



**NOAA  
FISHERIES**

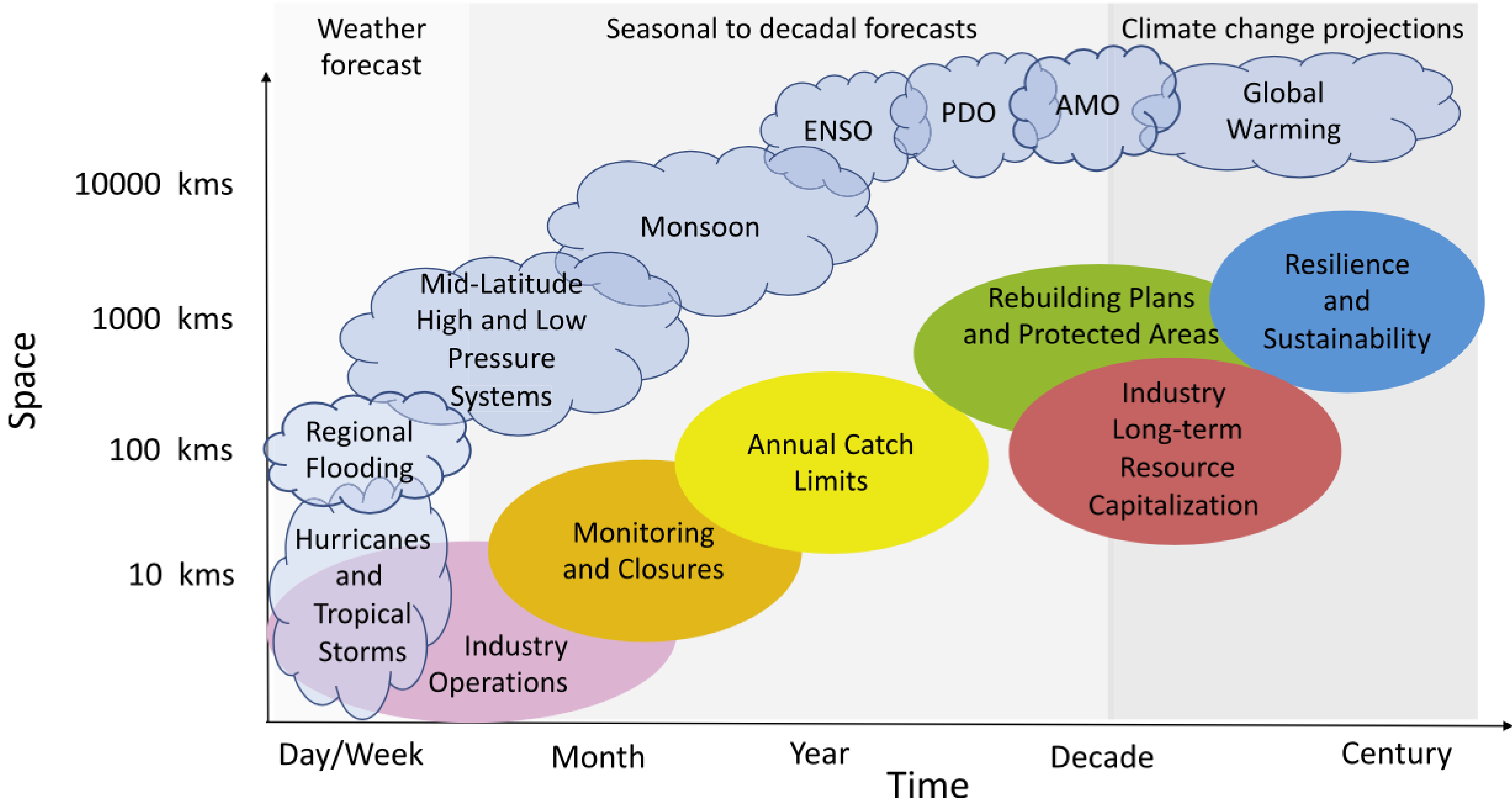
# **Anticipating medium-term climate shocks: Efforts to improve forecasts of marine heatwaves**

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NOAA Southwest Fisheries Science Center  
NOAA Earth System Research Laboratory

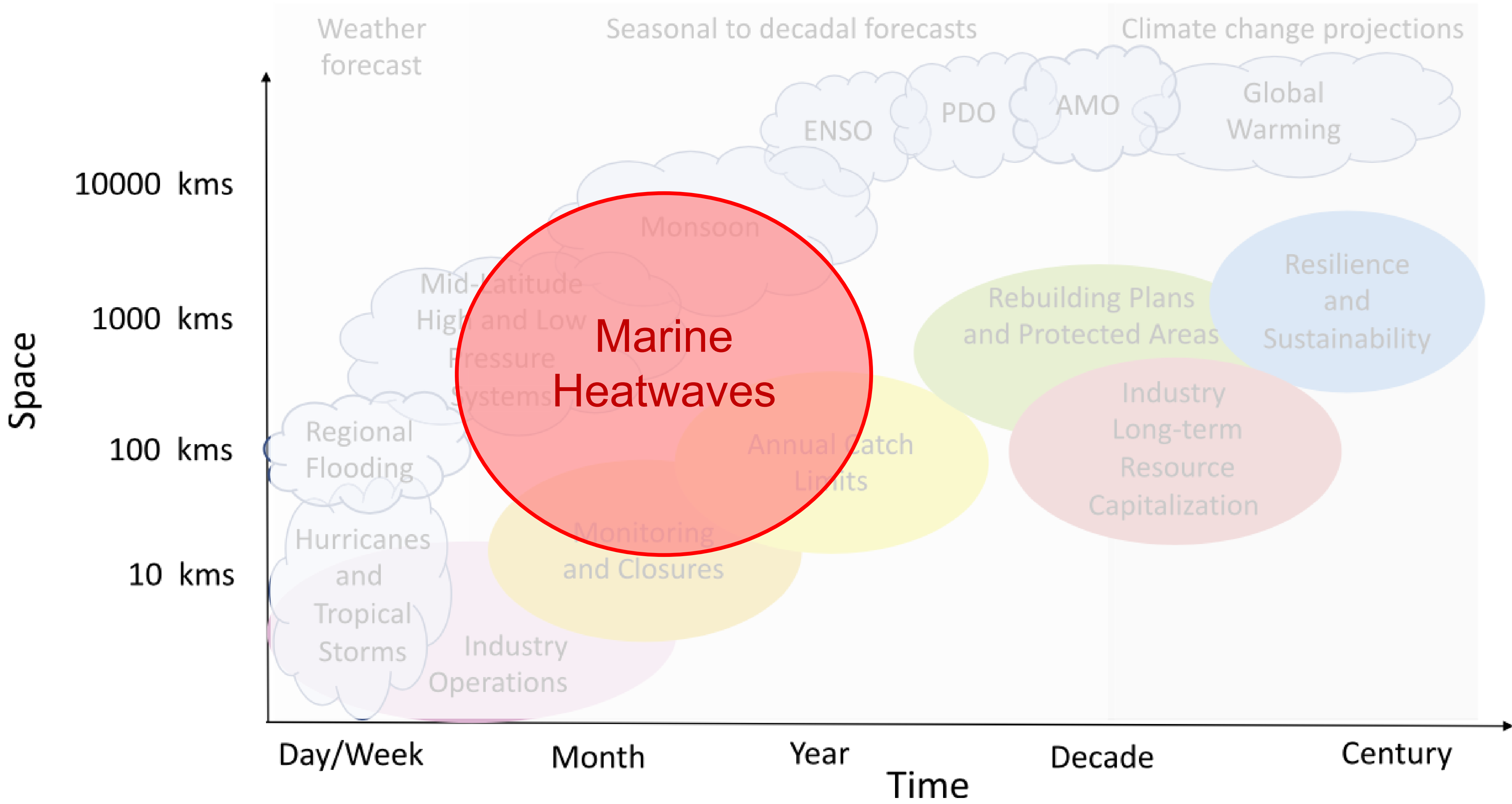
Symposium on the Fate of Fisheries in a Climate Changed World  
July 21, 2021

# Fisheries decisions span spatiotemporal scales



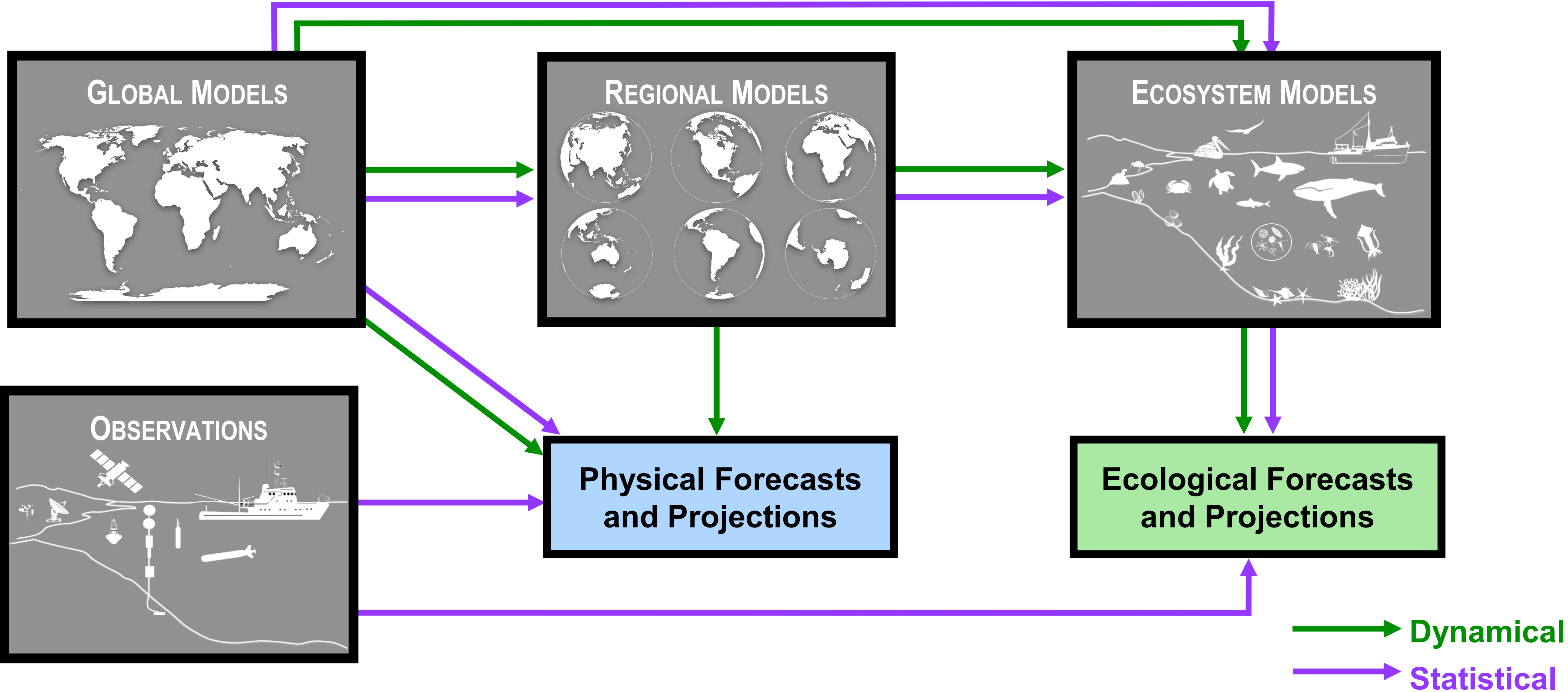
Tommasi et al. (2017)

# Fisheries decisions span spatiotemporal scales



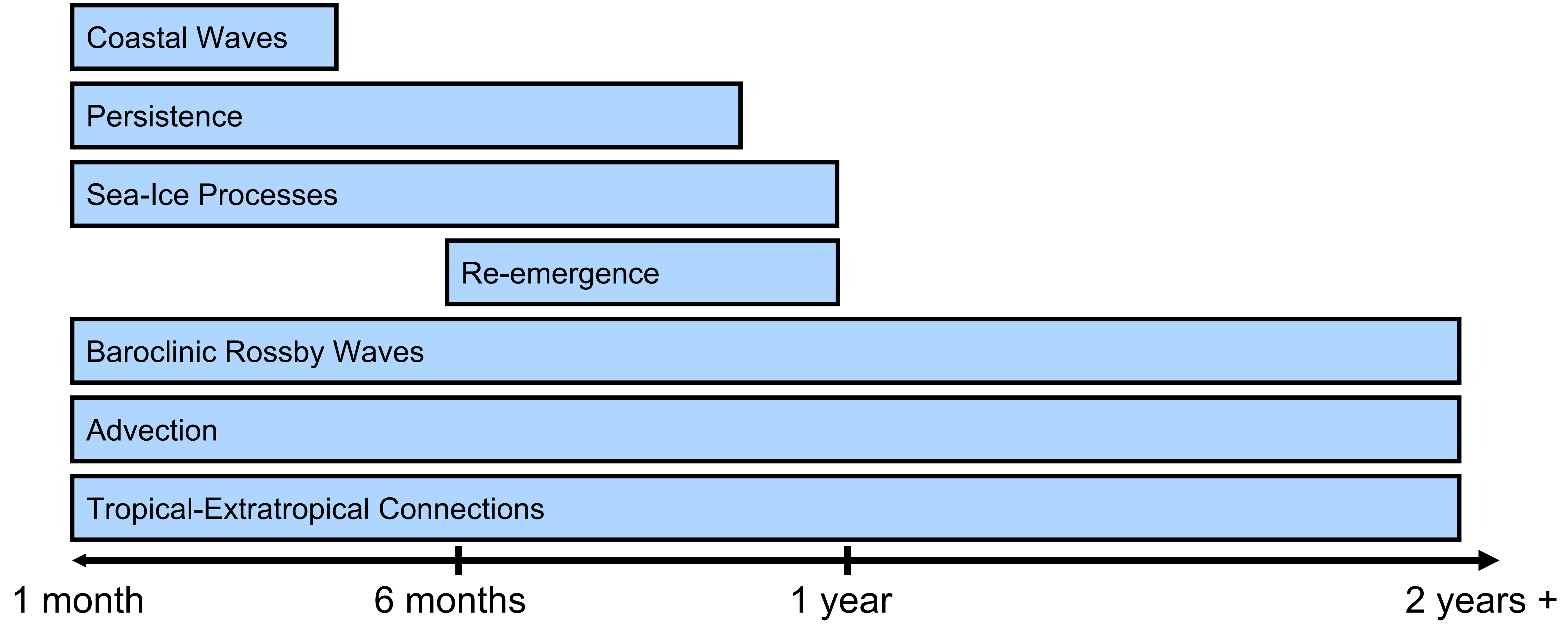
Tommasi et al. (2017)

# A powerful suite of prediction methods and tools



Jacox et al.  
(2020)

# Key processes and mechanisms for predictability



Jacox et al.  
(2020)

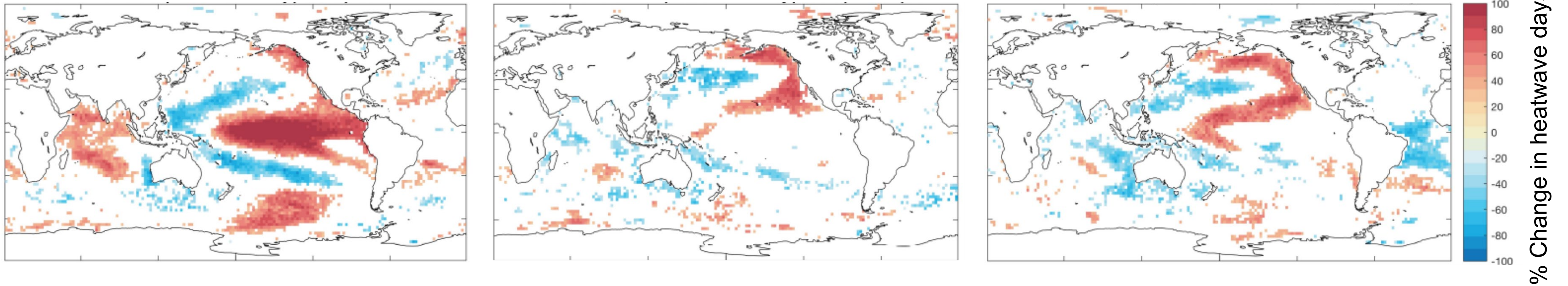
# Marine Heatwaves are influenced by large-scale climate variability

Increased Eastern Pacific heatwaves are associated with:

Positive phase of ENSO

Positive phase of PDO

Negative phase of NPGO

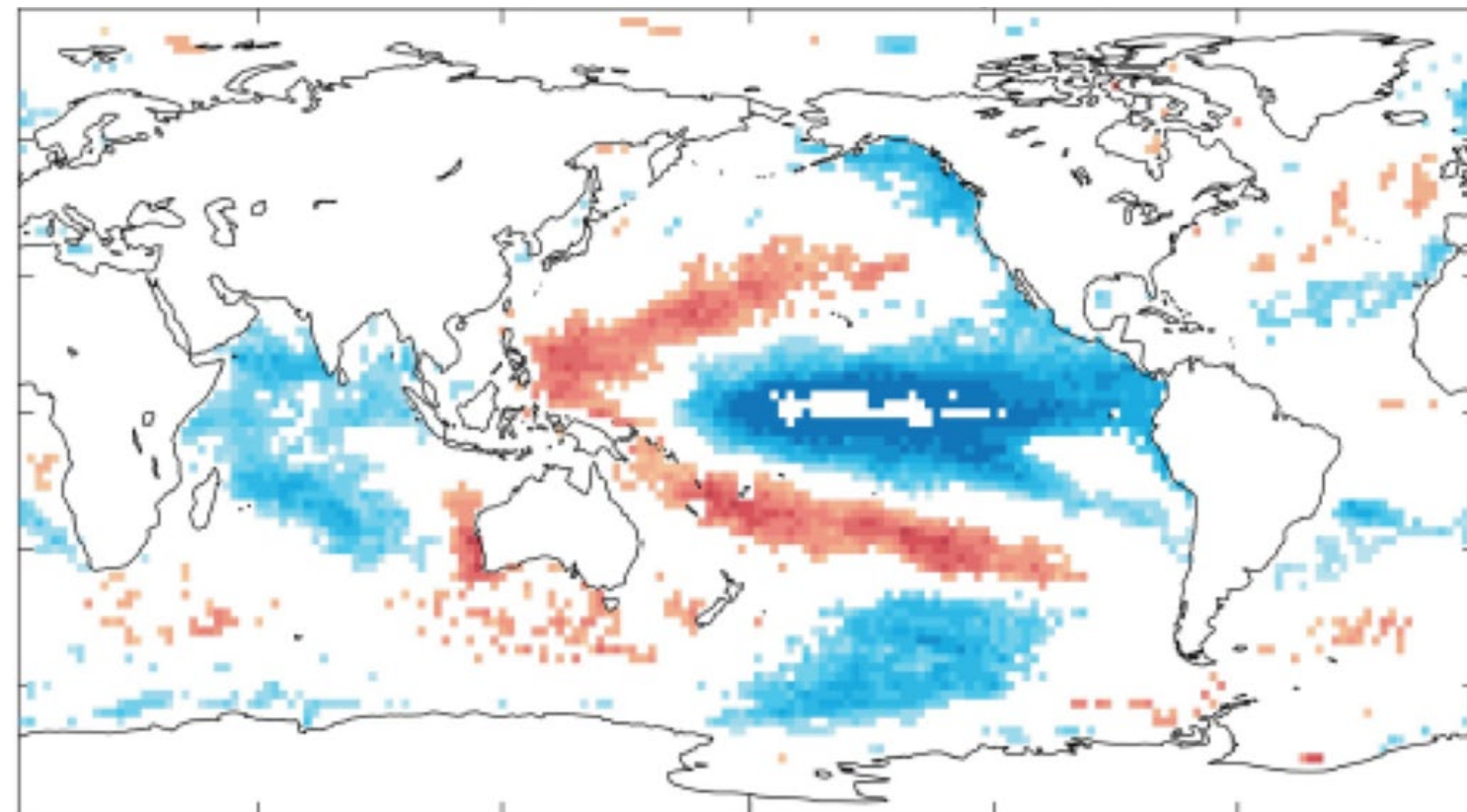


Holbrook et al. (2019)

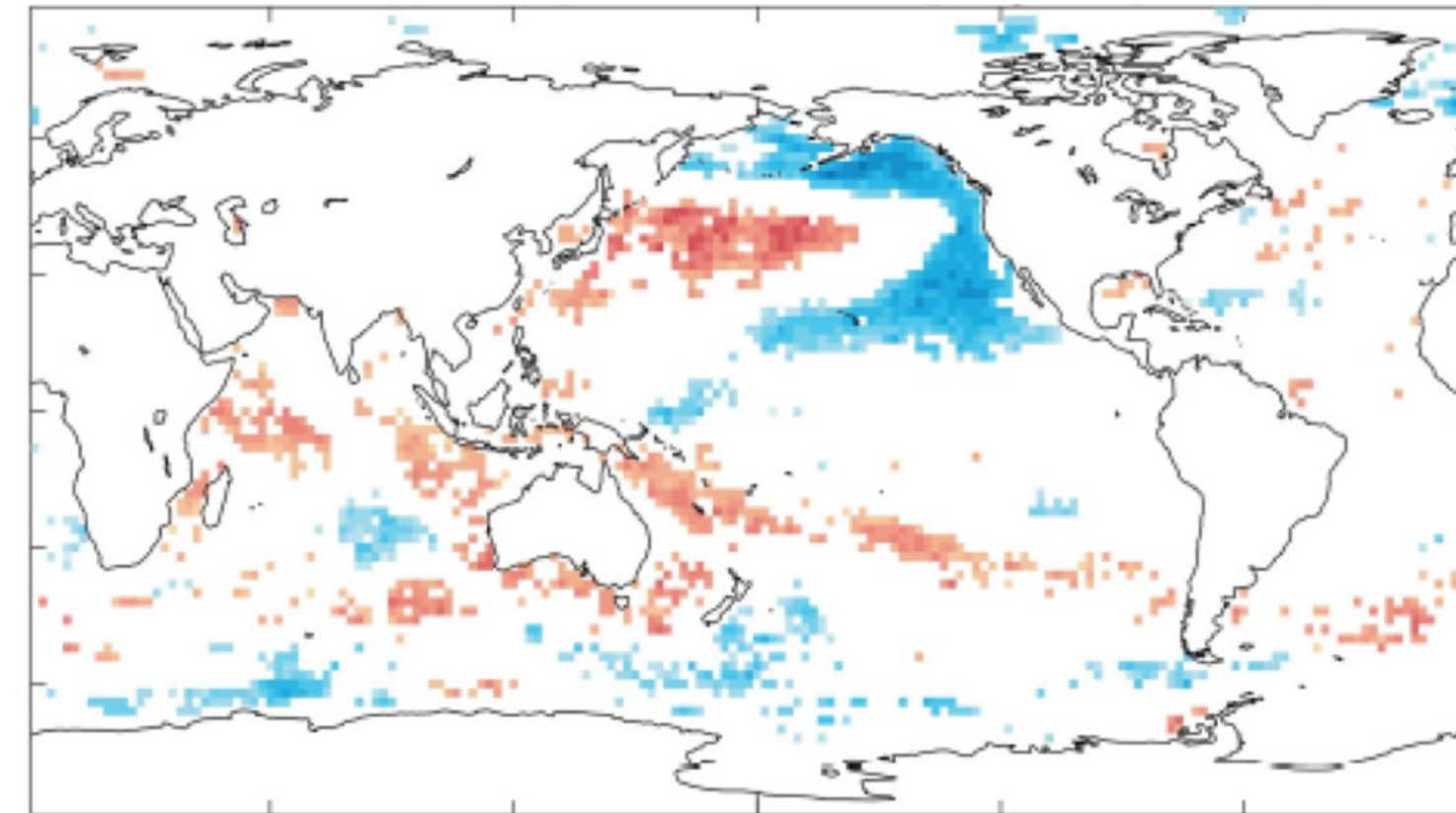
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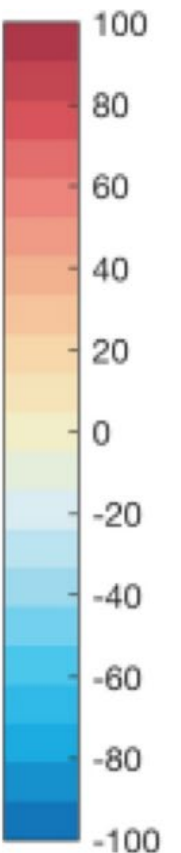
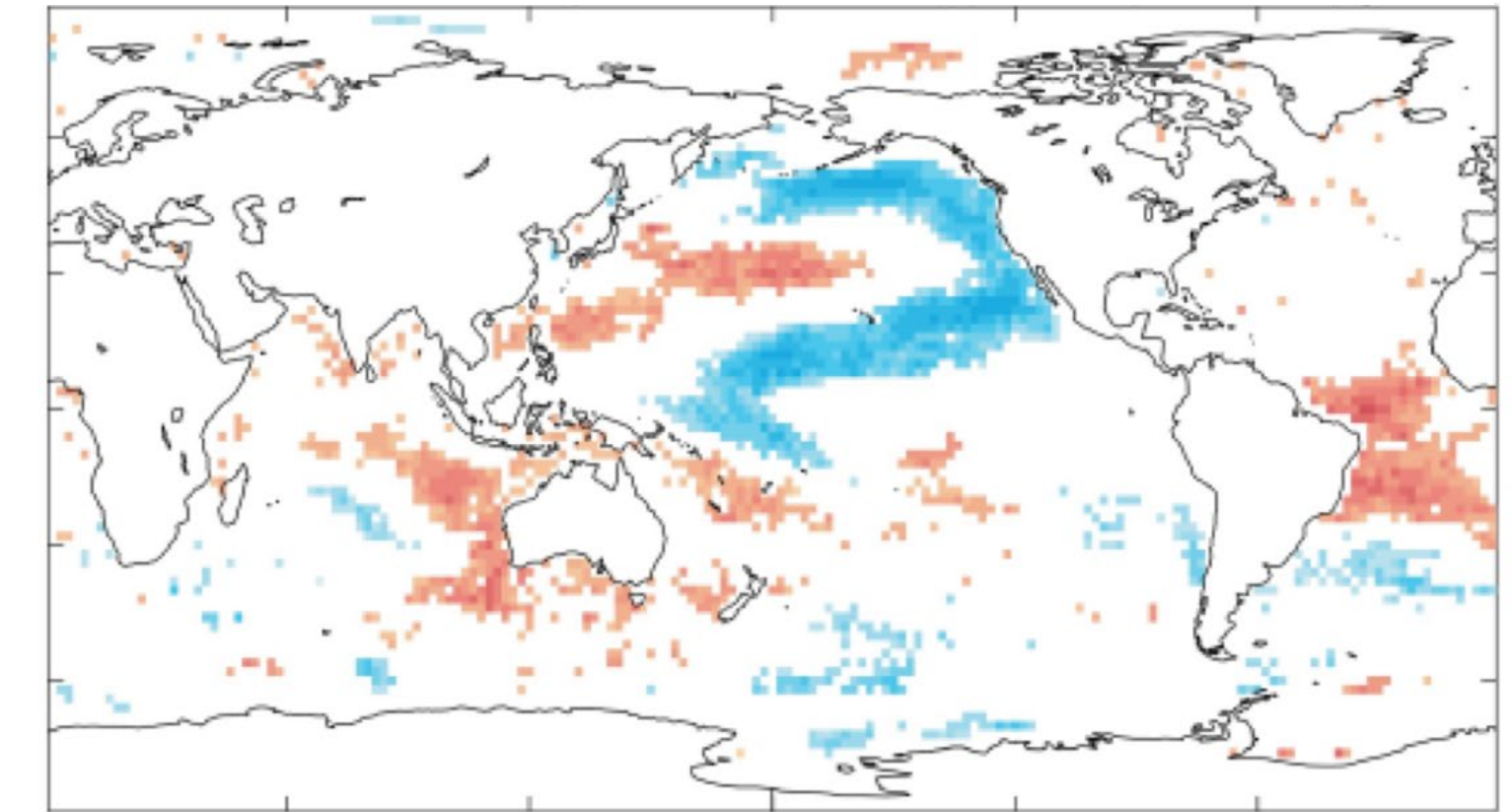
Negative phase of ENSO



Negative phase of PDO



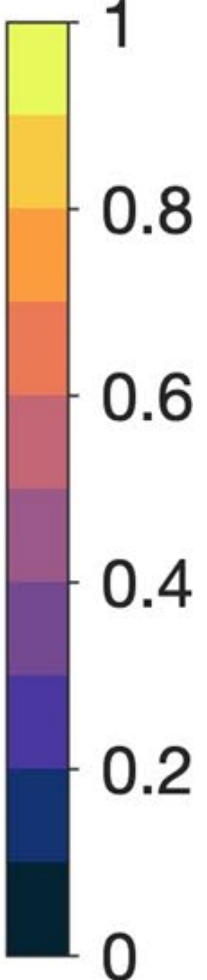
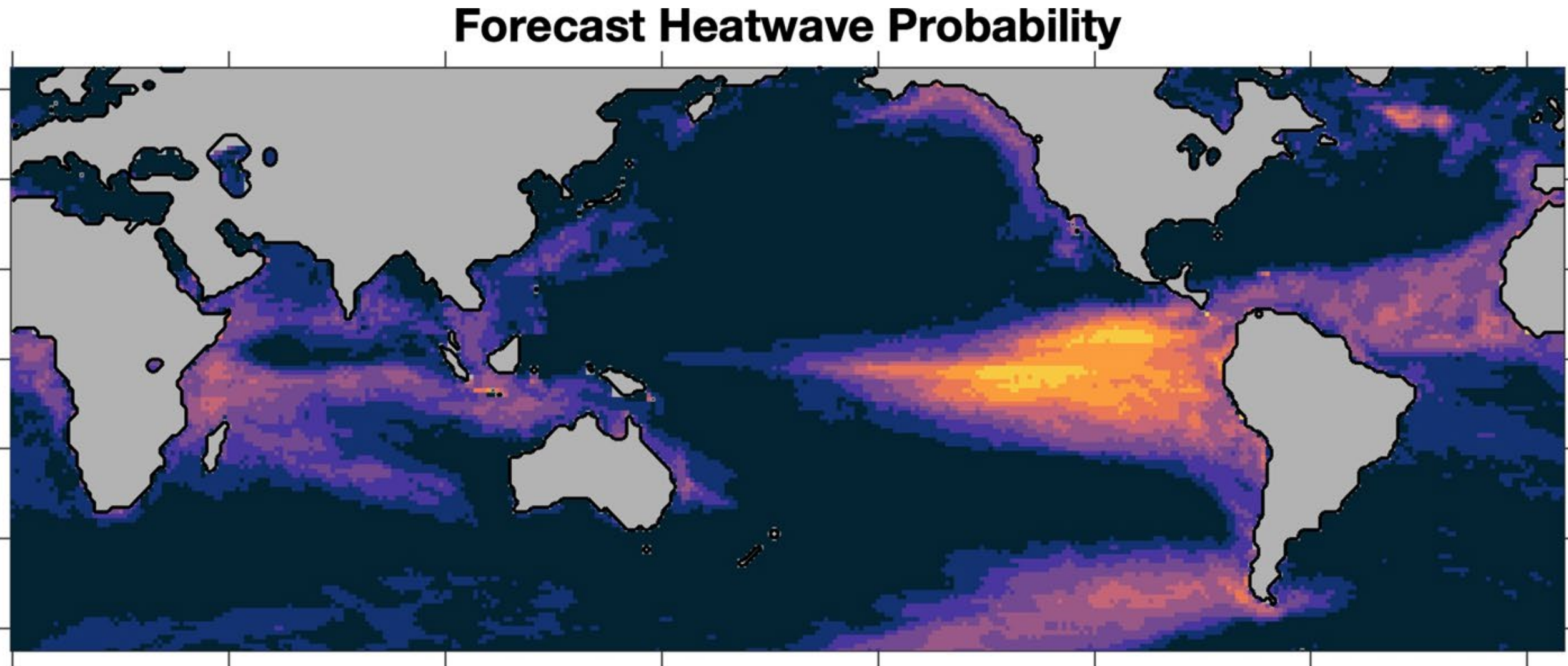
Positive phase of NPGO



% Change in heatwave days

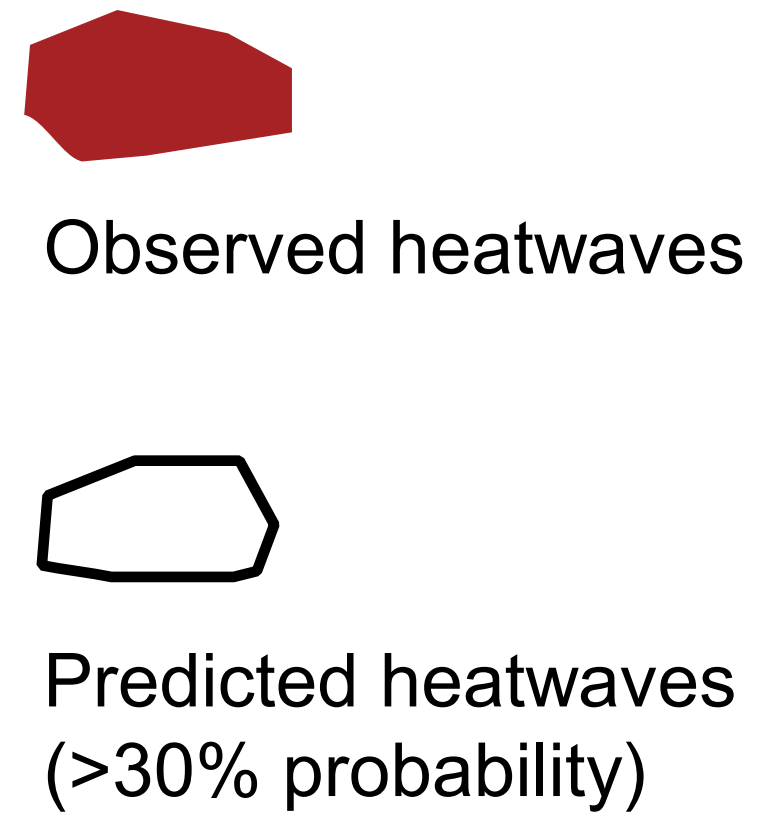
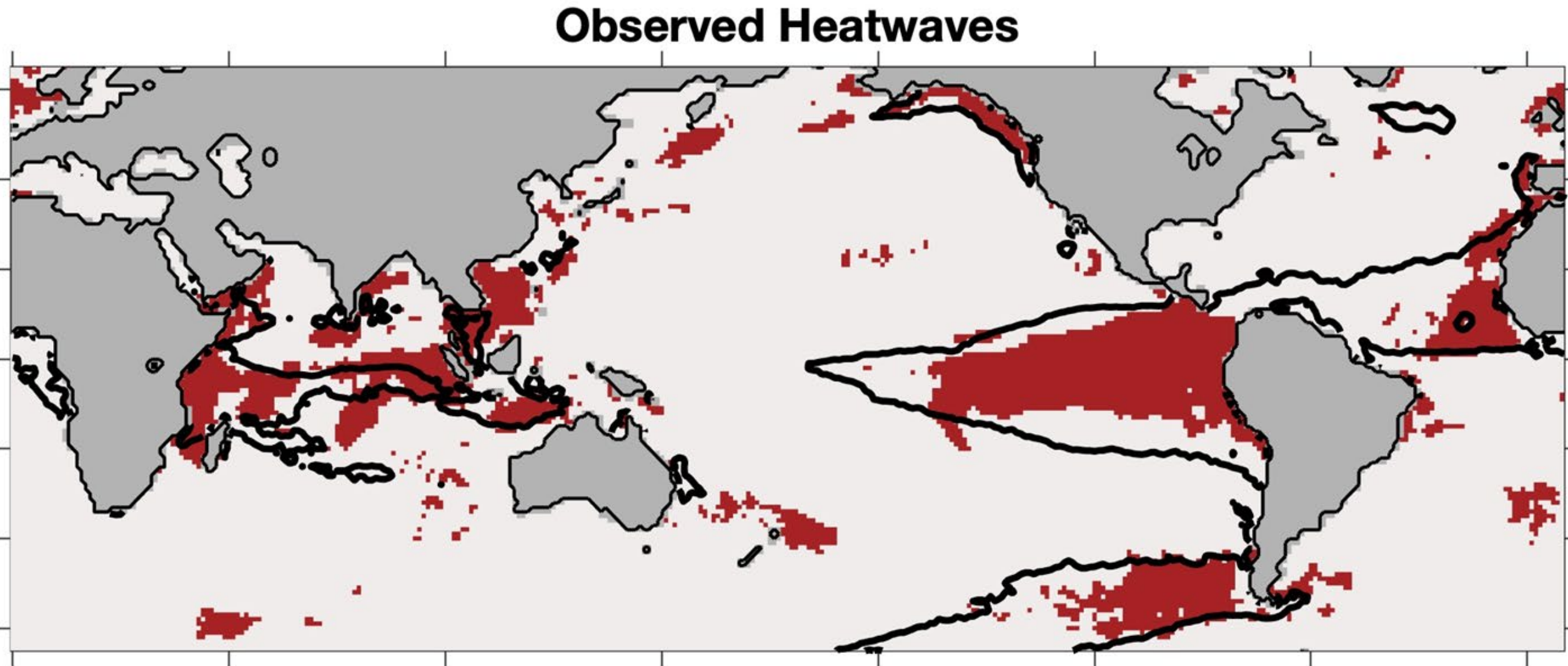
Holbrook et al. (2019)

# We are starting to test the skill of large forecast ensembles



July 1997 forecast of March 1998 heatwaves (~75-member forecast ensemble)

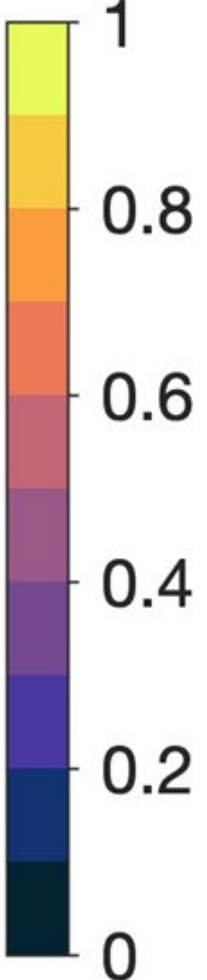
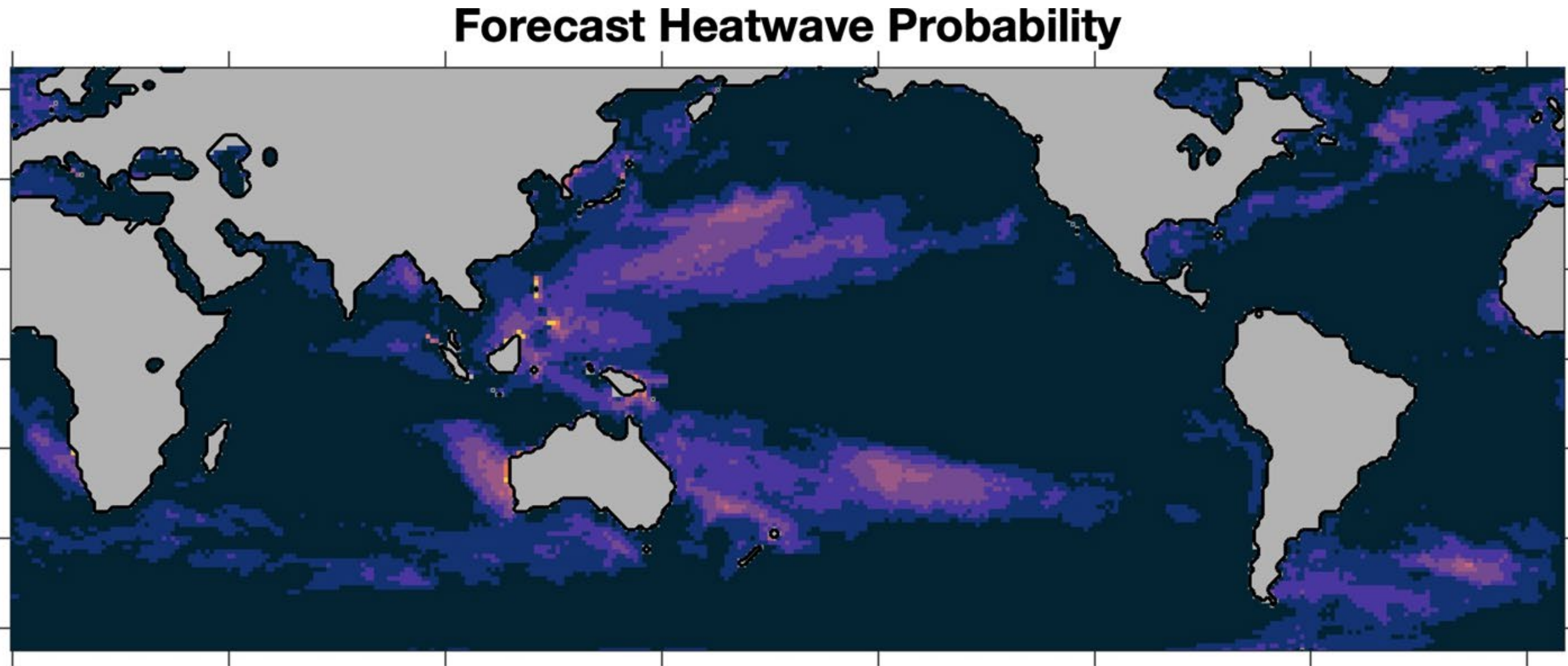
Successful prediction of Eastern Pacific heatwaves 8 months in advance



Jacox et al. (in prep)

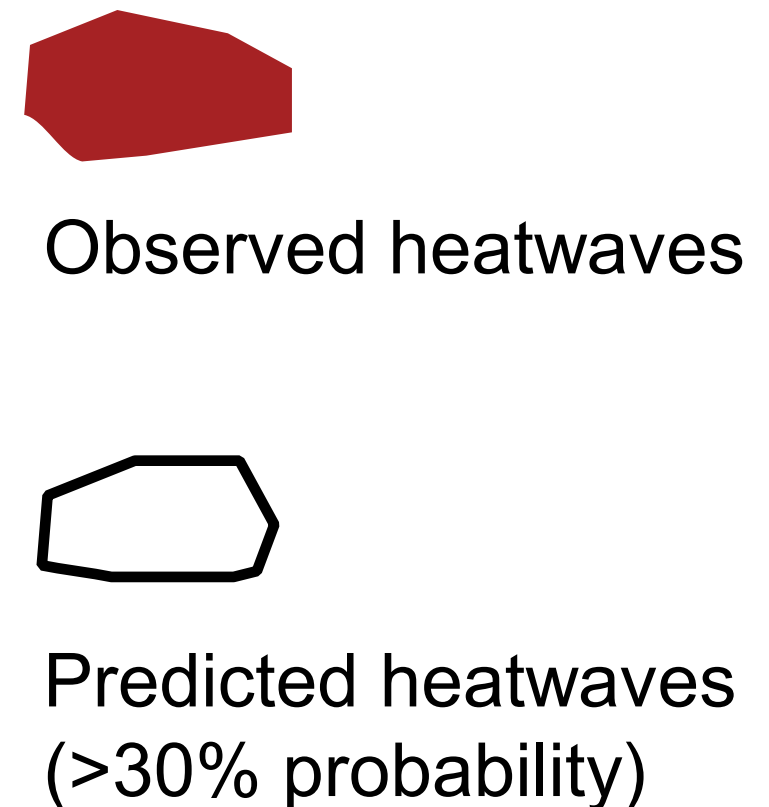
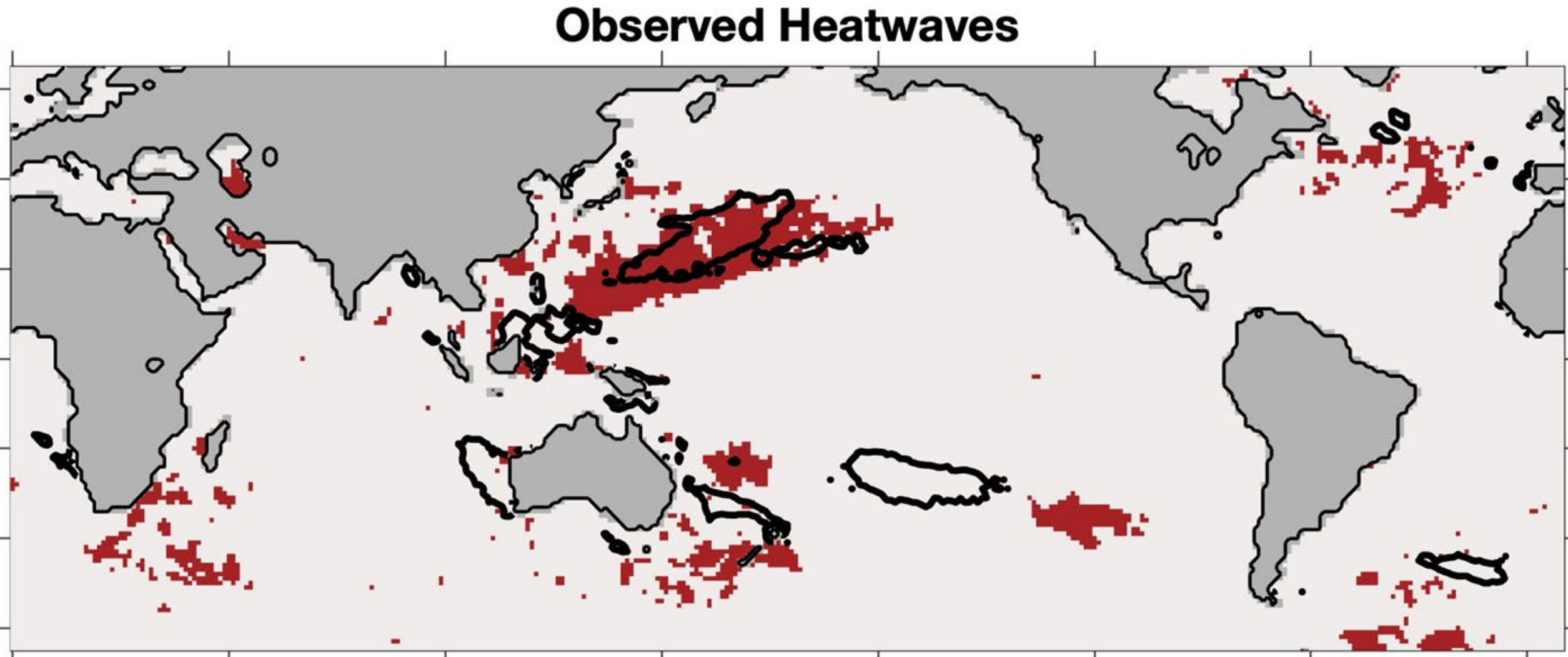


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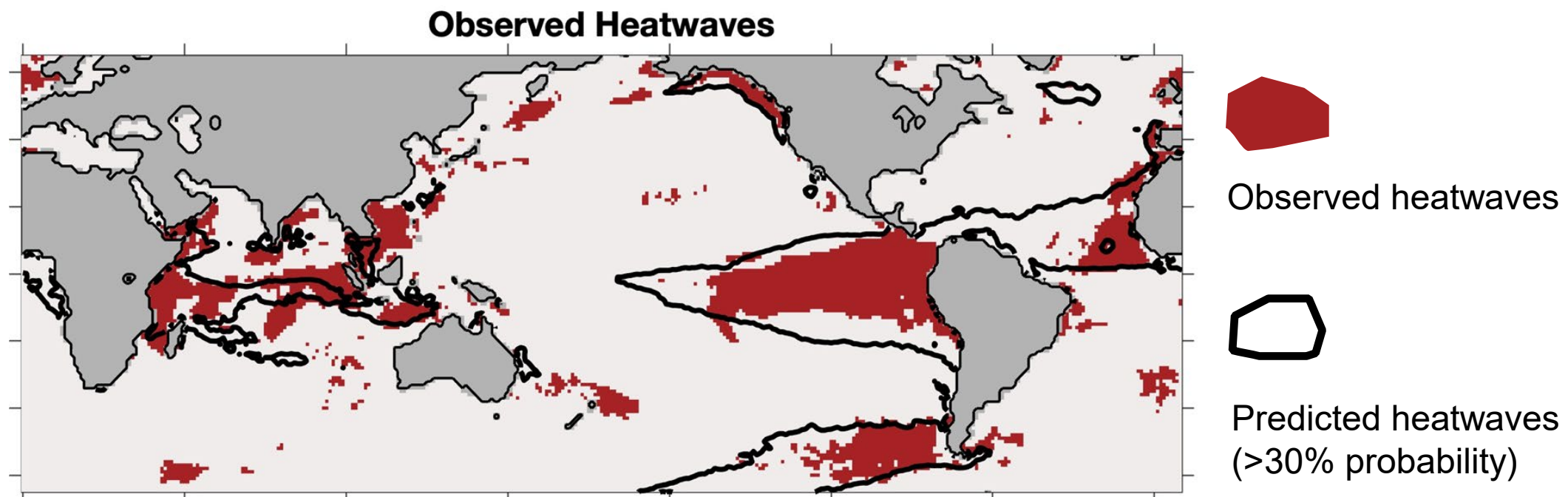
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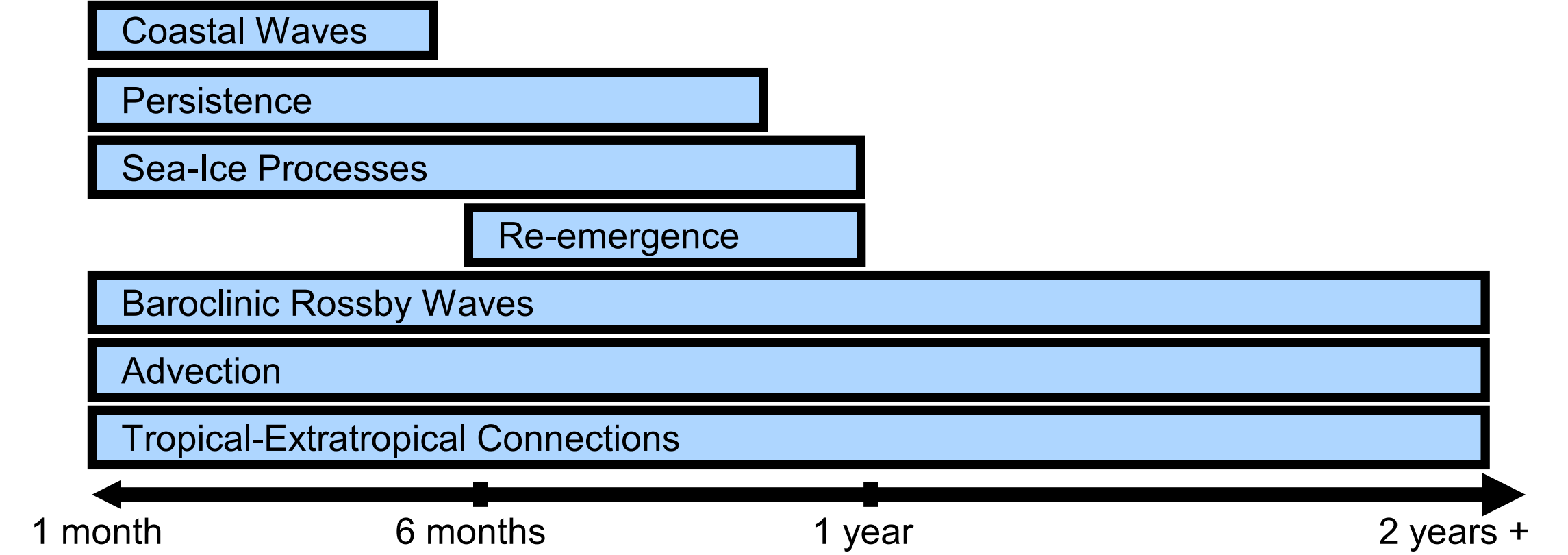
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# Pathways to progress in predicting extremes

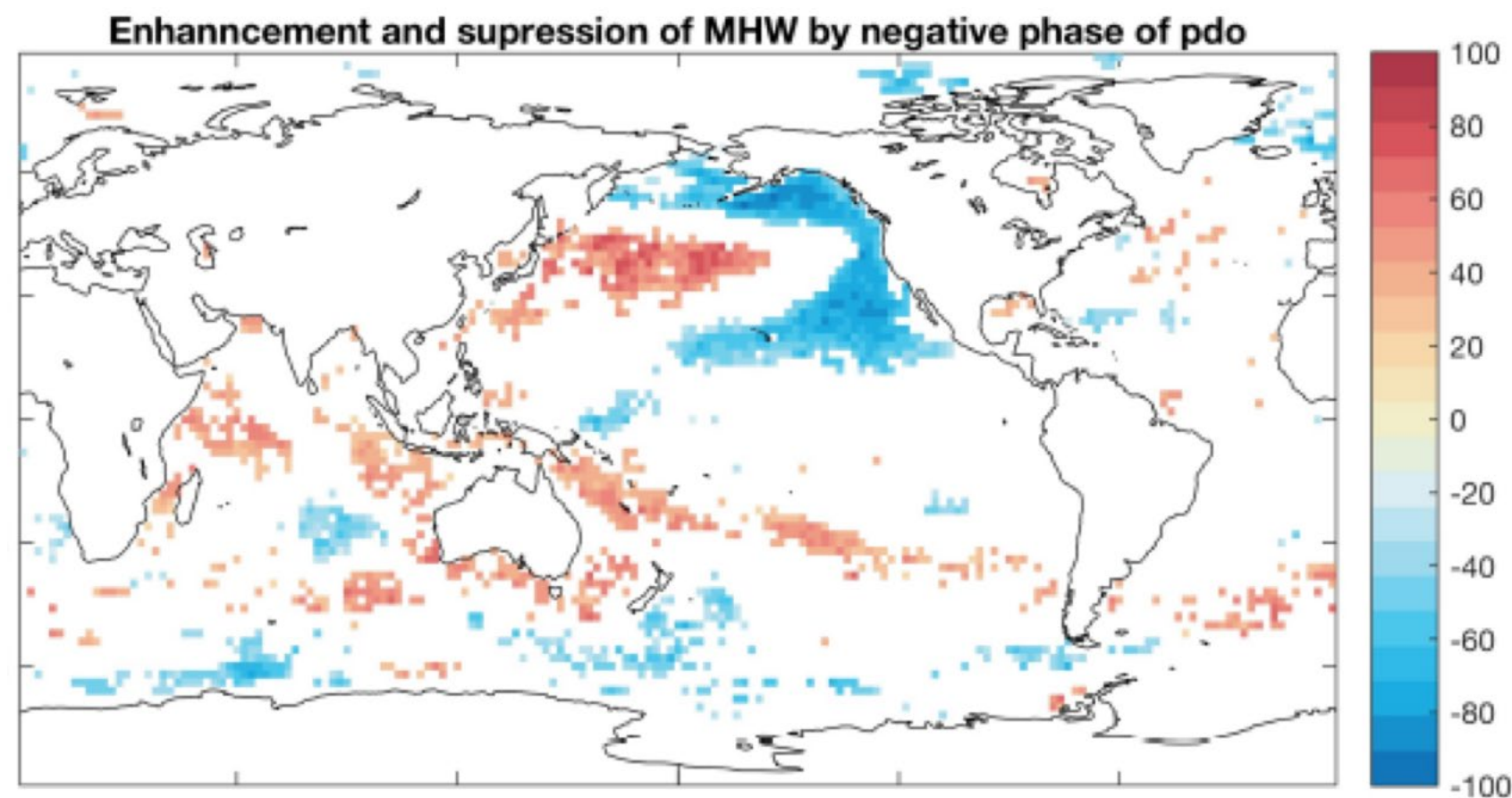
## Evaluate forecast skill



## Improve mechanistic understanding



## Quantify conditional forecast skill and uncertainty



## Improve models

