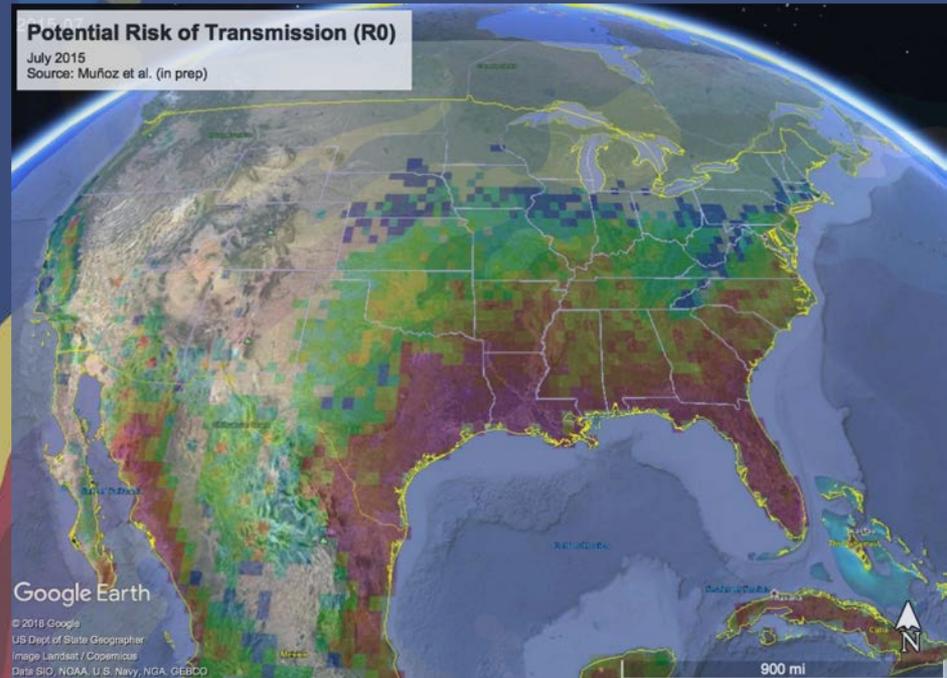


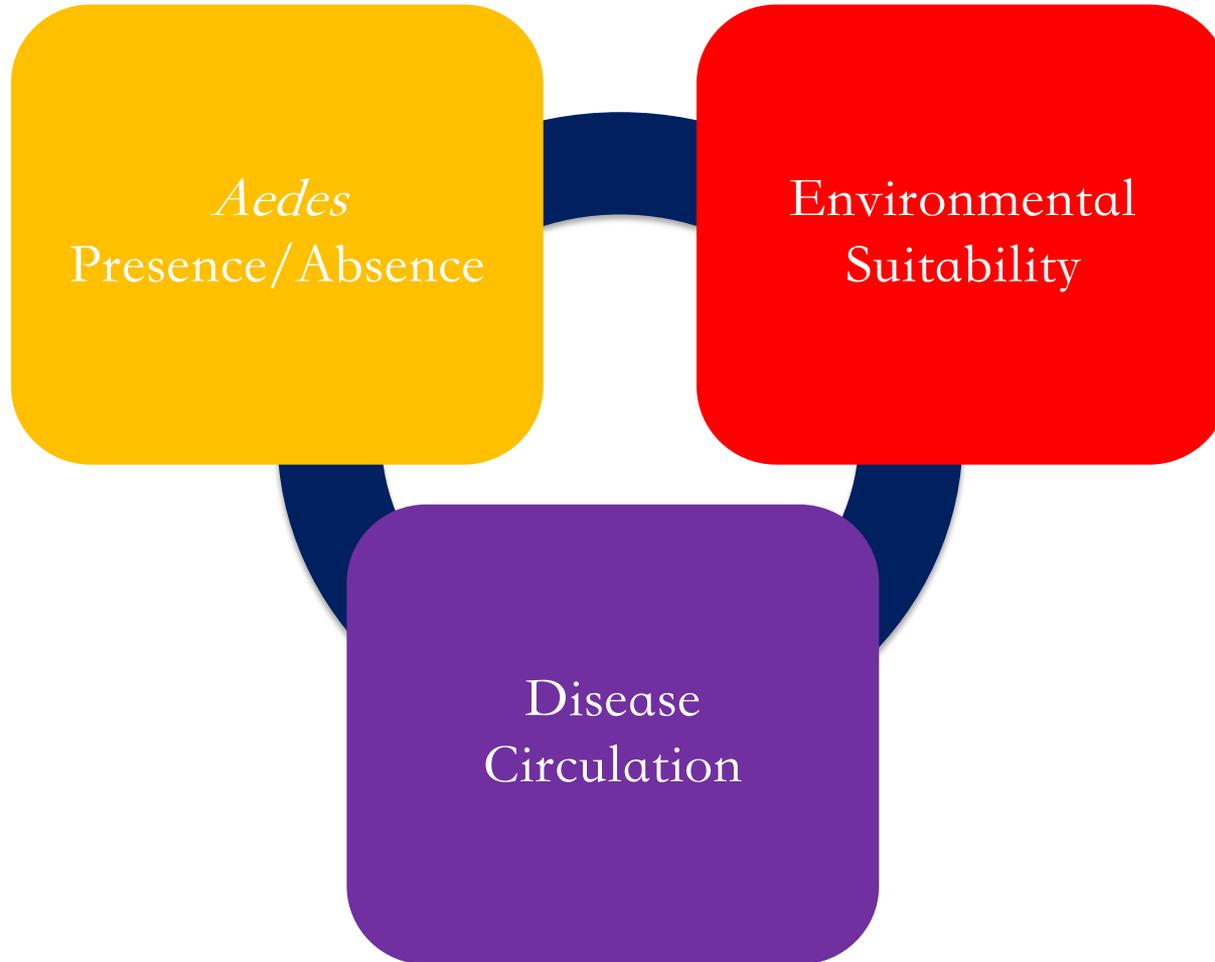
# A Next-Generation Monitoring and Forecasting System for Environmental Suitability of *Aedes*-borne Disease Transmission

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agmunoz@iri.columbia.edu

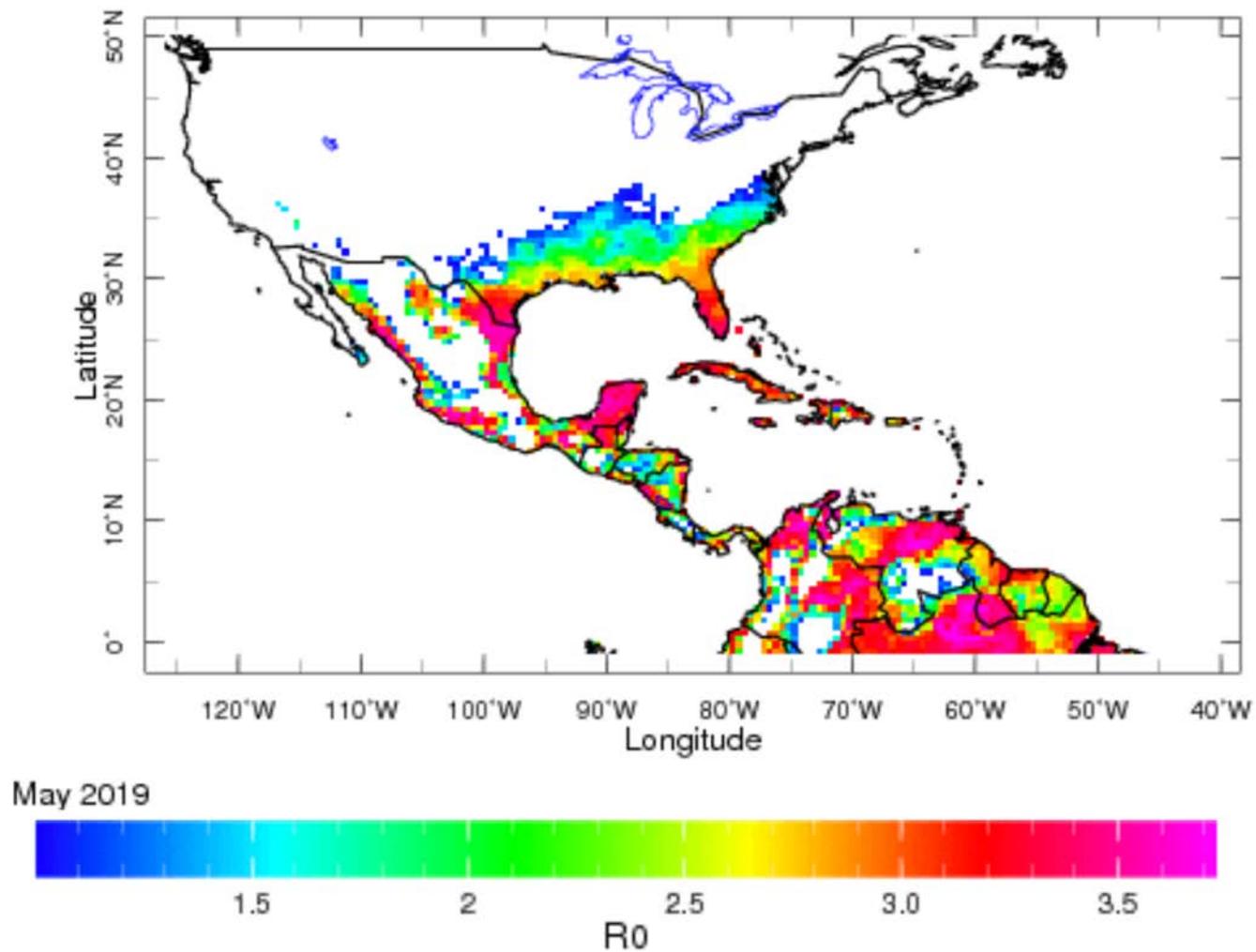
Xandre Chourio,  
Pallavi Kache,  
María Diuk-Wasser,  
Erin Mordecai,  
Laura Harrington,  
Madeleine C. Thomson



# A next-gen monitoring and forecast system of *Aedes* -borne diseases



# Environmental Suitability



# A multi-model monitoring and forecast system for environmental suitability of *Aedes*-borne diseases

Outcome: monitor and forecast system for environmental suitability (past or future)

Caminade et al



Wesolowski et al

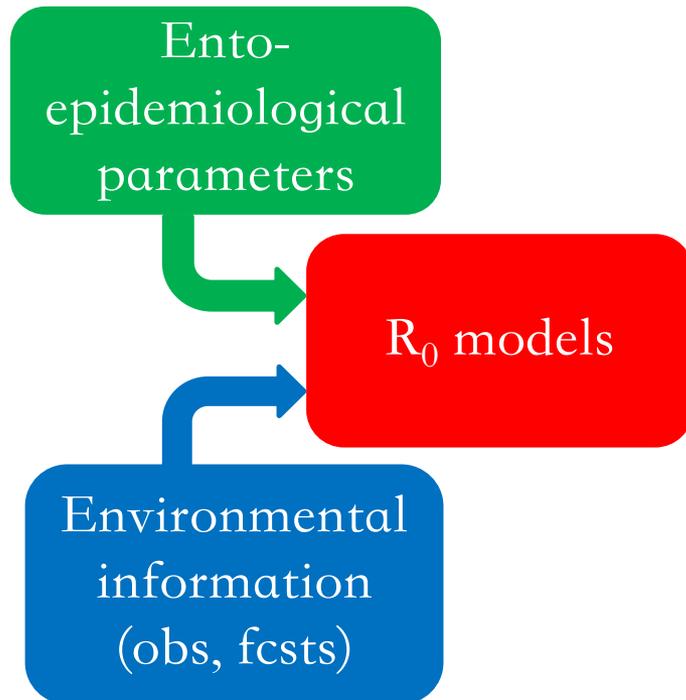
Liu-Helmersson et al

Mordecai et al

- Multiple validated basic reproduction number ( $R_0$ ) models for *Aedes*-borne diseases



# A multi-model monitoring and forecast system for environmental suitability of *Aedes*-borne diseases

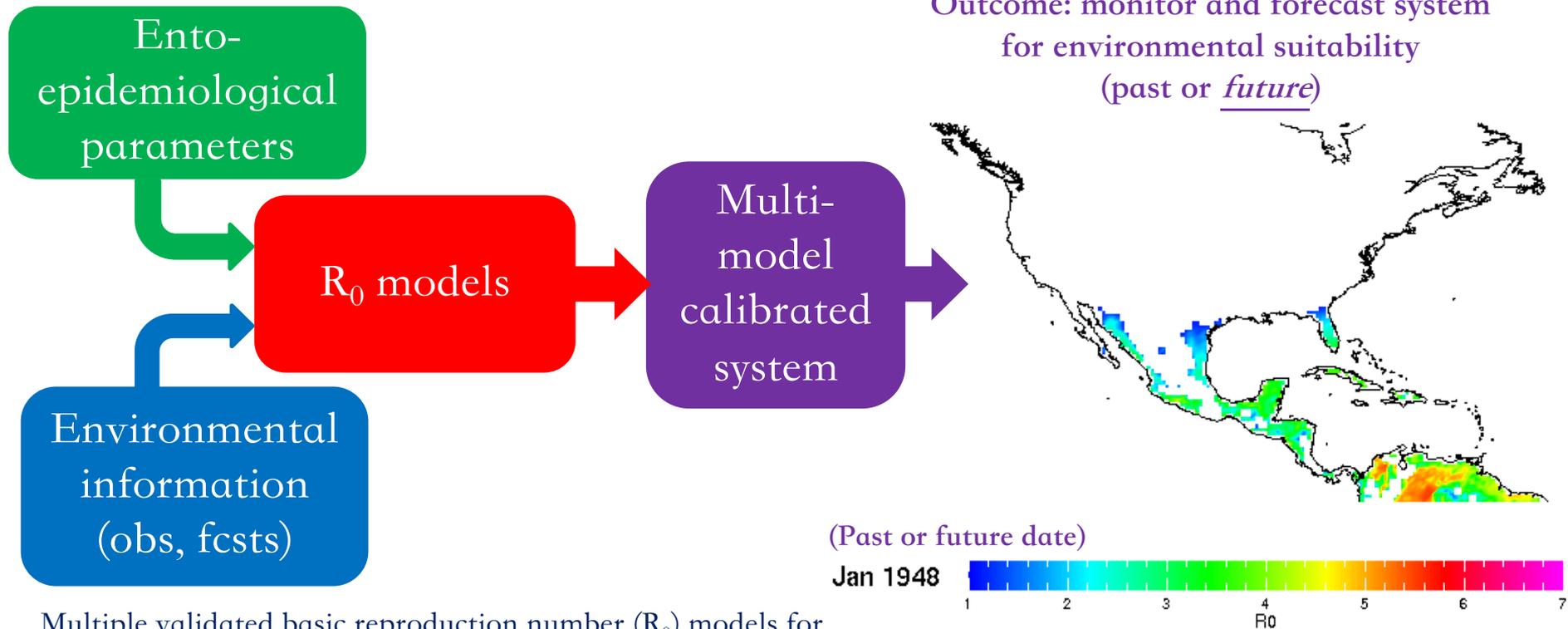


Outcome: monitor and forecast system for environmental suitability (past or future)

- Multiple validated basic reproduction number ( $R_0$ ) models for *Aedes*-borne diseases
- System uses both ento-epidemiological parameters and climate information (observed or forecast) to estimate past, present and future (from weeks to a few months) environmental suitability.

- Seasonal *climate* forecast: NMME
- Sub-seasonal climate forecasts: S2S Database/NOAA's SubX

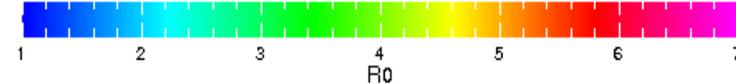
# A multi-model monitoring and forecast system for environmental suitability of *Aedes*-borne diseases



Outcome: monitor and forecast system for environmental suitability (past or future)

(Past or future date)

Jan 1948

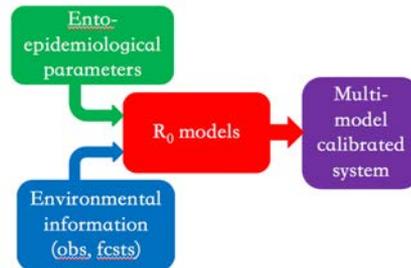


Environmental suitability (R<sub>0</sub>) for Aedes-borne diseases. [Muñoz et al., 2016, 2017a,b, 2018]

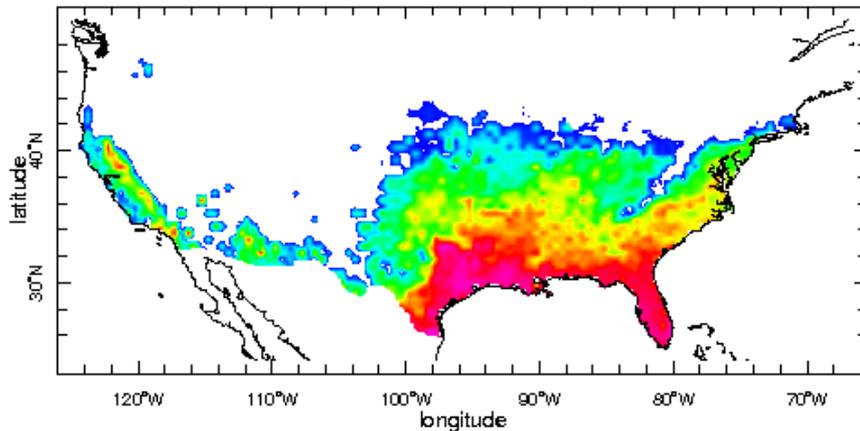
- Multiple validated basic reproduction number (R<sub>0</sub>) models for Aedes-borne diseases
- System uses both ento-epidemiological parameters and climate information (observed or forecast) to estimate past, present and future (from weeks to a few months) environmental suitability.
- Systematically combined in a calibrated multi-model ensemble.

- Seasonal *climate* forecast: NMME
- Sub-seasonal climate forecasts: S2S Database/NOAA's SubX

# Observations: Monitoring System

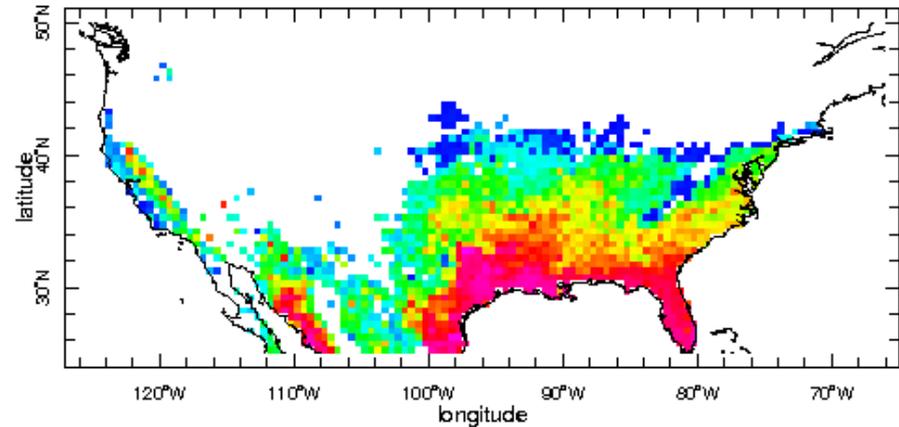


R0 model (PRISM)

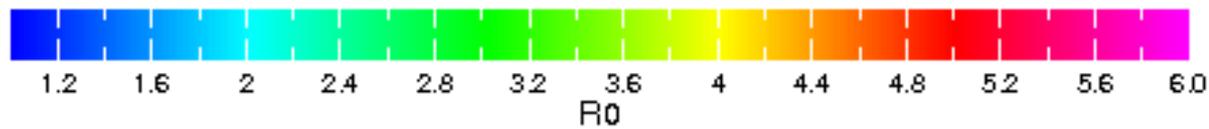


Aug 1998

R0 model (CRUv4)



Aug 1998



# Observations: Monitoring System

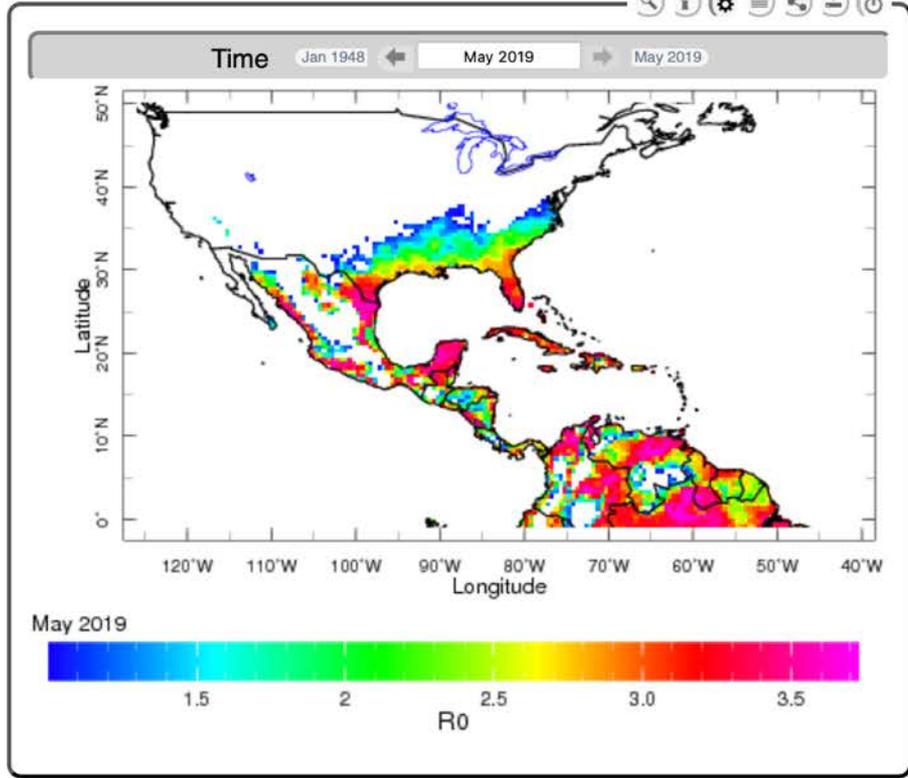


Climate and Diseases  
**Vector-Borne Diseases Regional Centers for Excellence**

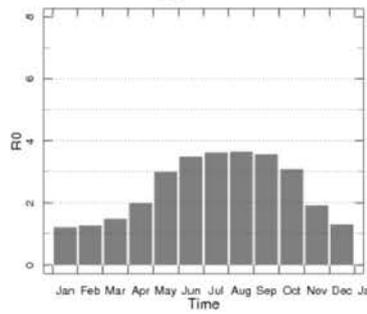
Climate and Aedes  
 Climate and Aedes

Maps  
 R0 Historical

Description More Information Dataset Documentation Instructions Contact

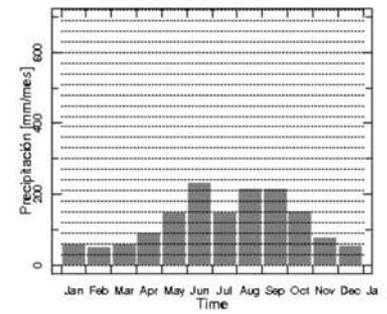


[80.5W-80W, 25.5N-26N]  
**R0**



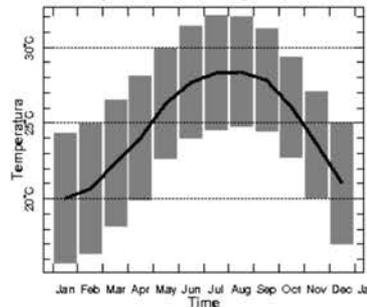
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**PRECIPITATION**

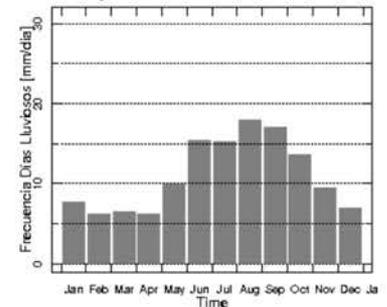


bb:-80.5:25.5:-80:26:bb

**TEMPERATURE (Min,Med,Max)**



**WET DAYS days/month with rain**

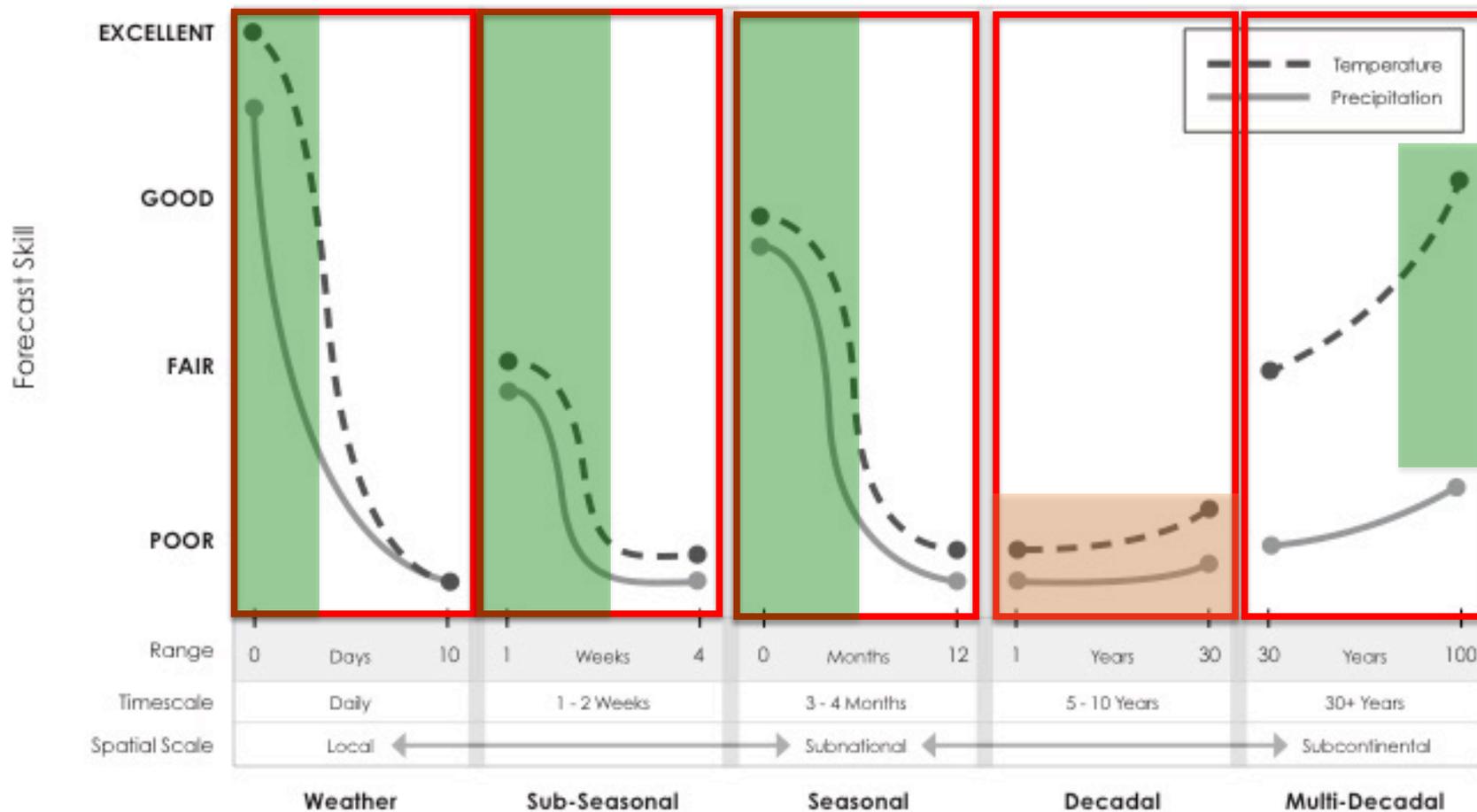


## Climate and Aedes

This maproom presents information about climatic variables and their influence on diseases transmitted by mosquitos Aedes. The user can choose to display a map of the presence of vectors

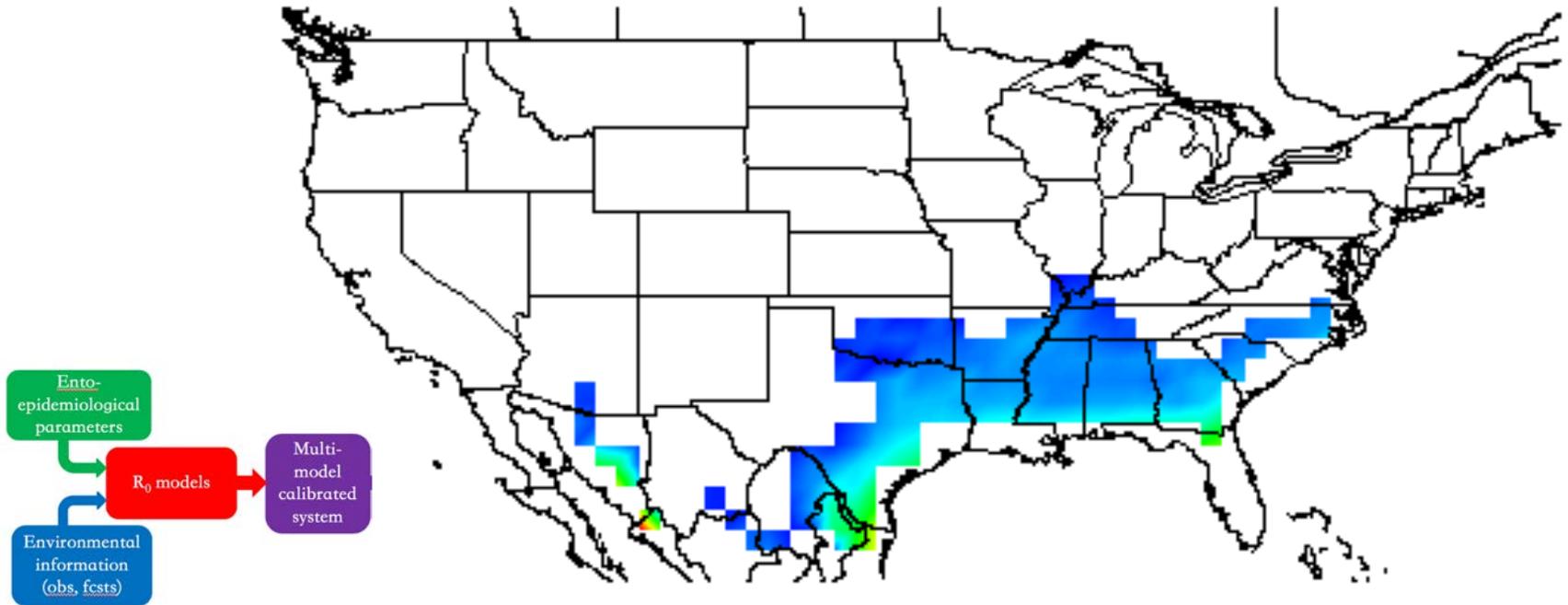


# Predictive skill depends on space and time scales



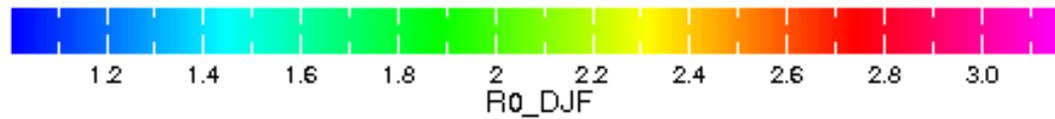
1. Thomson MC, et al. (2018). Chapter 3. Connecting Climate with health outcomes. Thomson MC, S.J. M, eds. Climate Information for Public Health Action. London UK: Routledge.

# How do we assess skill?



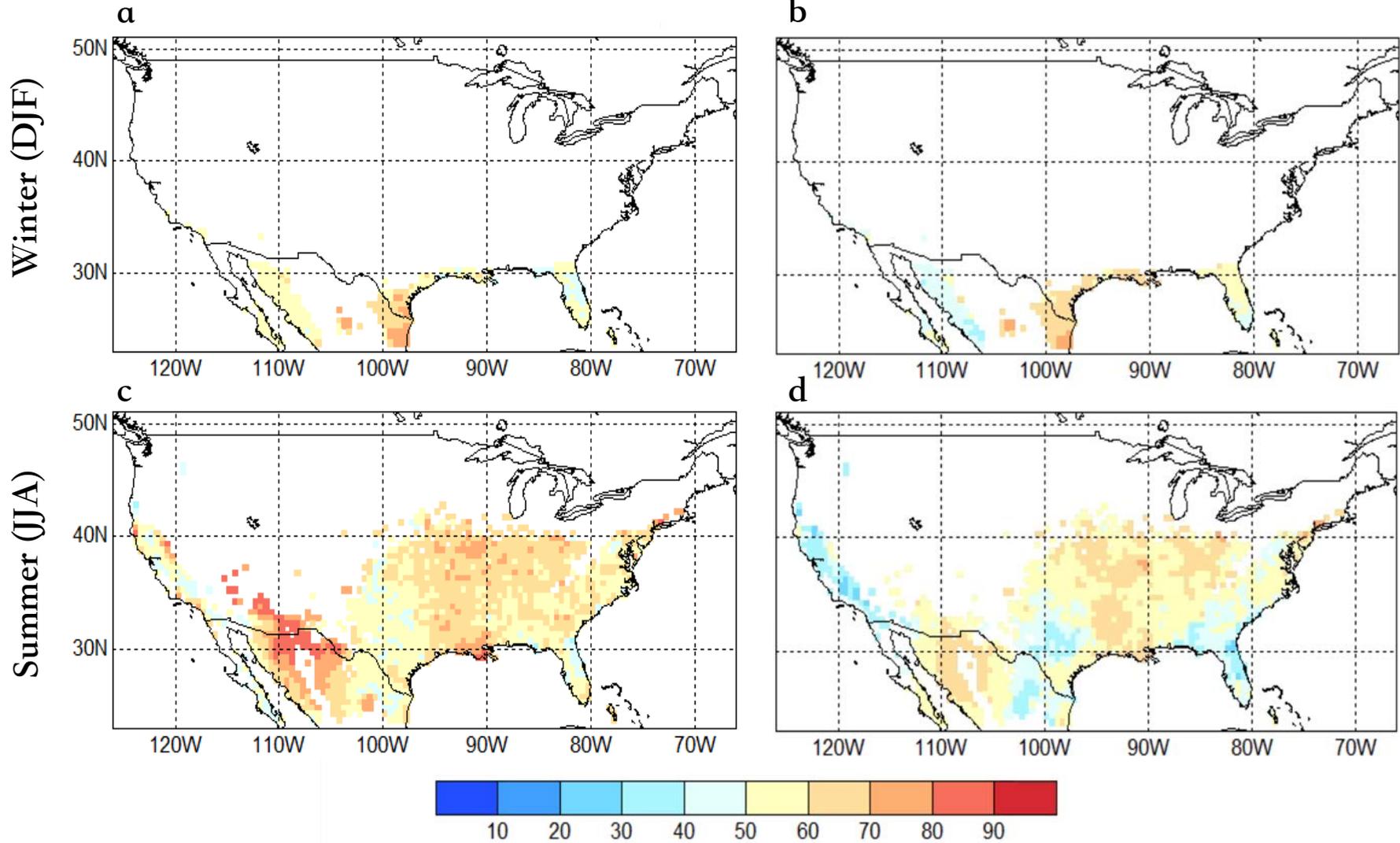
Compare DJF retrospective forecasts with model forced with observations (repeat for each season)

Dec 1982 - Feb 1983



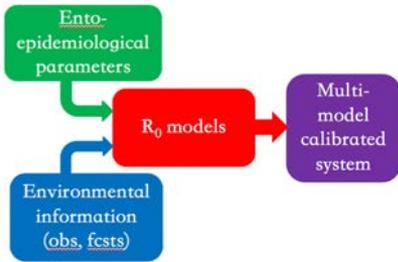
# Multi-model

# One model

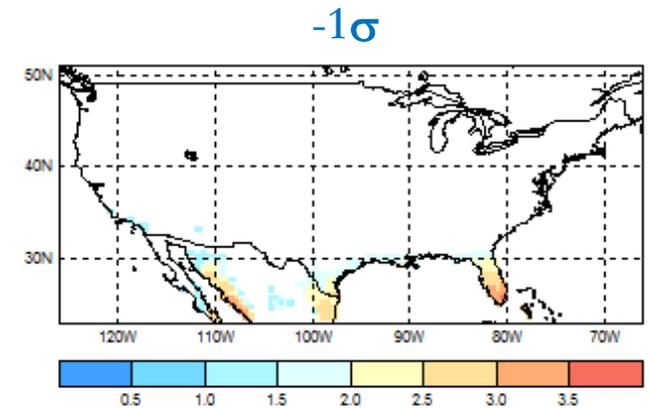
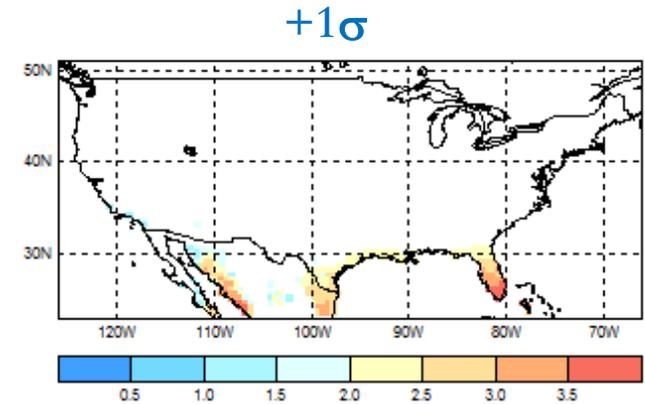
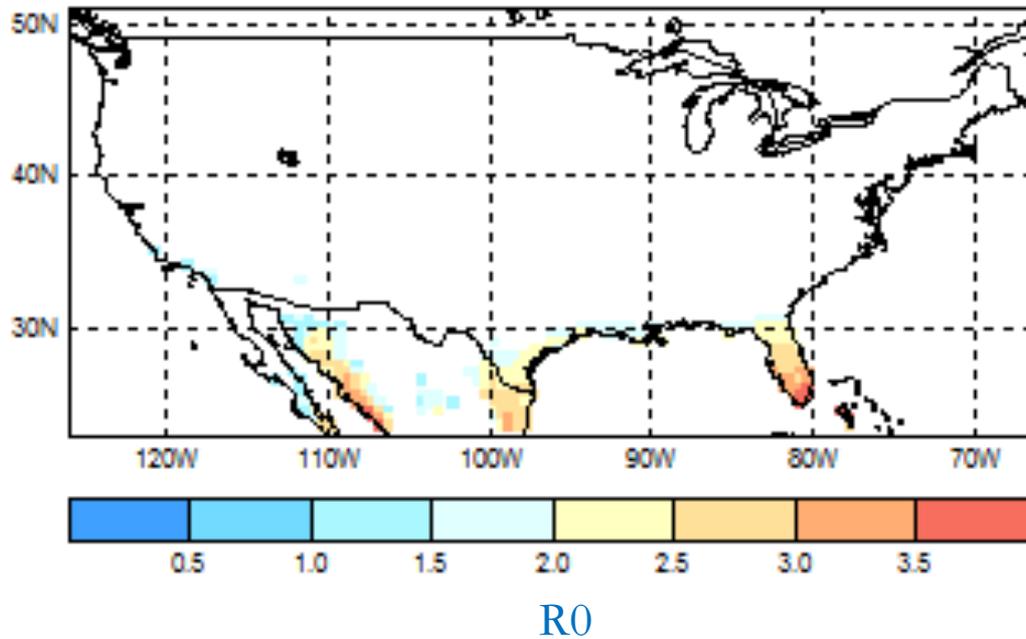


2AFC (categorical)  
-Assess discrimination-

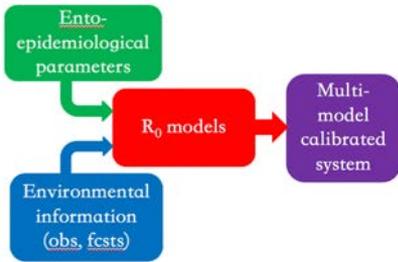
# Realtime Deterministic Forecasts



DJF 2018-2019 (Init. Nov 2018)

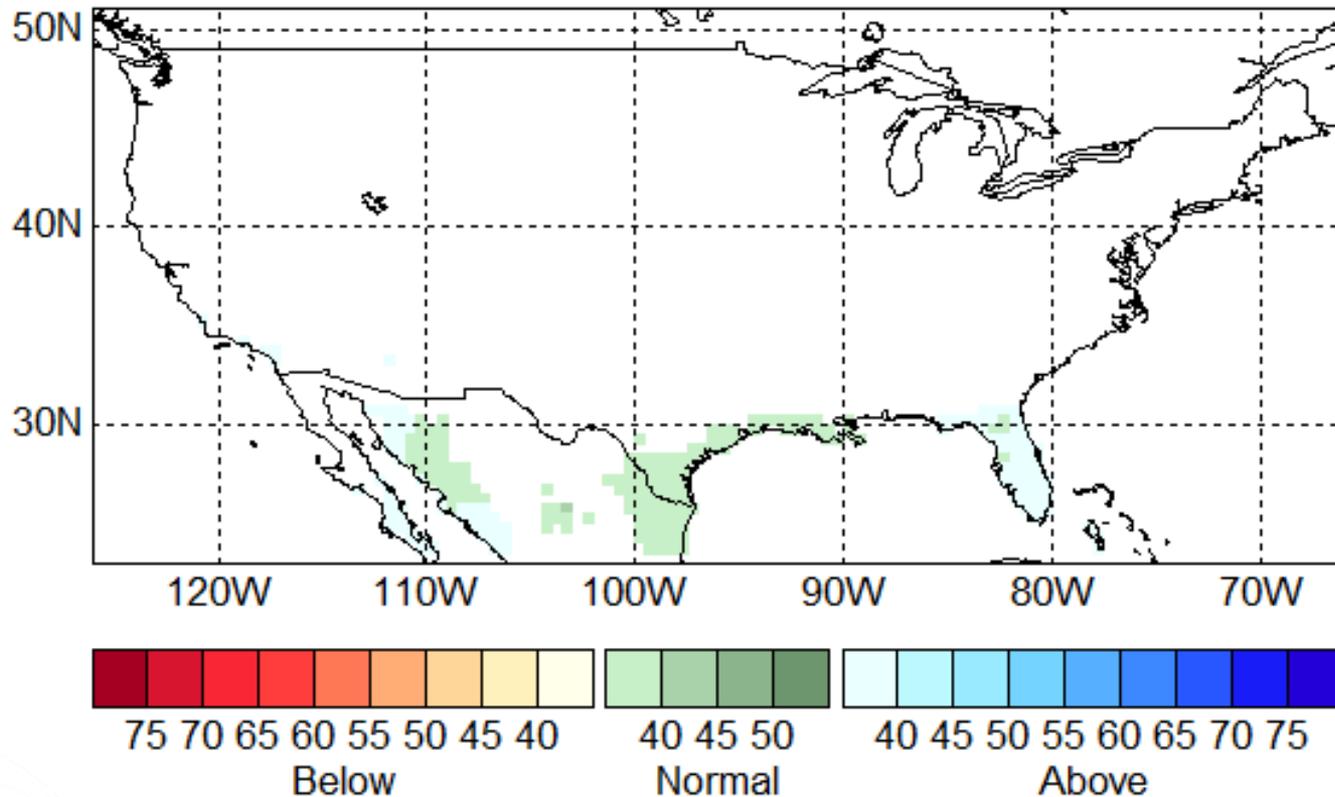


# Realtime Probabilistic Forecasts



DJF 2018-2019 (Init. Nov 2018)

Forecasts *in context*



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