and BBNJ in near-real time and into the future.
- Opportunities for capacity development, increase efficiency of industry and reduce BBNJ impacts.



Ephemeral: technological advancements allow for monitoring

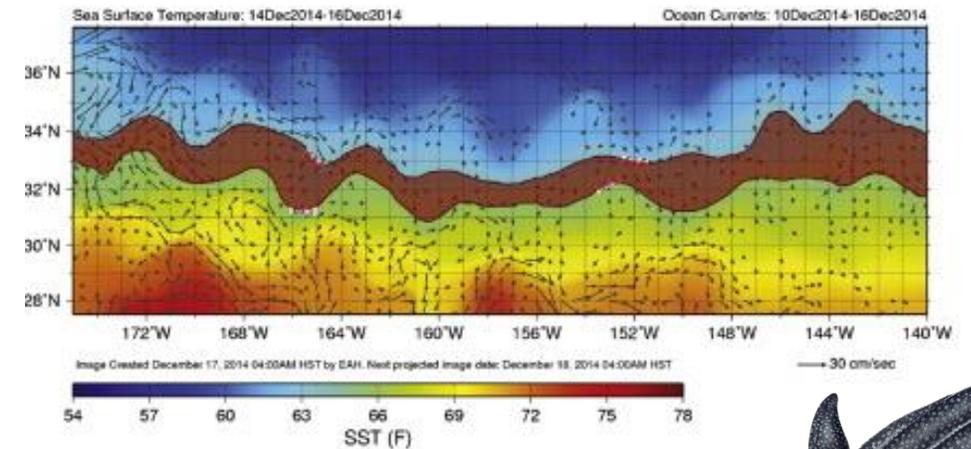


Advances in geospatial technologies (e.g. satellite imagery or AIS tracking technology) allow for near-real time monitoring and modelling of BBNJ and H(umans)BNJ.

Dynamic Ocean Management

EXPERIMENTAL PRODUCT

avoid fishing between solid black 63.5°F and 65.5°F lines
to help reduce loggerhead sea turtle interactions



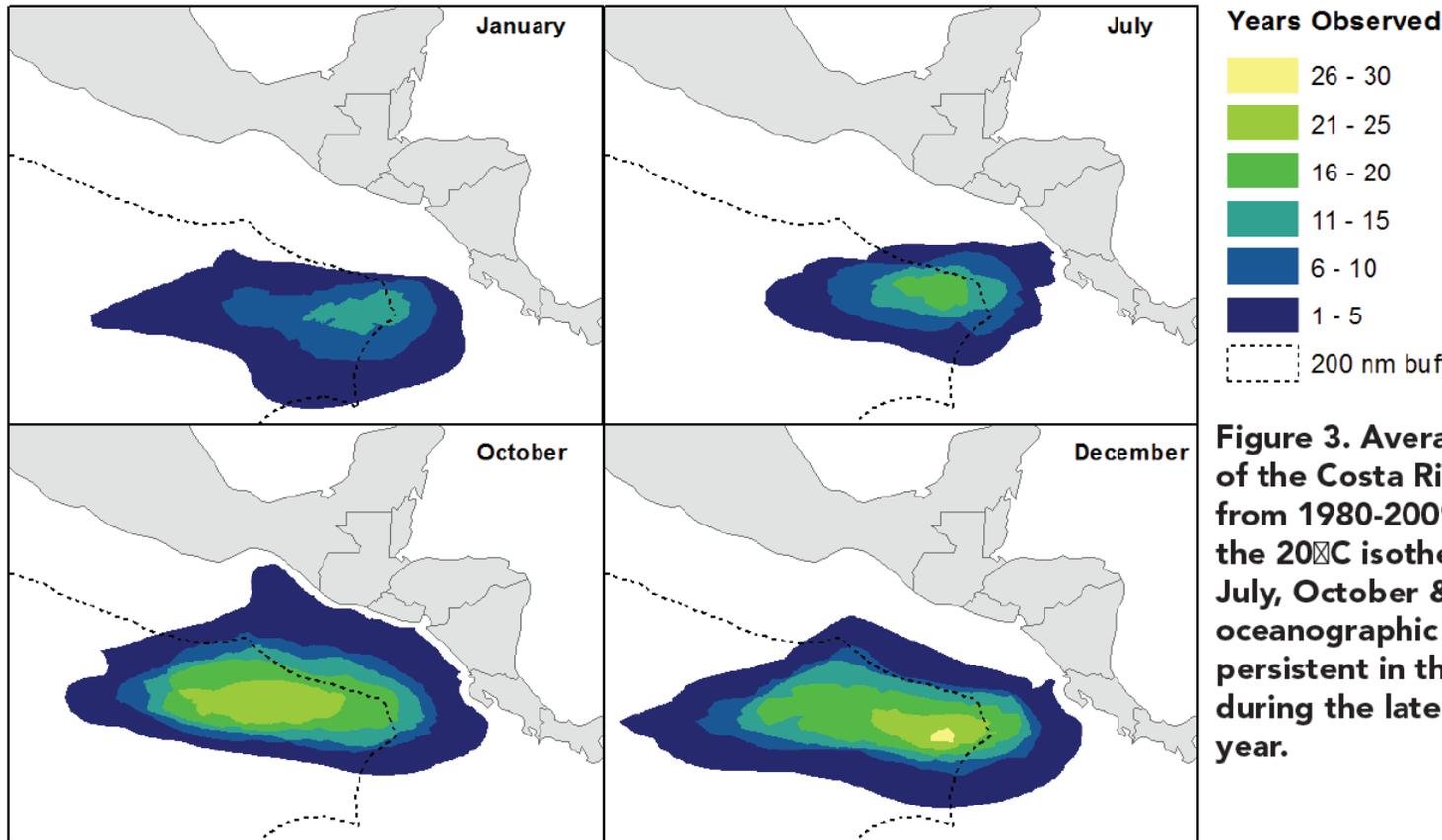
PACIFIC ISLANDS FISHERIES SCIENCE CENTER
ECOSYSTEMS AND OCEANOGRAPHY DIVISION
2570 Dole Street, Honolulu, HI 96822
<http://www.pifsc.noaa.gov/load/turtlewatch.php>
contact: Evan Howell@noaa.gov
Data provided by Central Pacific CoastWatch node

TURTLEWATCH

Howell et al., 2008



Intra-annual: reliable & predictable



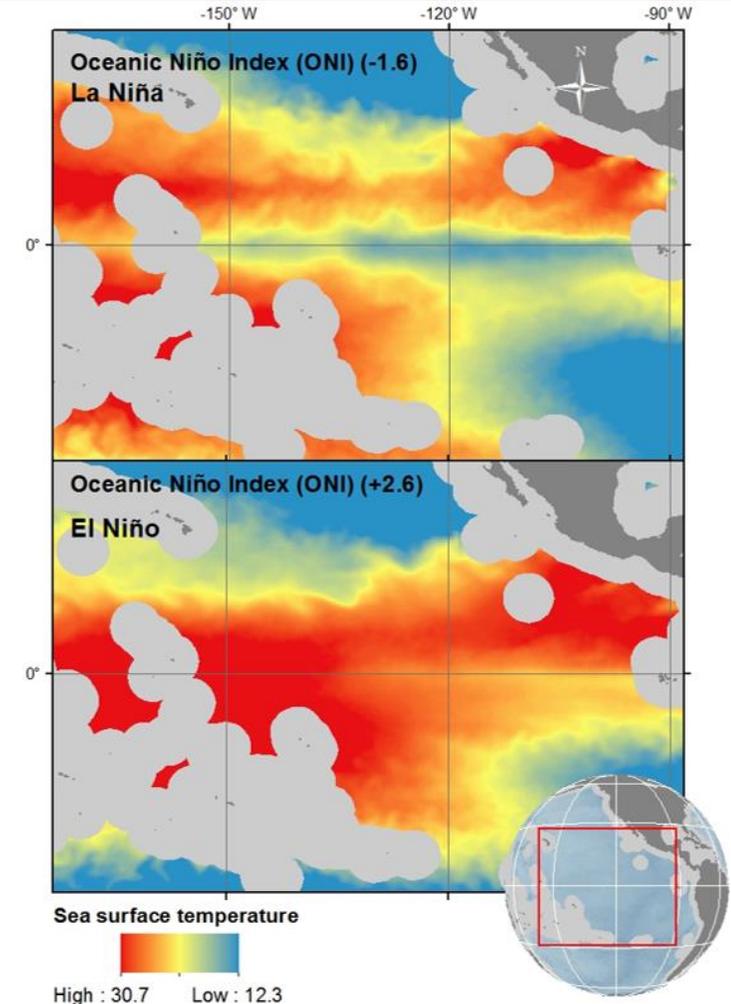
- Seasonal / predictable changes in oceanographic conditions or persistent features may allow for efficient intra-annual closures or rules to fishing and shipping to reduce impacts on BBNJ.

Figure 3. Average persistence of the Costa Rica Thermal Dome from 1980-2009 derived from the 20°C isotherm for: January, July, October & December. The oceanographic feature is more persistent in the time series during the later months of the year.



Inter-annual: semi-predictable – ‘shocks’ to BBNJ

- Inter-annual climatic cycles change the biology, physics and chemistry of the high seas in semi-predictable ways.
- If unaccounted for shift in climatic indices may deem intra-annual closures ‘useless’.
- Large-scale ocean die-offs & redistribution of resources and BBNJ is well documented.
- Serious implications for industry. BBNJ can increase knowledge and work with sectoral organizations.



El Niño Southern Oscillation

Figure 4: differences in November sea surface temperature under a 2010 La Niña (top) and a 2016 El Niño (bottom).

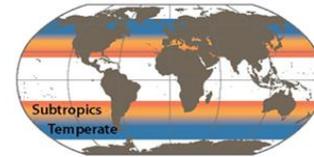
Multidecadal: preparing for future oceans

- We expect changes in the...
 - [1] abundance;
 - [2] vertical & horizontal distribution;
 - [3] phenology ('biological clock');
 - [4] size;
 - [5] behavior;
 - [6] extinction risk;
 - [7] predator-prey relationships;... of BBNJ under climate change.

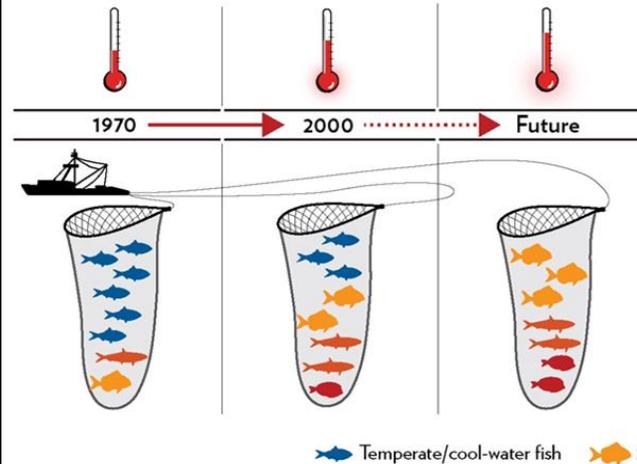
Warming Oceans Are Reshaping Fisheries

Marine species are gradually moving away from the equator into cooler waters, and, as a result, species from warmer waters are replacing those traditionally caught in many fisheries worldwide. Scientific studies show that this change is related to increasing ocean temperatures.

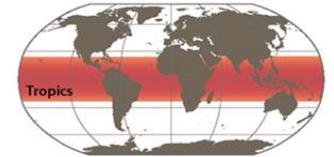
Subtropic and temperate ocean



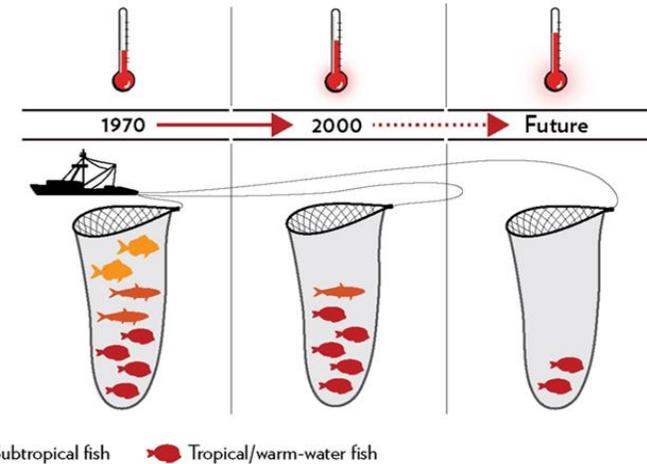
From 1970 to 2006, as open temperatures were rising, catch composition in the subtropic and temperate areas slowly changed to include more warm-water species and fewer cool-water species.



Tropics



In the tropics, the catch composition changed from 1970 to 1980 and then stabilized, likely because there are no species with high enough temperature preferences to replace those that declined.



These shifts could have negative effects including loss of traditional fisheries, decreases in profits and jobs, conflicts over new fisheries that emerge because of distribution shifts, food security concerns, and a large decrease in catch in the tropics.

Textual Recommendations: Art 1

3. “Area-based management tool” means a tool for a geographically defined area, other than a marine protected area, through which one or several sectors or activities are managed with the aim of achieving particular conservation and sustainable use objectives [and affording higher protection than that provided in the surrounding areas].

“... a tool for **a defined area**, through which one or several sectors or activities are managed **across temporal or spatial scales** with the aim of achieving particular conservation and sustainable use objectives”

Proposals for ABMTs: Article 17

(4) Proposals shall contain the following elements:

(a) A description of the area that is the subject of the proposal **based on geographic or other characteristics**

...

(f) A description of the proposed conservation and management measures to be adopted to achieve the specified objectives

Query whether additional provision is needed:

(bis) **Delineation of zones within the proposed area, if relevant, and any specific management measures to be adopted within each of those zones**

Monitoring and Review: Art 21

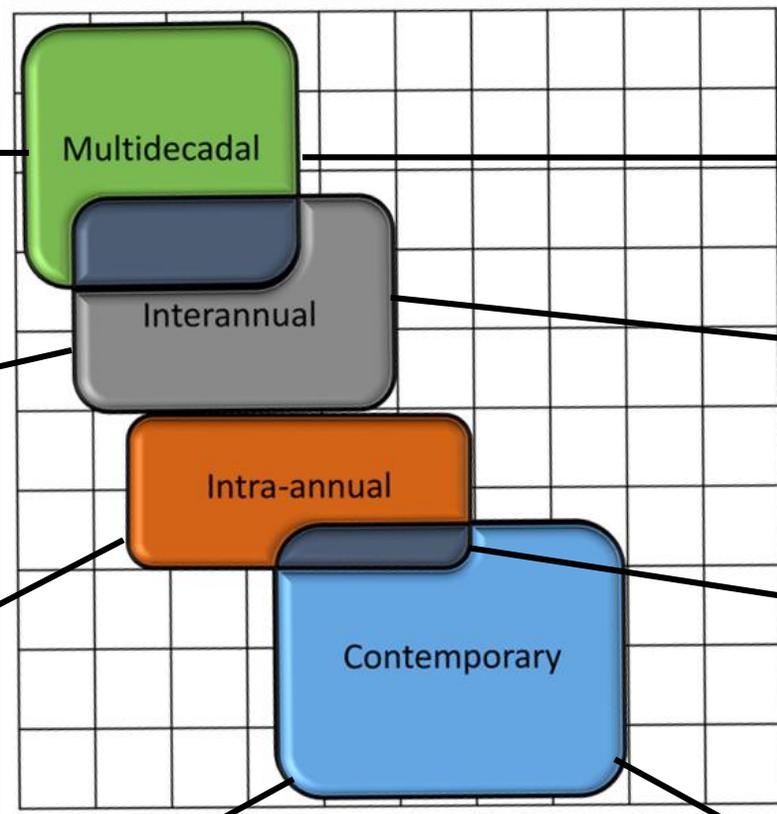
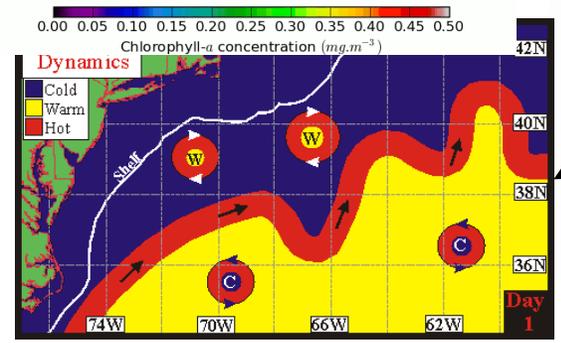
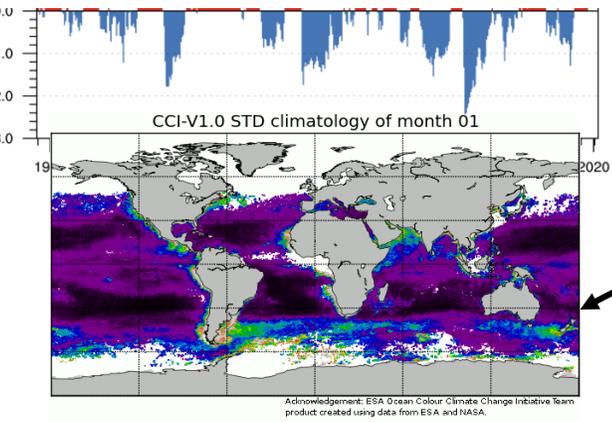
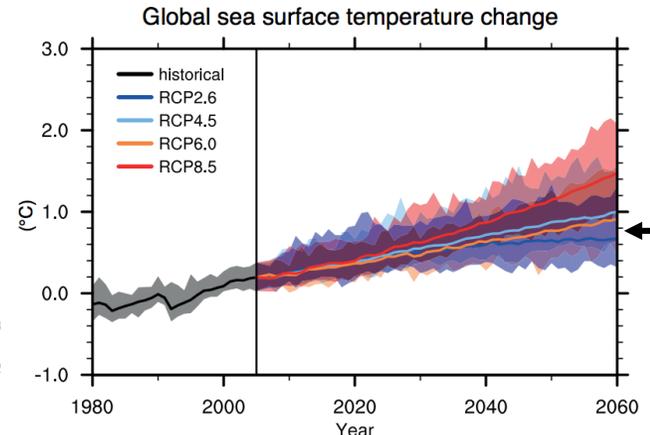
4. Following the review the COP shall, as necessary, take decisions on the **revision** of ABMTs, including MPAs, including any associated conservation and management measures, on the basis of an adaptive management approach and taking into account the best available scientific information including traditional knowledge, the precautionary approach, the ecosystem approach, **and the goal that any revision should achieve the original objective of the ABMT as much as practicable.**

~~[Alt 2] ...The duration of MPAs and related conservation and management measures shall be specified. These areas and related measures shall terminate automatically upon the expiration of the time period, unless otherwise decided by the same body that decided on the initial establishment.~~



Thank you!

Dynamic features affect the distribution and behavior of seasonal patterns in a predictable manner. Multi-scale seasonal patterns are affected by annual cycles, interannual variability, and decadal variability. Multi-scale seasonal patterns are affected by annual cycles, interannual variability, and decadal variability.



← Millennium

← Century

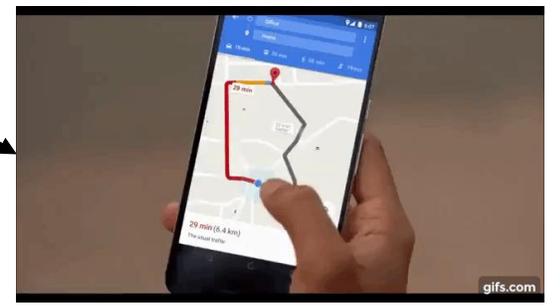
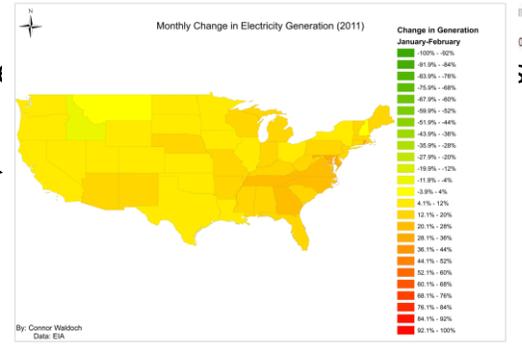
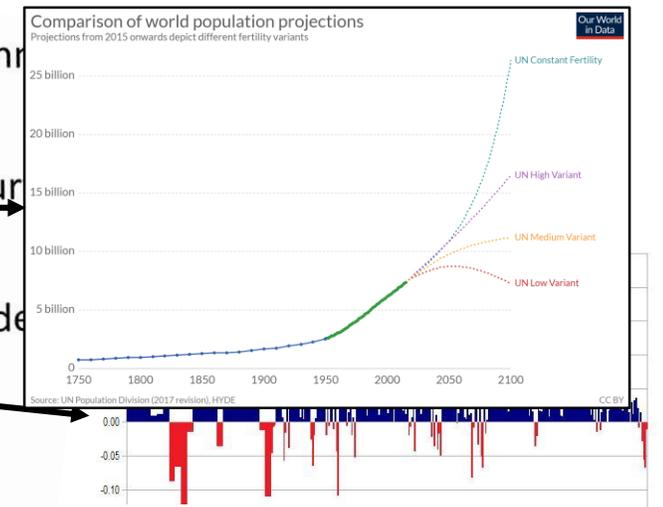
← Decade

← Year

← Months

← Week

← Day



High seas oceanography Temporal scales of relevance Homo sapiens

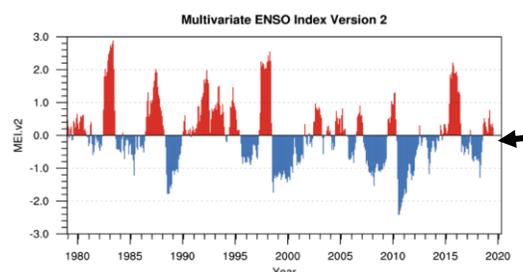
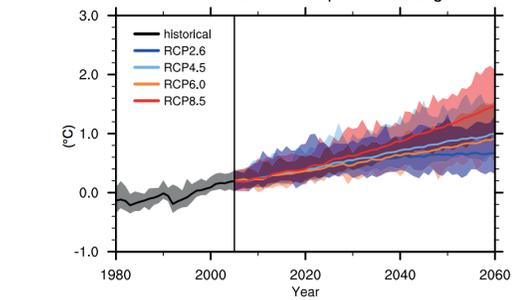
Just like human beings, biodiversity in the high seas respond to processes across a wide range of temporal scales

Multi-annual cyclical or partially cyclical shocks

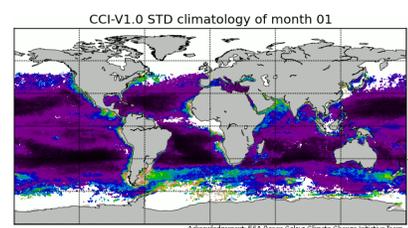
Dynamic features affect short-term distribution and behavior

Predictable seasonal patterns of productivity and consumption

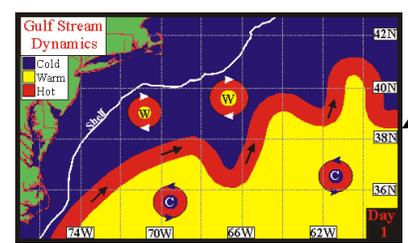
Multidecadal change – uncertainty and scenarios



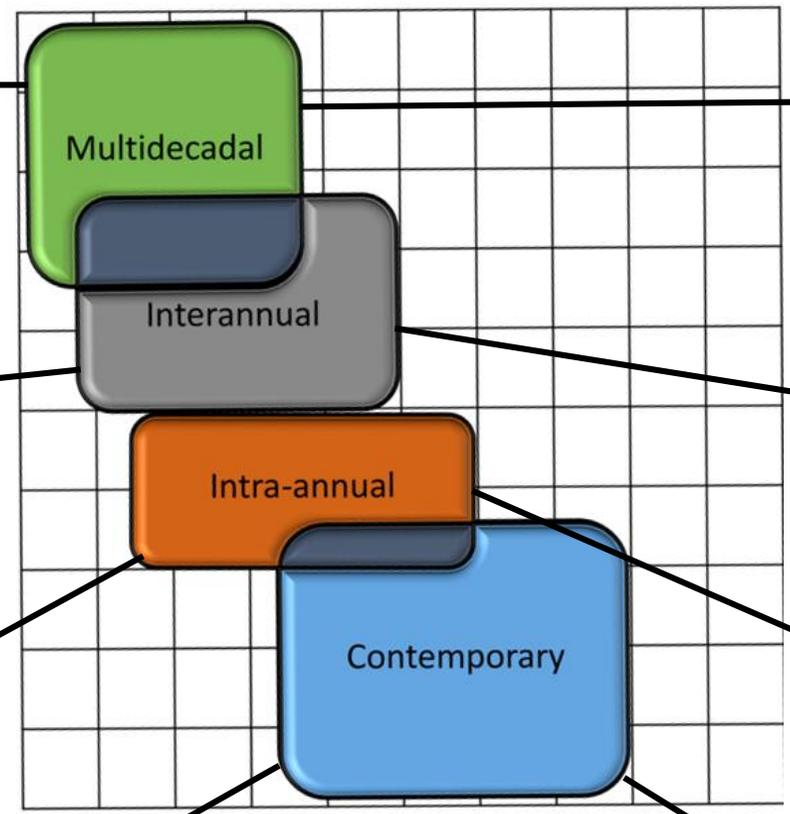
ENSO cycle ('shocks' to the system)



Monthly change in chlorophyll productivity

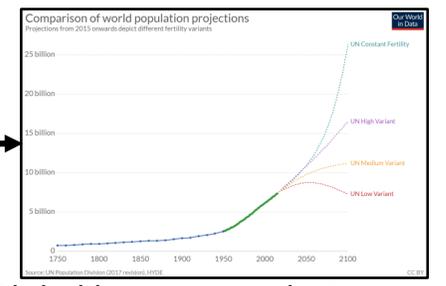


High seas oceanography

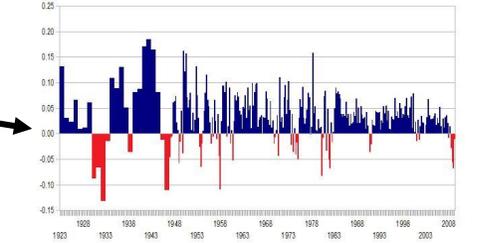


Processes, scenarios and decisions across temporal scales

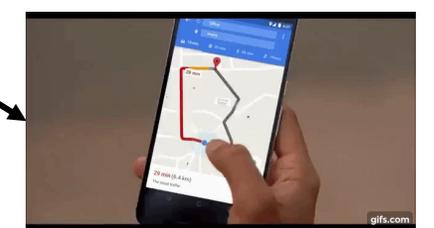
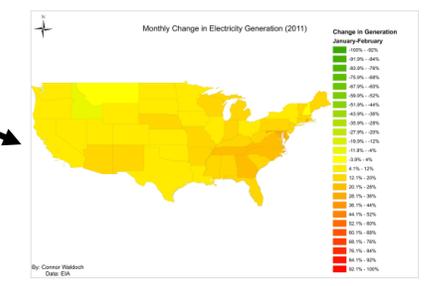
Temporal scales of relevance



Global human population trends



U.S. recession time series ('shocks' to the system)



Dynamic changes in distribution and behavior

Homo sapiens