Understanding Decision-Climate Interactions on Decadal Scales

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www.mmm.ucar.edu/udecide

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

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Partners:

Denver Water
Urban Drainage and Flood Control District
Sonoma County Water Agency
California Department of Water Resources
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.
Phenomena: Flood and drought

Timescale: 2-30 years
Why Decadal Prediction?
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Decadal Prediction

Climate Change Projection

Time

Climate Impact Variable

Denver Water, Mar 24 2016
Decadal Prediction

Weather Forecasts  Seasonal Outlooks  Decadal Predictions  Climate Change Projections

Skill from Initial State  Skill from Climate Forcing

Adapted from Meehl et al (2009)
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.
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
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

Workshop, Nov 17 2015
Opportunity
References


