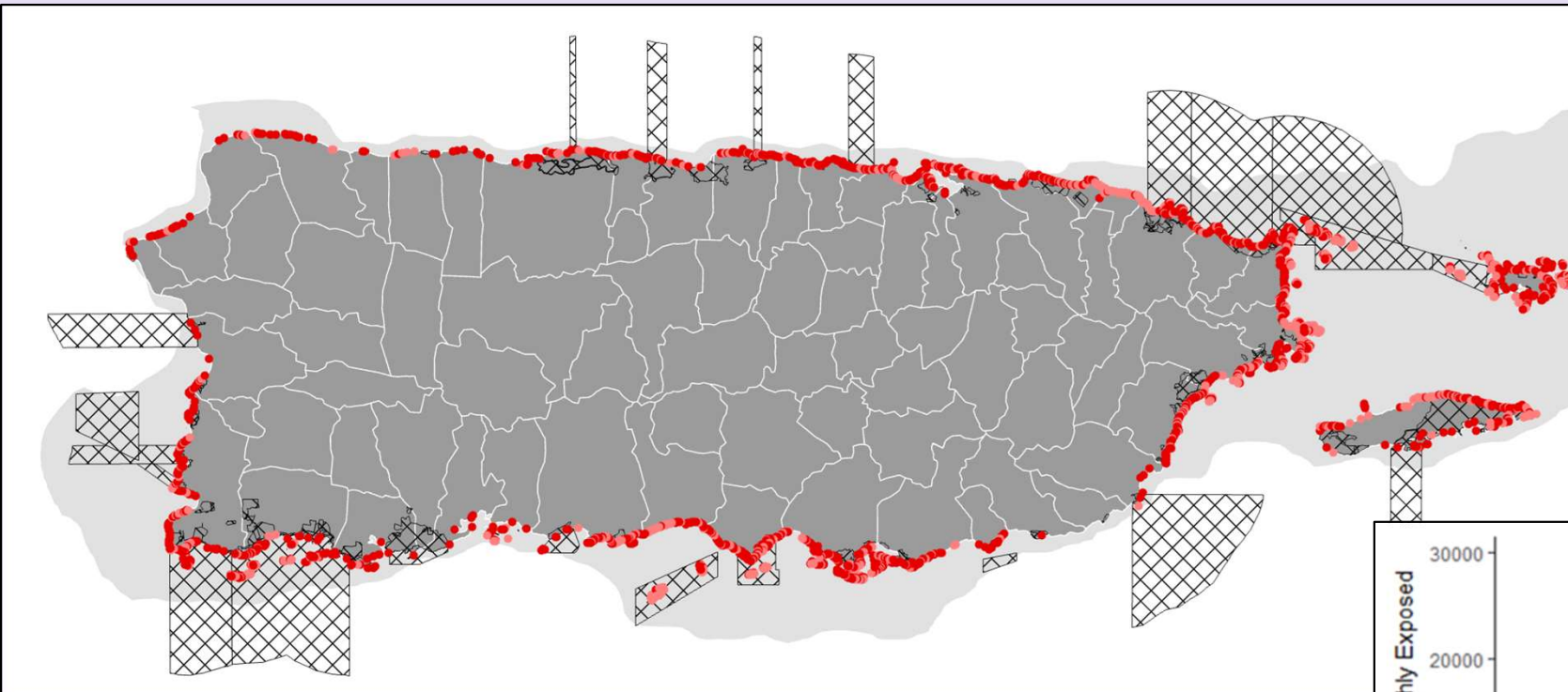


# Coastal Habitats Improve Disaster Resilience in Puerto Rico

Max Perkins et al.



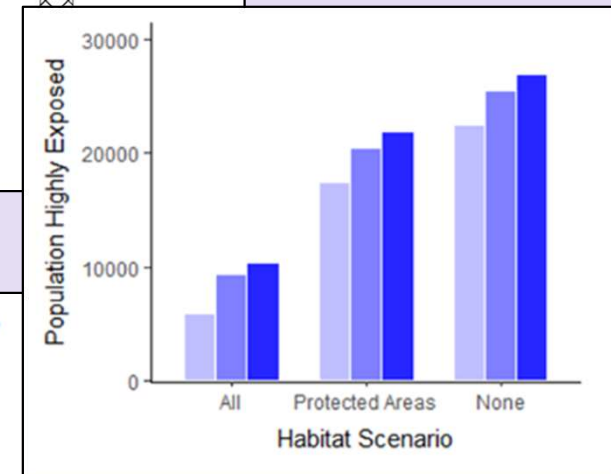
↑ *Fig. 1:* Exposure to coastal hazards with and without habitats. Protected areas offer potential risk reduction benefits.

Already at-risk  
with existing  
habitats

Becomes at-  
risk without  
habitats

2100 Sea-Level Rise

Low  
Intermediate  
High

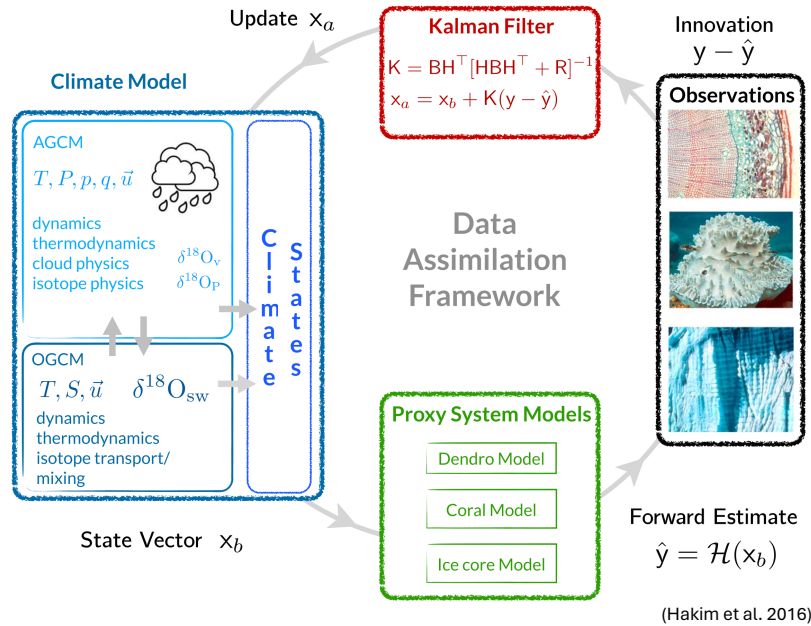


↓ *Fig. 2:* The number of people highly exposed to coastal hazards varies across habitat and sea-level rise scenarios.

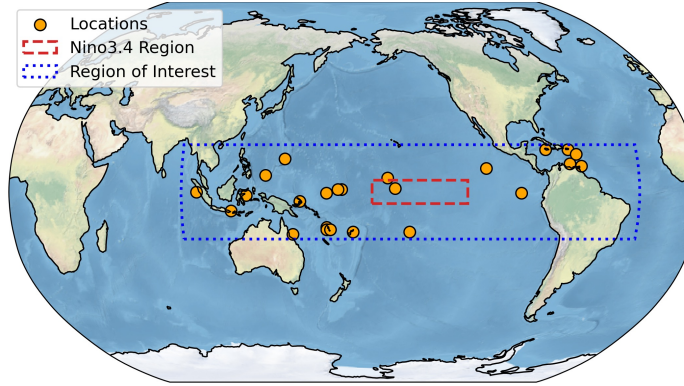
# Reconstructing the Tropical Pacific Upper Ocean using Data Assimilation with a Deep Learning model

**UW ATMS**  
Zilu Meng  
Gregory Hakim

## Paleo-climate Data assimilation



## Research region and DL Model



✓ Trained on **CMIP6**  
✓ Validated on **SODA**

$X_{t+1:t+12}^{out} = DL(X_{t-12:t}^{in})$

Surface wind stress  
upper ocean temperature

## Data assimilation method

**Kalman Filter:**

$$x_a = x_p + K[y - \mathcal{H}(x_p)]$$

$$K = BH^T[HBH^T + R]^{-1}$$

**Online DA:**

$$x_{p,t+1} = \mathcal{M}(x_{a,t})$$

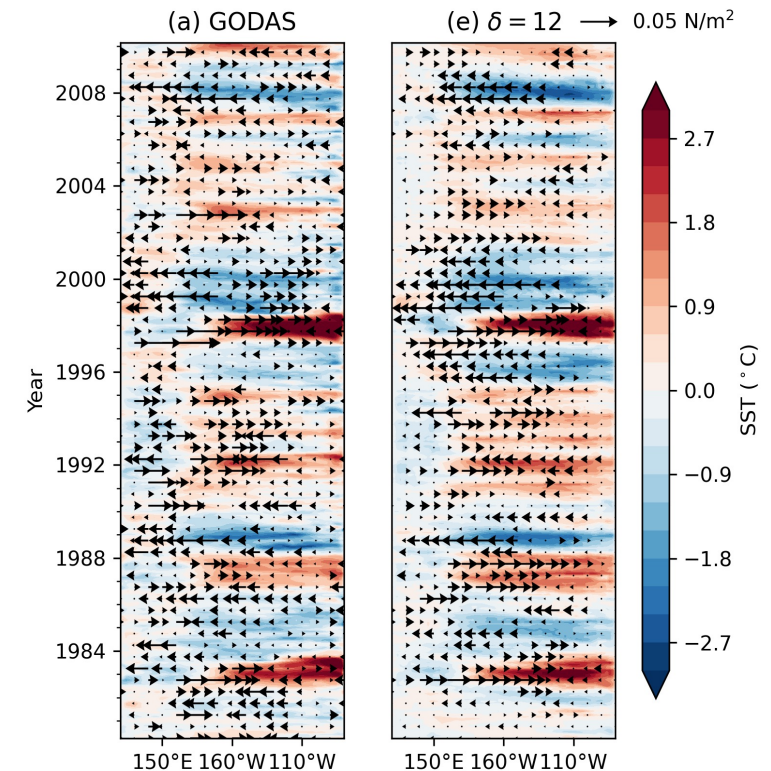
$\mathcal{M}$ : Climate Model

## Pseudo-proxy experiments

$$y_{avg,N} = \frac{1}{N} \sum_{i=k+1}^{k+N} y_i, \quad y'_{avg,N} = y_{avg,N} + \zeta;$$

- Generating SST proxy from **GODAS** (ground truth);
- Average proxy N months (N = 1,3,6,12);
- Reconstruct monthly climate fields;

## Data assimilation result

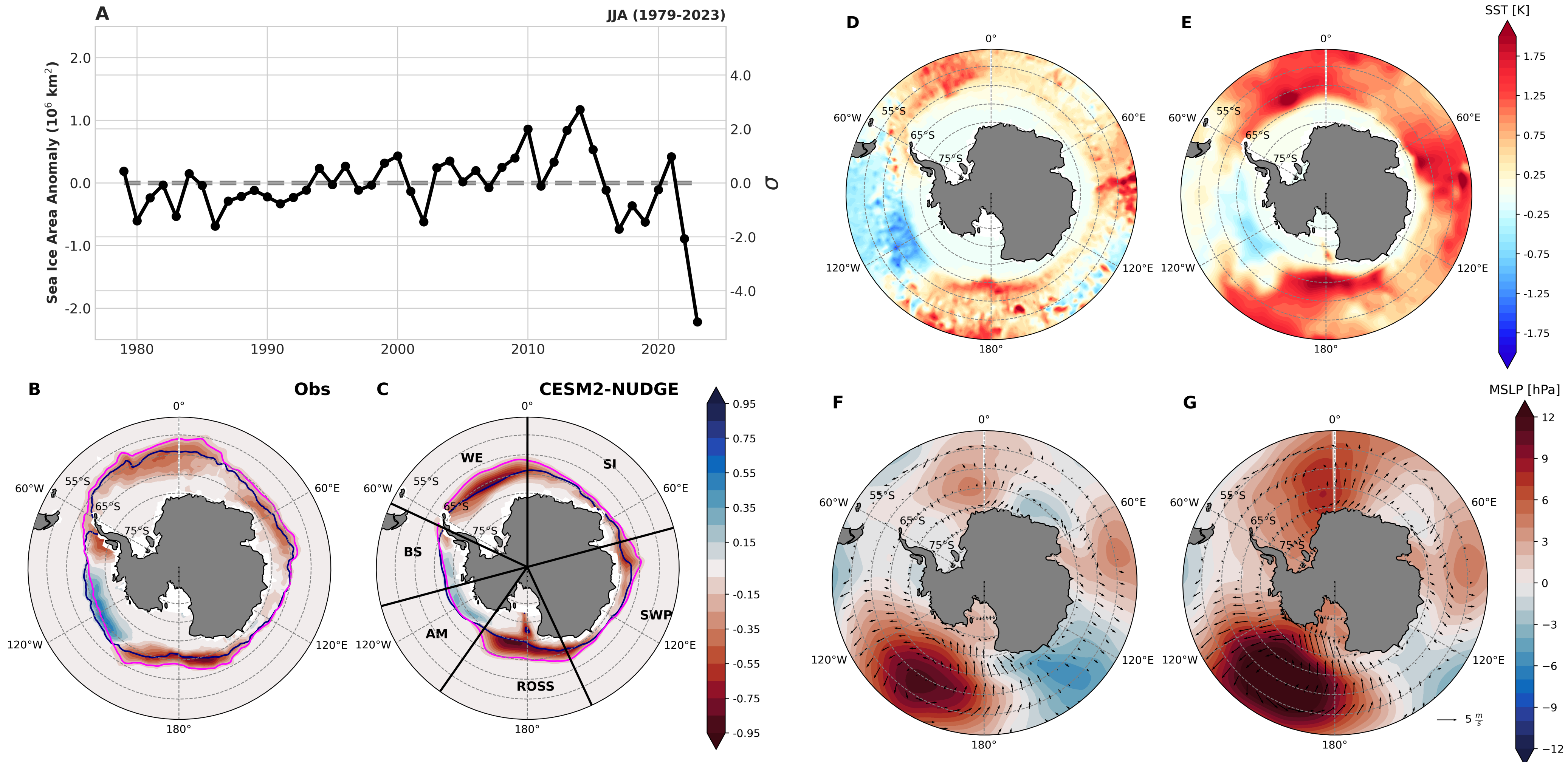


Vector: equatorial wind stress; Shading: SST

ENSO can be reconstructed by 24 annual-mean proxies by DL DA.



# Antarctic Sea Ice in Winter 2023 was at a Record Low



Zac Espinosa<sup>1</sup>  
Edward Blanchard-Wrigglesworth<sup>1</sup>  
Cecilia Bitz<sup>1</sup>

<sup>1</sup>Atmospheric Sciences, University of Washington PCC Spring Symposium