Understanding Decision-Climate Interactions on Decadal Scales

Oct 1, 2014 – Sept 30 2019

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To understand the role of decadal climate information for water management decisions.

NCAR
NATIONAL CENTER FOR ATMOSPHERIC RESEARCH

NCAR is Sponsored by NSF

Project Team

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Partners:

Denver Water

Urban Drainage and Flood Control District

Sonoma County Water Agency

California Department of Water Resources

Project Snapshot

Part 1: Understand climate information needs and use

- Climate information currently used or desired
- Types of decisions
- Management outcomes

Part 1: Approach

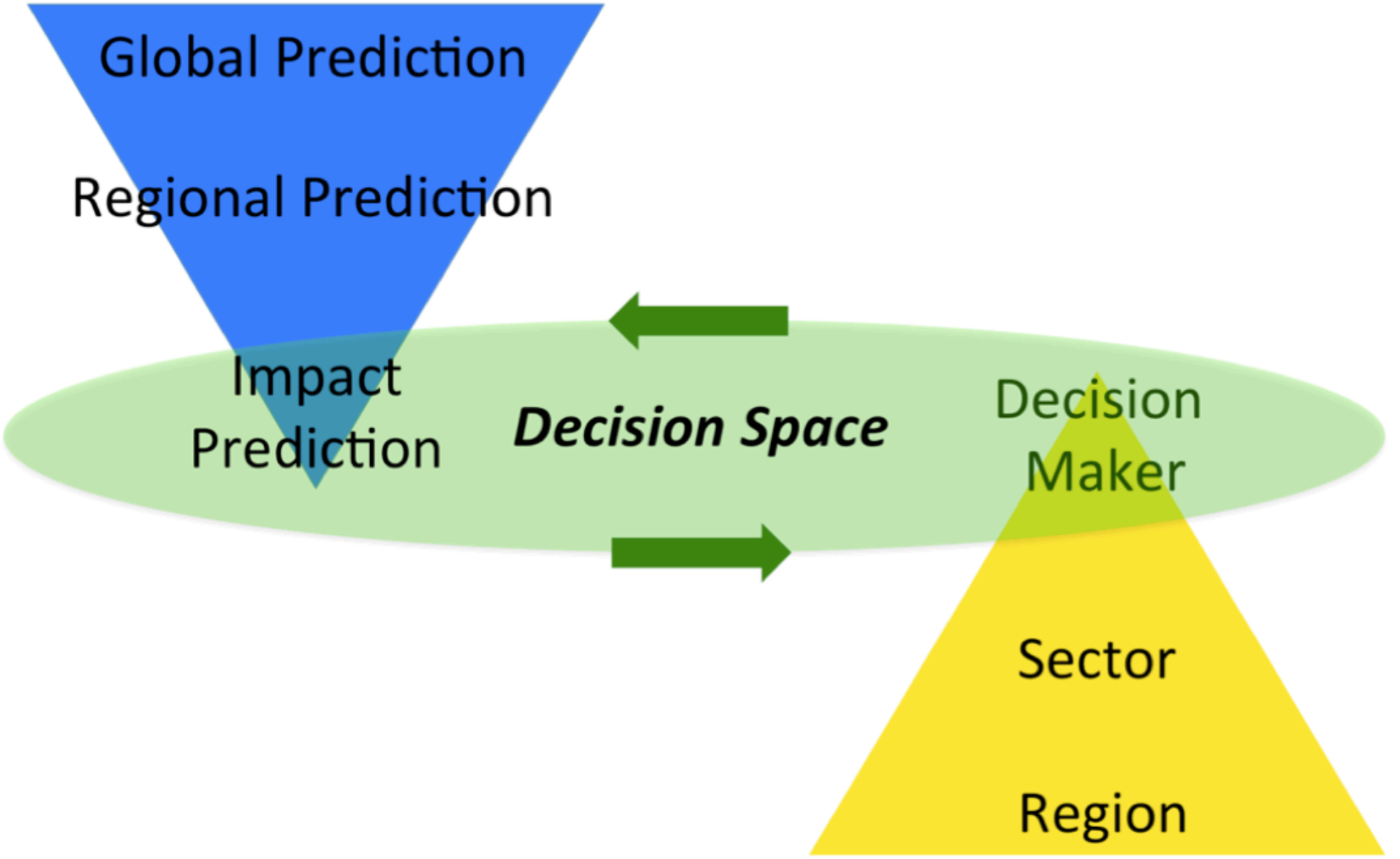
Conversations with practitioners

- Surveys
- Focus groups
- In-depth interviews

From public official: "*We're all sort of wondering when the next big one is going to come, and knowing that it's inevitable but not knowing particularly when, because it could be next year or it could be in 50 or 100 years.*"

- Morss et al. (2015)

Part 2: Build predictive capacity for the needed information



Overall Project Outcomes

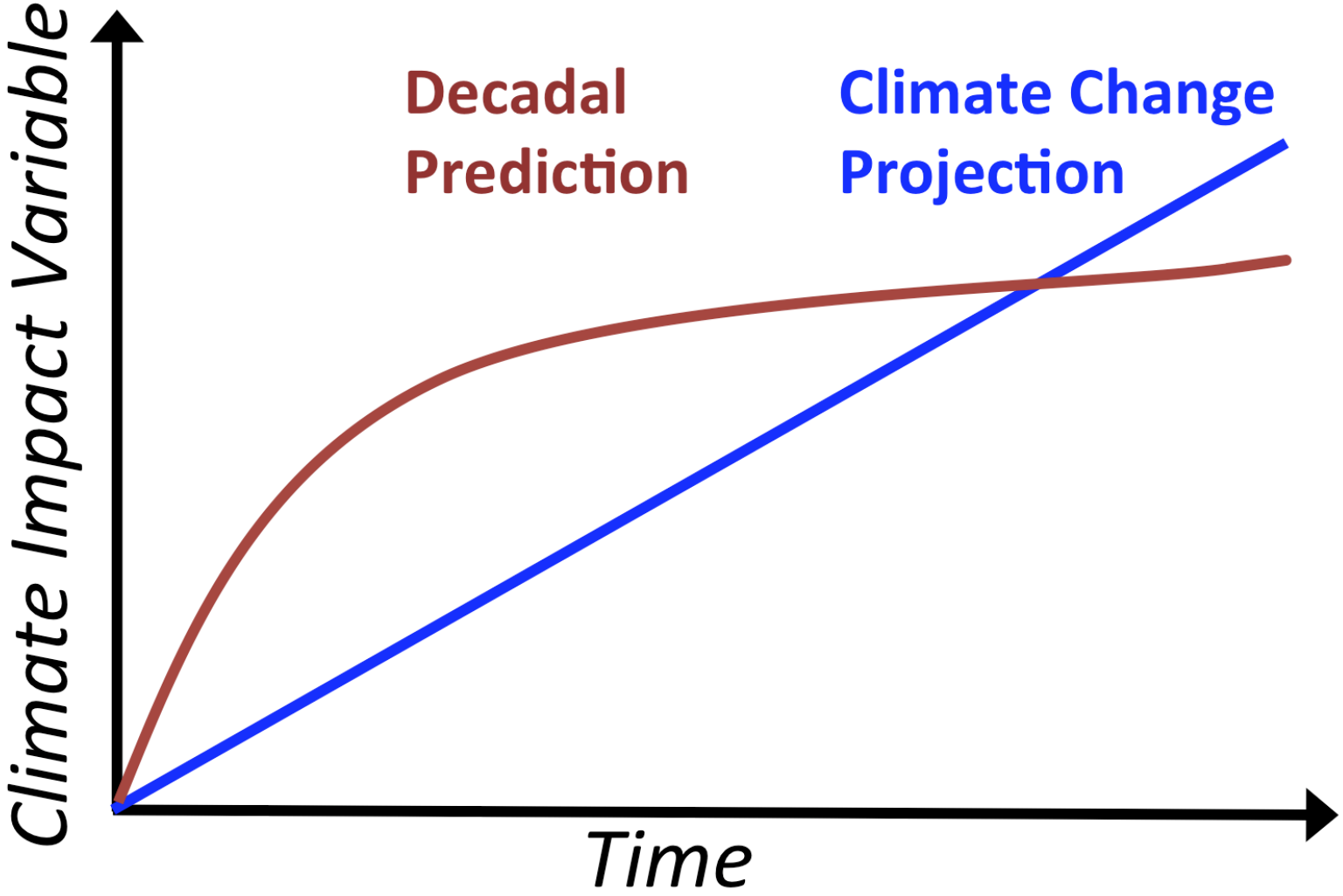
- A generalized framework to support water management decisions.
- Transform how scientists and practitioners conceptualize decadal climate prediction.
- Interim benefit: Prototypes of predictive information tailored to CH2M/Partner projects.

Project Scope

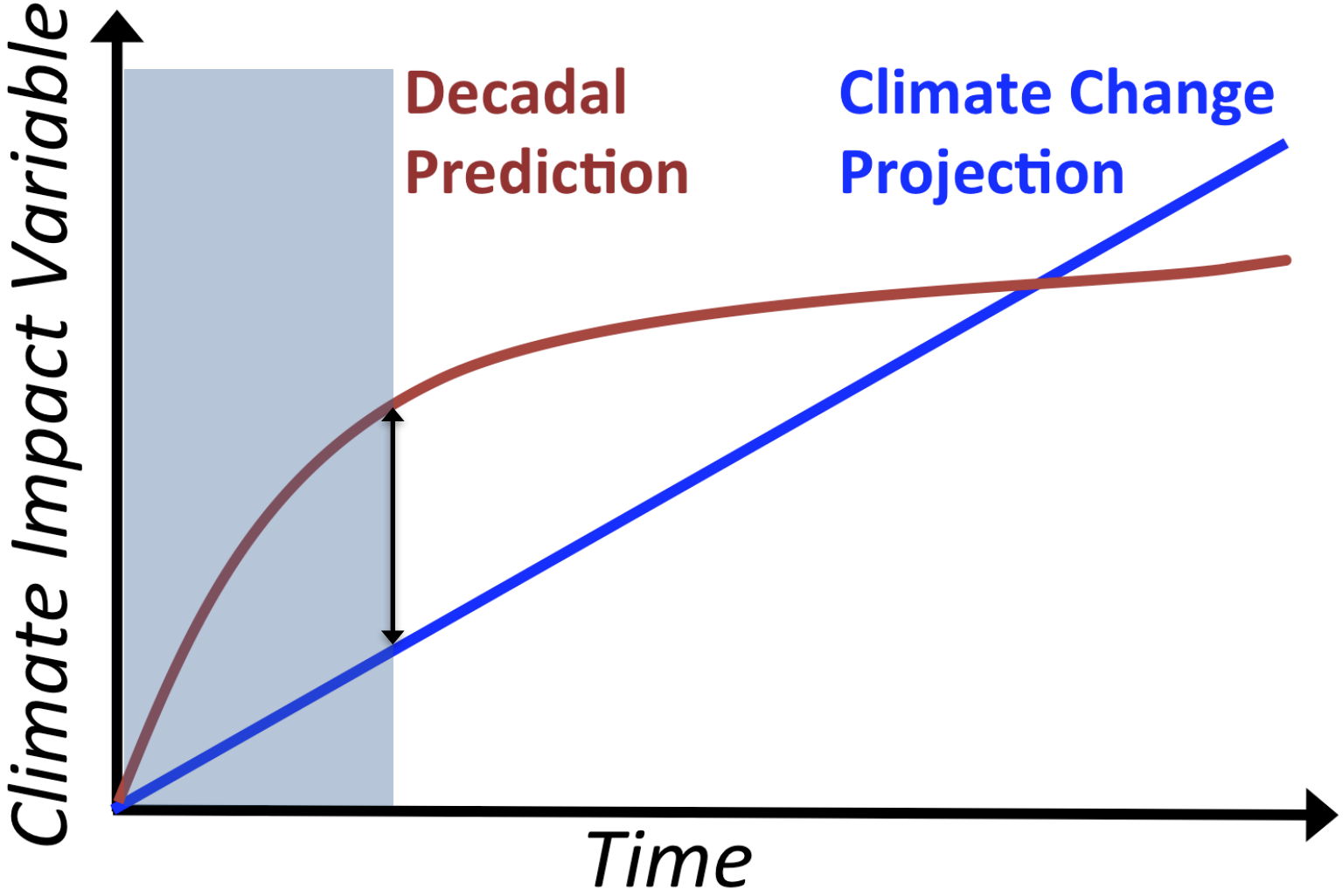
Phenomena: Flood and drought

Timescale: 2-30 years

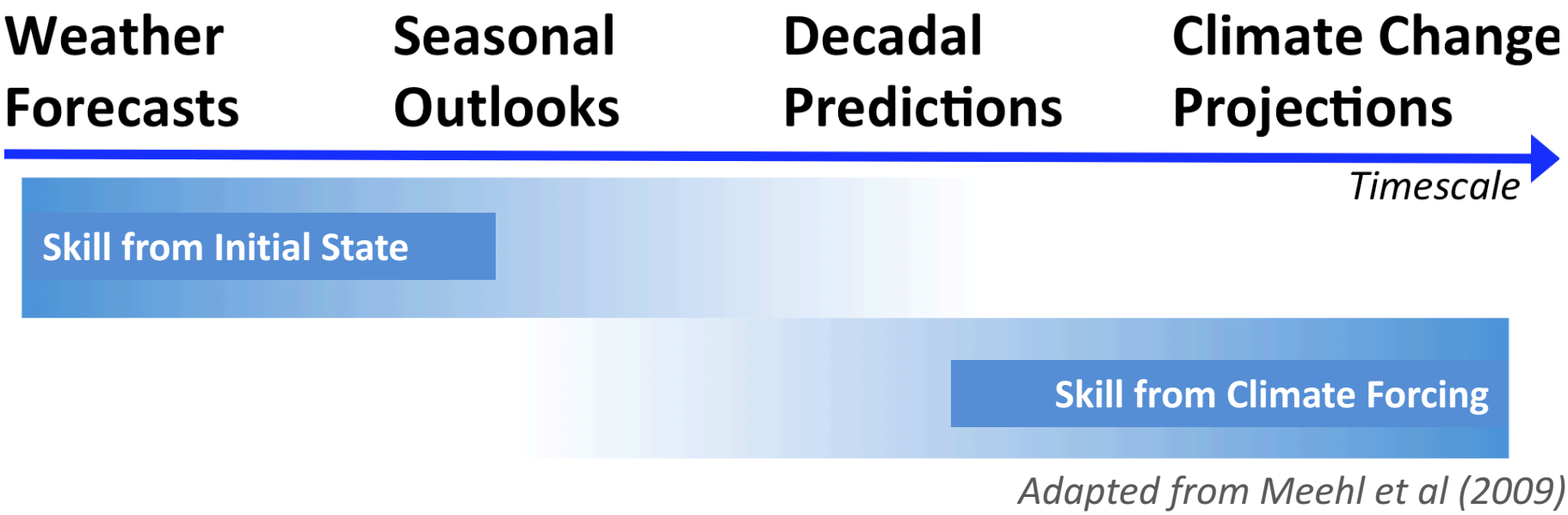
Why Decadal Prediction?



Why Decadal Prediction?



Decadal Prediction



Adapted from Meehl et al (2009)

Flood Case Study

To understand the role of decadal flood information for water management.

Primary Partner: Urban Drainage Flood and Control District

Data collected on information use will guide the physical science that will map out the landscape of flood predictability on decadal scales. The physical science data will, in turn, feedback onto the decision space.

Drought Case Study

To understand the role of decadal drought information for water management.

Primary Partner: Denver Water

How does the role of seasonal and centennial scale climate information extend to the decadal scale?

How do other climate events (e.g., floods) intersect with droughts (e.g., co-occurrence, sequences of events) in ways that affect decisions, and how might that change in the future due to changes in climate, management strategies, or other factors?

Collected data will guide the physical science that will map out the landscape of drought predictability on decadal scales. The physical science results will, in turn, feedback onto the decision space.

Extra Slides

Decadal Prediction Skill

- Skill depends on region and variable.
- Skill greater for ocean variables than atmospheric or land variables.
- Ocean skill increases with latitude
- Ensemble prediction more skillful than single prediction.

(Kirtman et al. 2013, IPCC)

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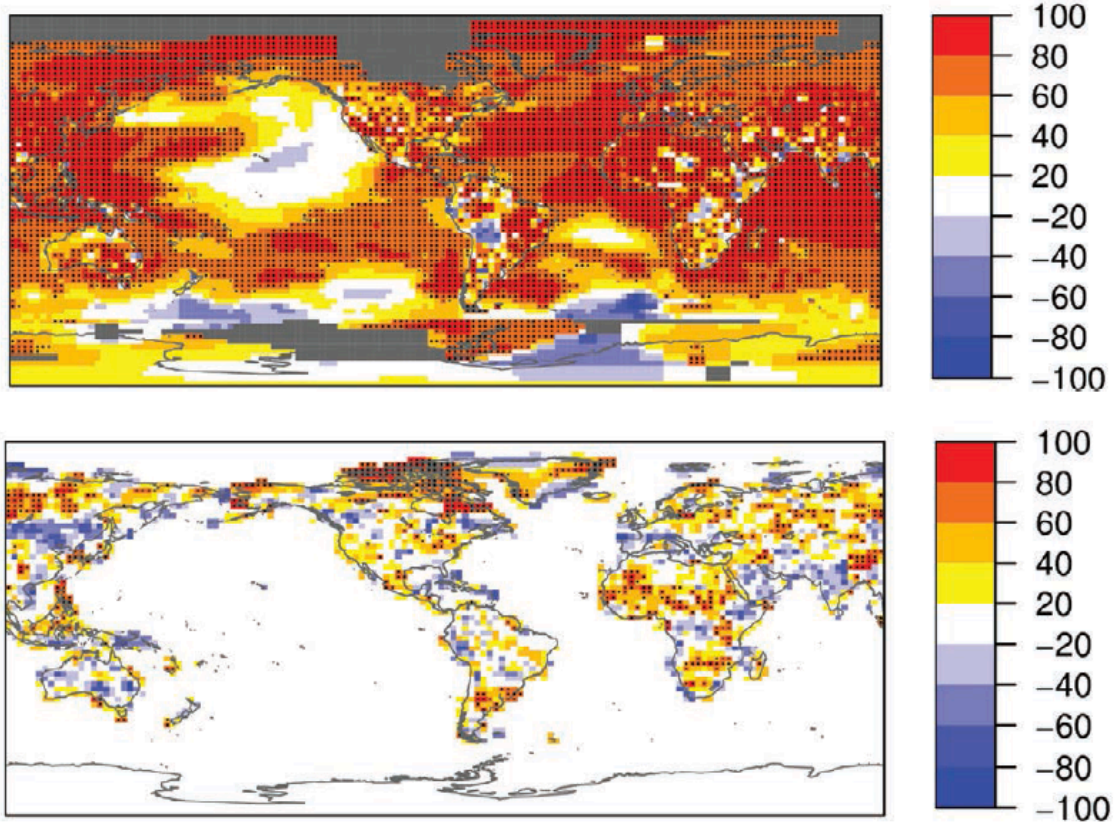
Skill arises from:

1. The initial state - first few years to a decade.
2. Built-in skill beyond first few years:
   - existing greenhouse gases
   - future greenhouse gases

(Kirtman et al. 2013, IPCC)

Hot Spots of Skill



Surface air temperature skill in years 6-9

Precipitation skill in years 6-9

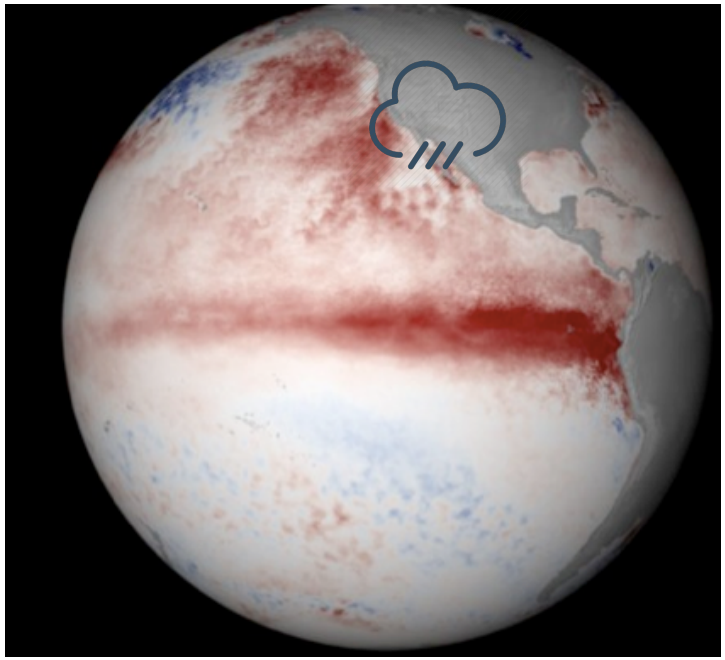
Meehl et al. 2014, BAMS

The Way Forward

Physical mechanisms connect local extremes to the predictable components of the climate system.

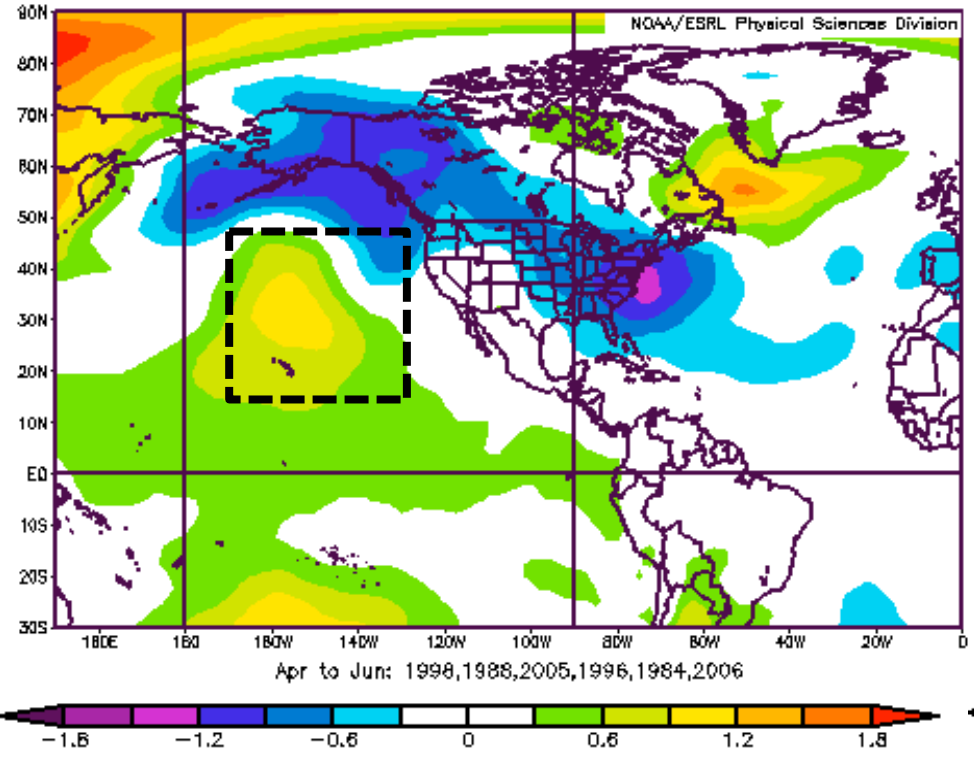
- an untapped source of decadal predictability of local impacts

E.g., ENSO -> California Storms

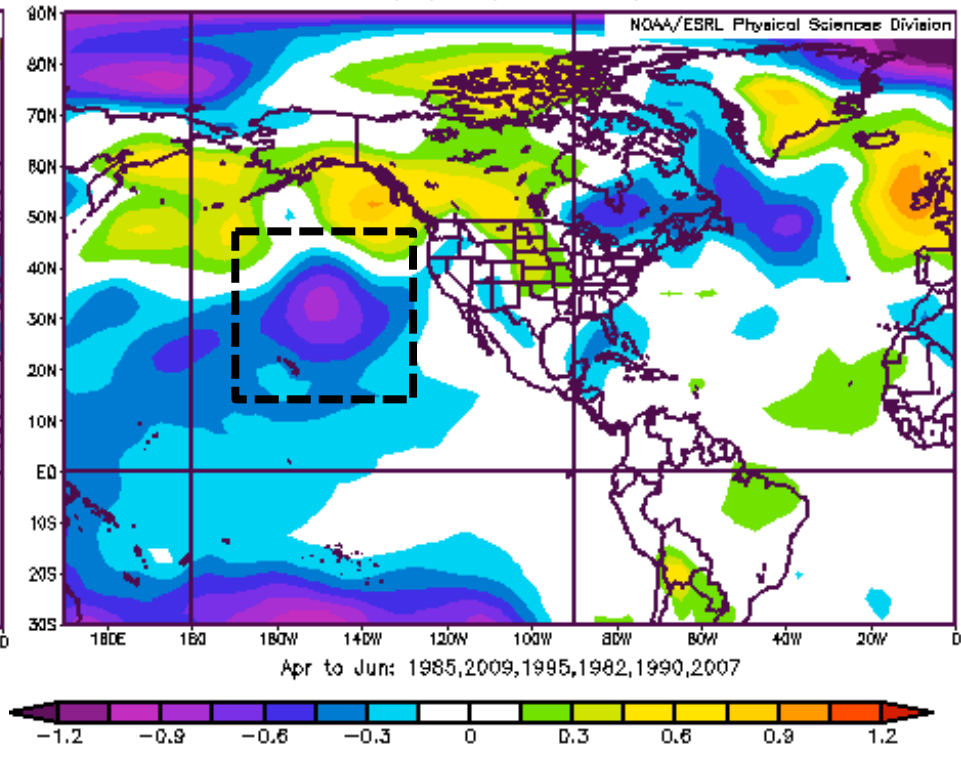


E.g., Pacific Sea Level Pressure correlates with Oklahoma rainfall

Dry Years



Wet Years



Opportunity

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