# Update Meeting

November 30, 2016

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Goals

Discover where predictability and water and flood risk management information needs meet on decadal scales.

Understand what constitutes effective communication of decadal predictive information to stakeholders.

Deliverables

- Prototype presentations of predictive information.

- A research framework to integrate predictive capacity with decision-making.

- Peer-reviewed academic papers and relevant reports

Approach
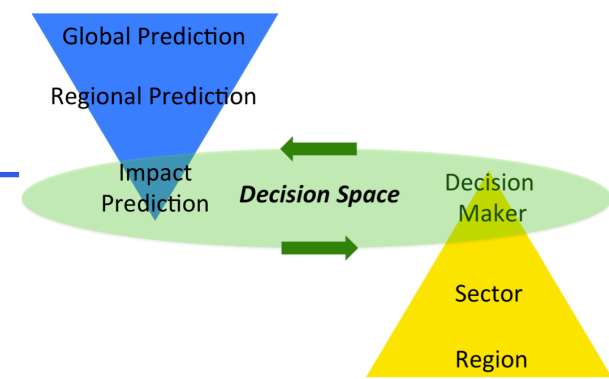
Understand decision types

Identify climate sensitivities and potentially useful information.

Understand our general predictive capacity at decadal scales.

Understand our predictive capacity of the needed information.

Understand what is effective presentation

Interviewed Colorado partners

- Transcribed interview data.
- Code analysis.

Initial read:

- Mapped diverse interests, decision types.
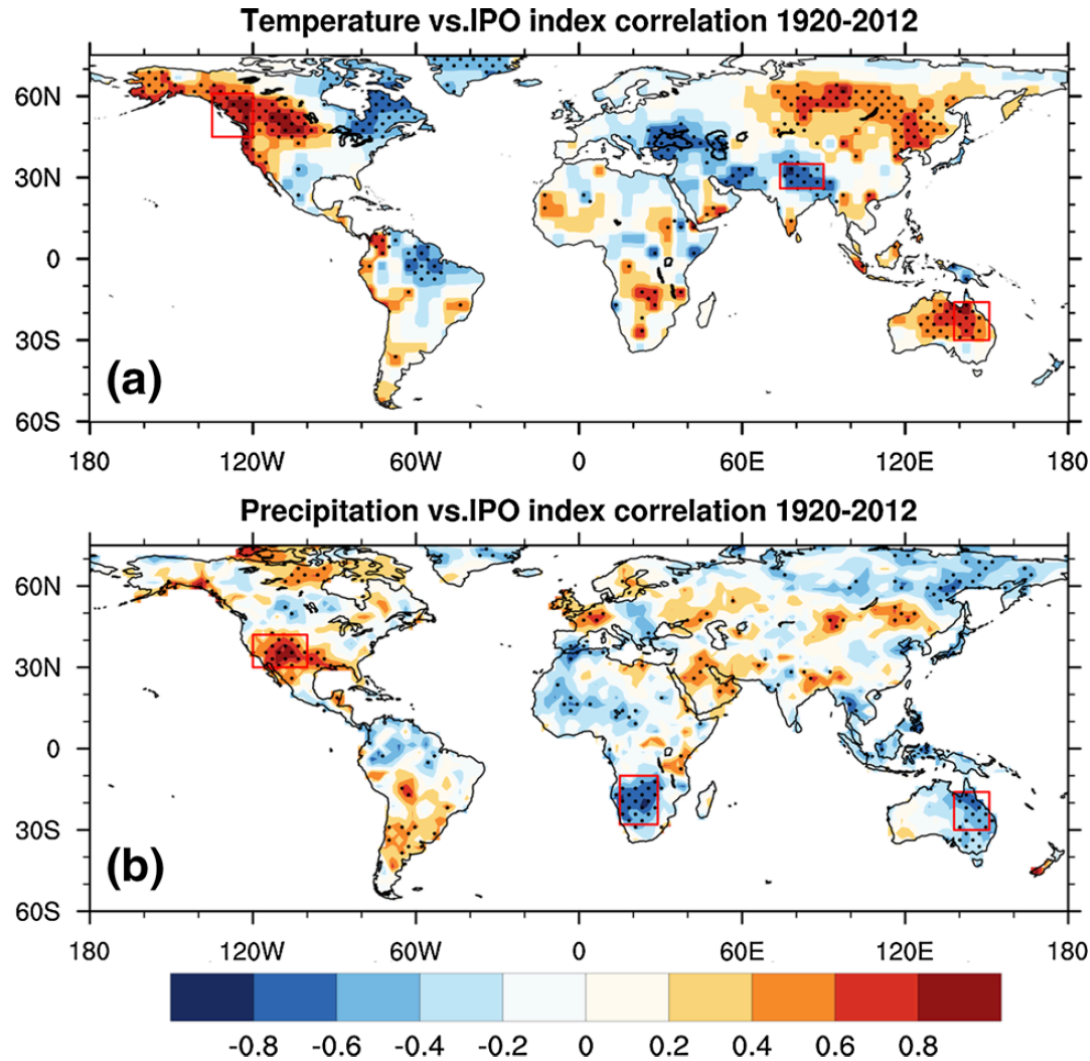- Validating that decadal climate information is potentially useful.

Research:

- Explore the potential of decadal climate information
- Identify roadblocks for use of decadal climate information
- Explore how criteria for usability maps onto Cash et al (2002), Dilling and Lemos (2011).
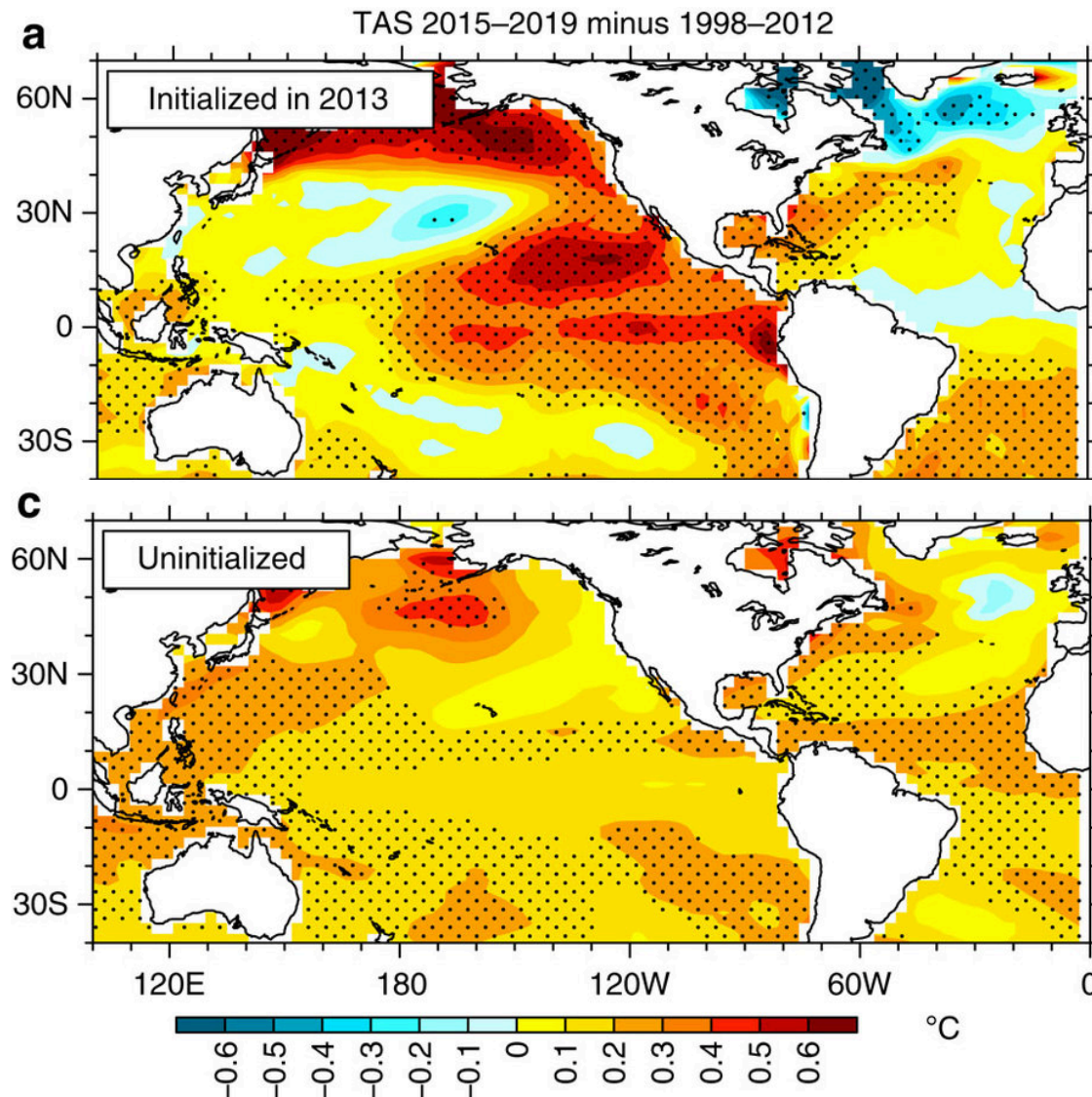
Interdecadal Pacific Oscillation
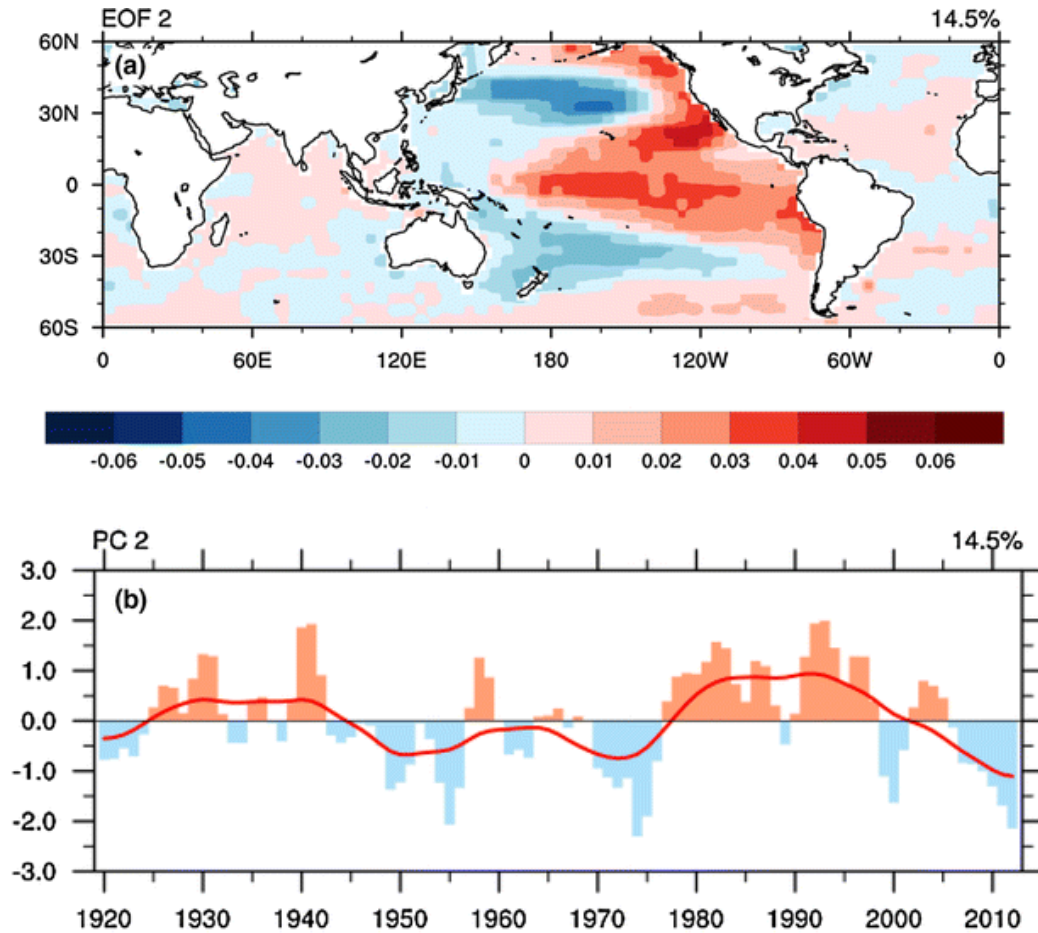
Dong, B. & Dai, A. (2015) The influence of the Interdecadal Pacific Oscillation on Temperature and Precipitation over the Globe. Clim Dyn 45: 2667. doi:10.1007/s00382-015-2500-x

Interdecadal Pacific Oscillation

Temperature vs.IPO index correlation 1920-2012

Precipitation vs.IPO index correlation 1920-2012

Strong decadal variability

Meehl GA et al (2016) Initialized decadal prediction for transition to positive phase of the Interdecadal Pacific Oscillation. Nature Communications. doi:10.1038/ncomms11718

A framework for modeling teleconnections
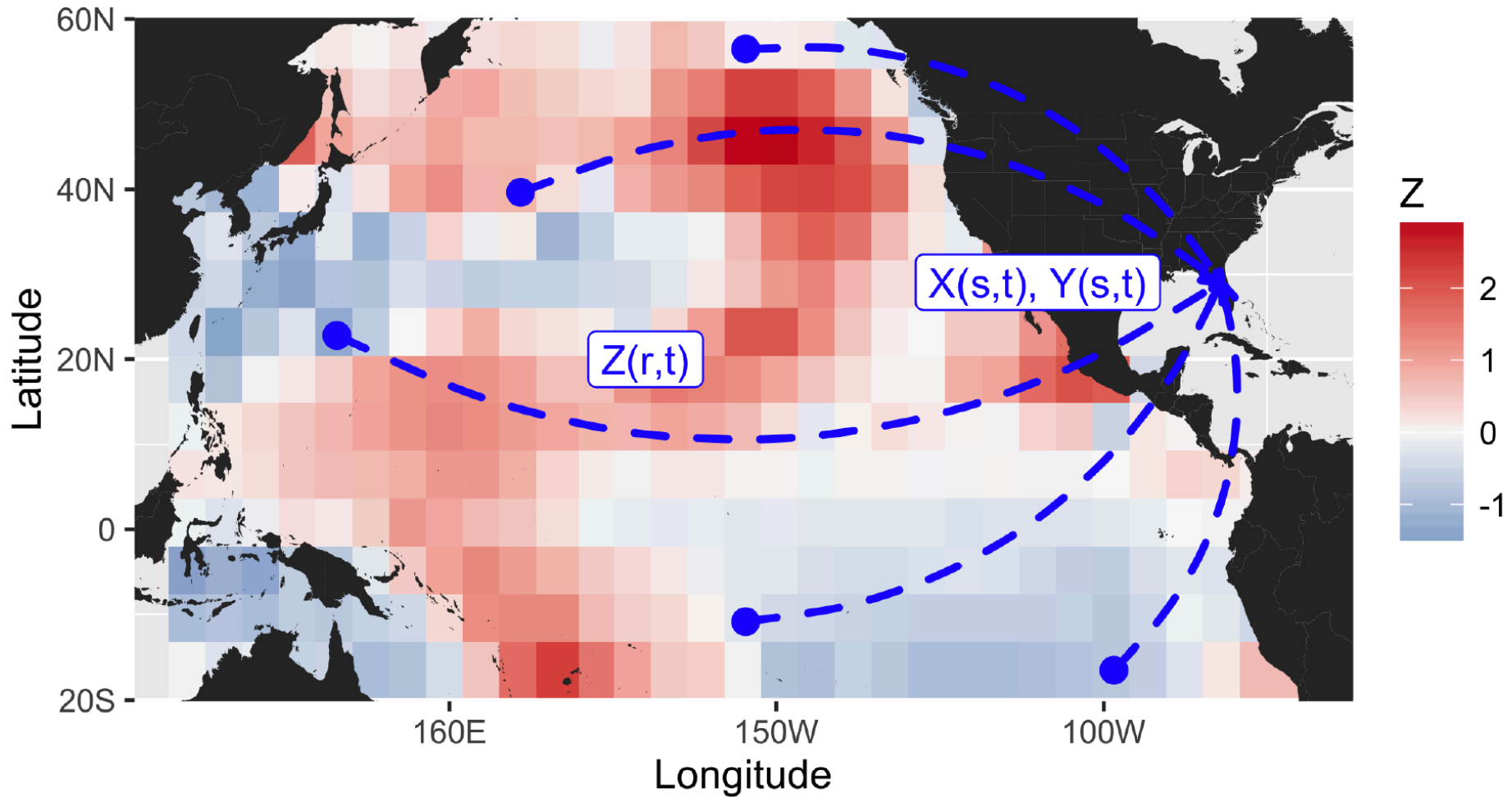
Hewitt J, Hoeting JA, Done JM, Towler E, A Geostatistical Approach to Modeling Teleconnections [To be submitted]

Snowpack linked to flash drought
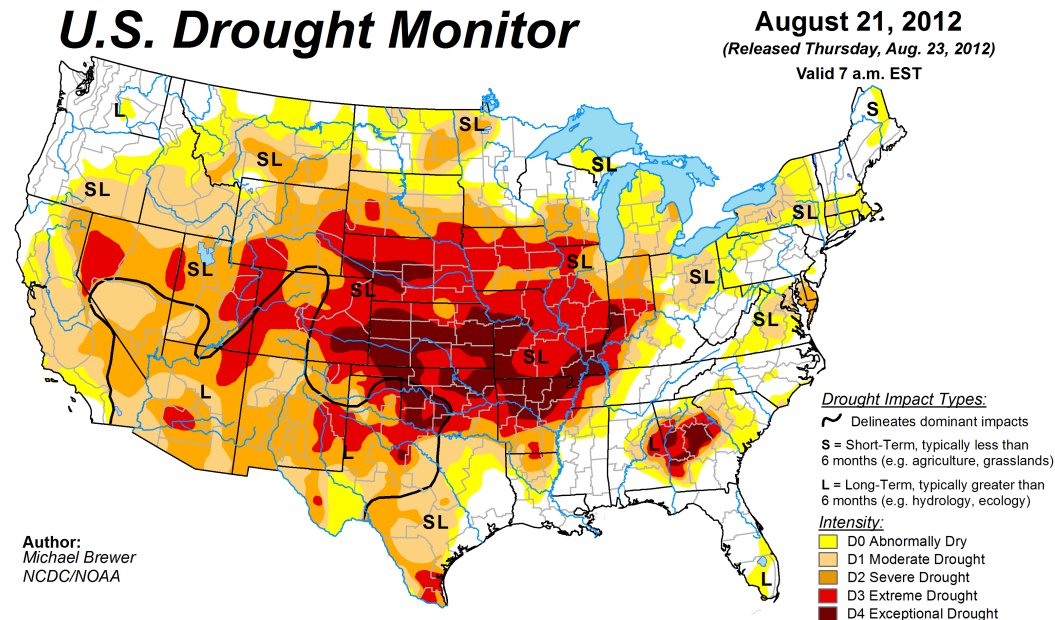
"This study highlights the role of snowpack and soil moisture conditions in predicting the sudden onset of drought." Anjuli Bamzai

PaiMazumder, D., and J. M. Done (2016), Potential predictability sources of the 2012 U.S. drought in observations and a regional model ensemble, J. Geophys. Res. Atmos., 121, doi:10.1002/2016JD025322.

Explore how decadal predictions can be used in an adaptive management framework.
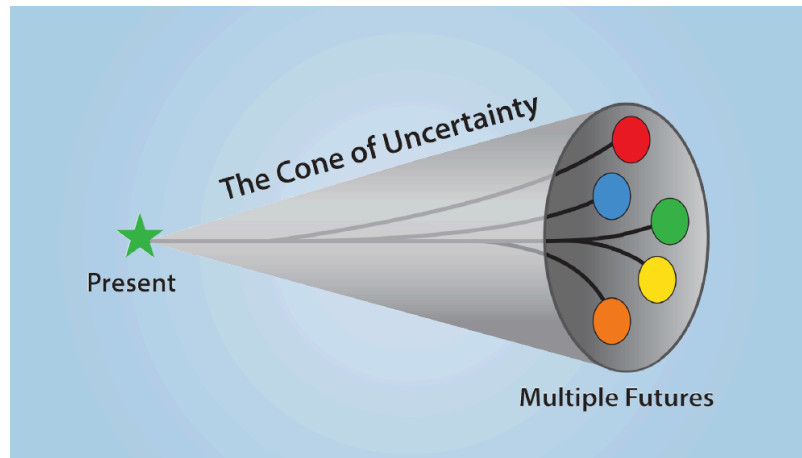
(Stratus & DW 2015)

Specifically, identify where we are in the "cone of uncertainty", and relative to historical conditions (a need from interviews).
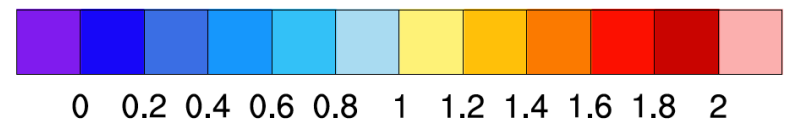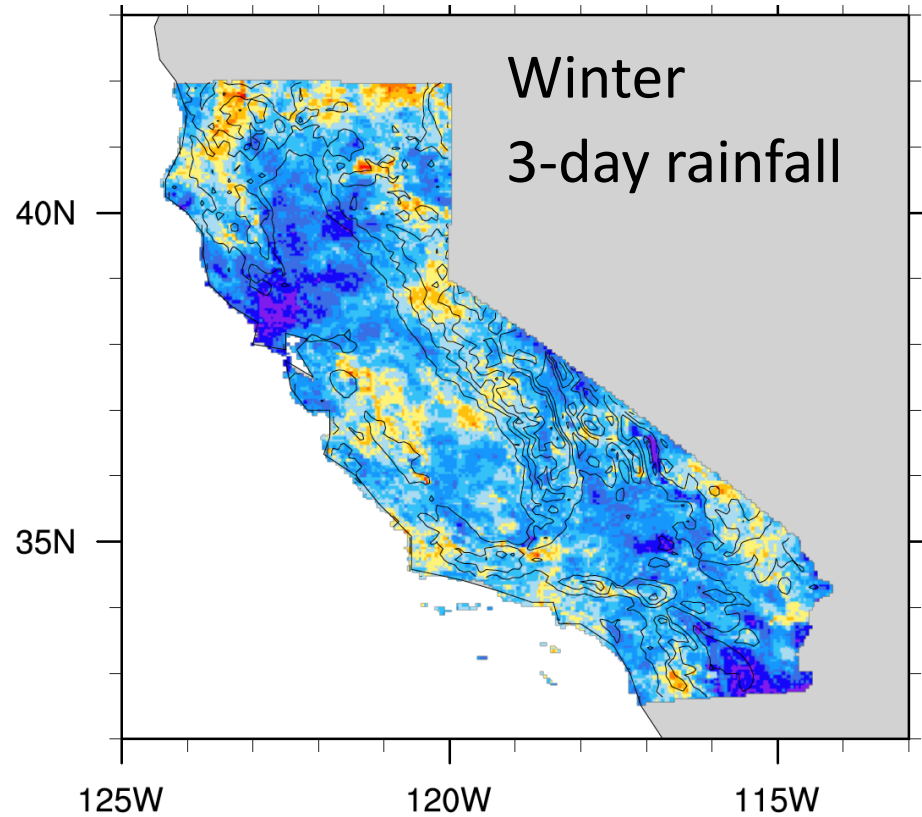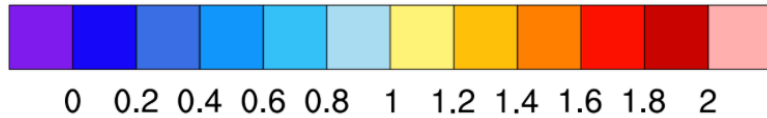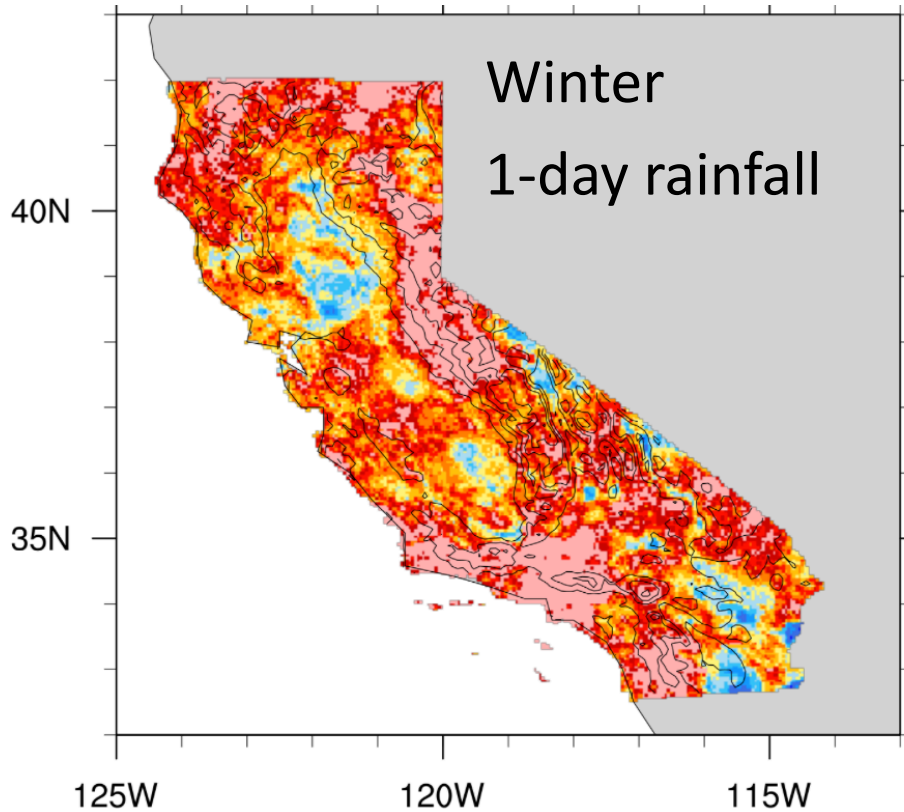
Understand the value of relating decadal predictions to three different historical 'normals': i) 30-yr average, ii) updated 15-yr average, iii) trend.

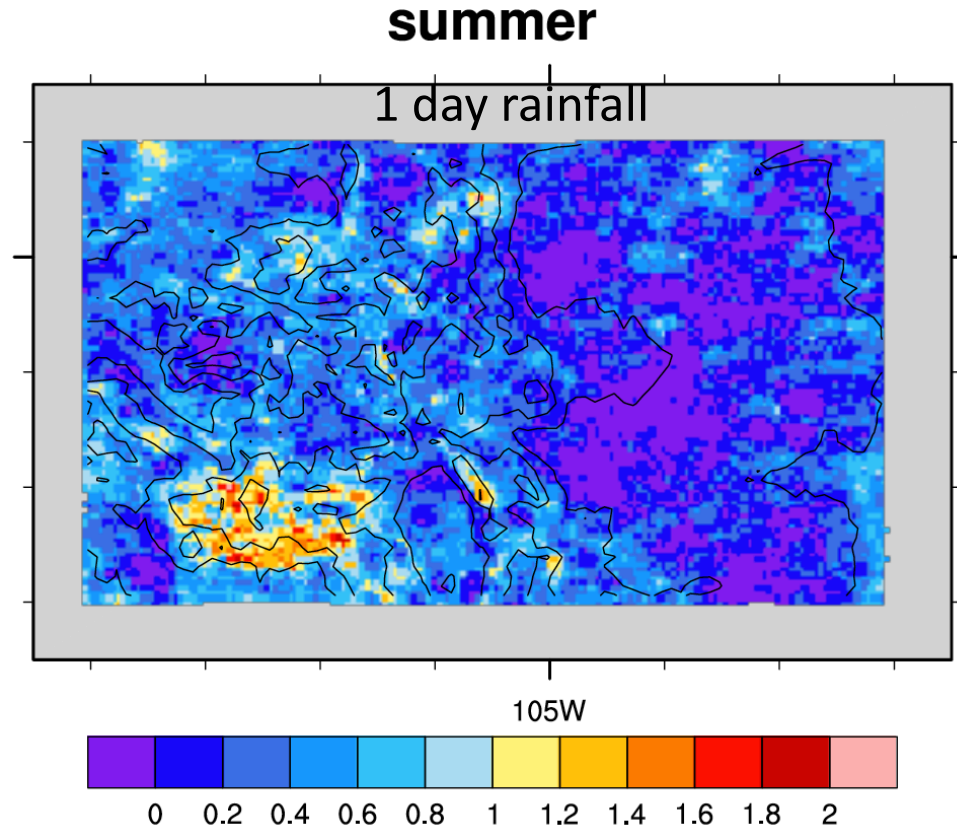Future work: run through Denver Water's WEAP model. Iterate with Denver Water.

Clustering

$X_{i,j,t}$ = seasonal number of rain event exceedances > 80th percentile.

Dispersion = variance($X_{i,j}$) / mean($X_{i,j}$)

Clustering

Summer rainfall is very regular over UDFCD

"*Although upslope storms may cause local drainage problems or affect the flood levels of large watersheds, typically they are not the cause of 2- through 100-year type of flooding of small urban catchments in the Denver area.*" – UDFCD Urban Storm Drainage Criteria Manual.

Communicating decadal climate information using design storms

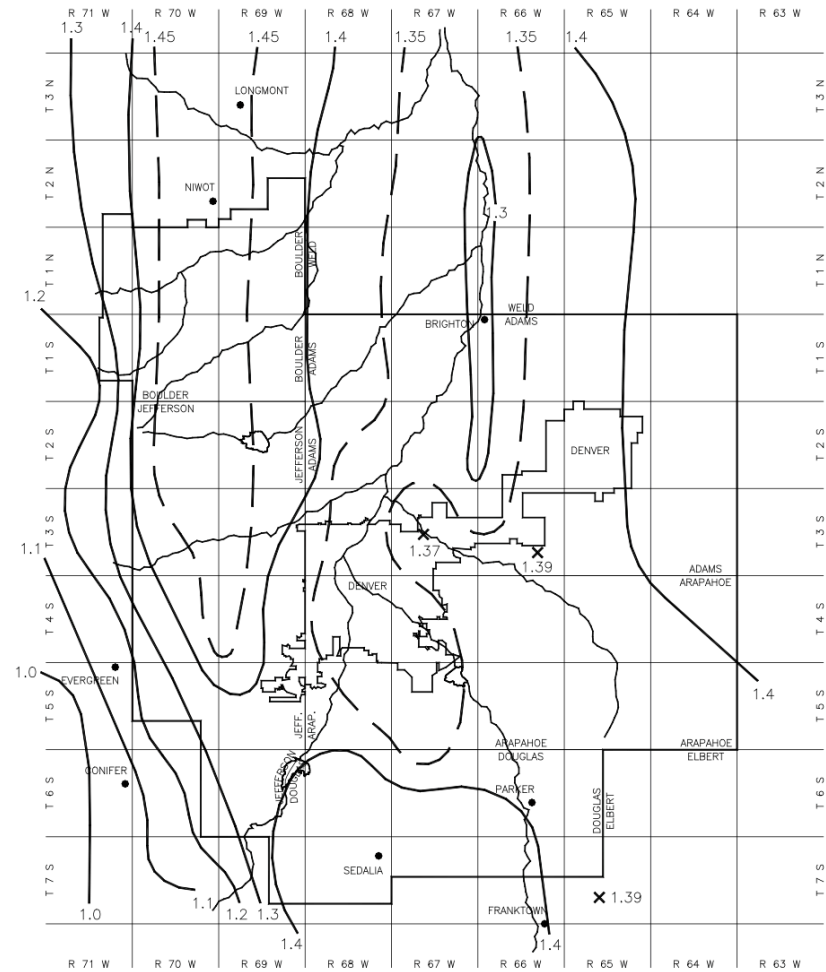UDFCD: 1-hour design storm

CH2M: 3-day design storm

Figure 5-2. Rainfall depth-duration-frequency: 5-year, 1-hour rainfall

Communicating decadal climate information using design storms

Have design events changed on decadal scales?

- If so, why hasn't this been a problem?

How may design events change?

- prediction vs projection

- relative to historical variability, and factors of safety.

Possible experiments:

Simulate historical CO and CA 'design storms' to understand roles of local and remote processes.

Modify simulations using skillful components of decadal predictions.

TAS 2015–2019 minus 1998–2012

Initialized in 2013
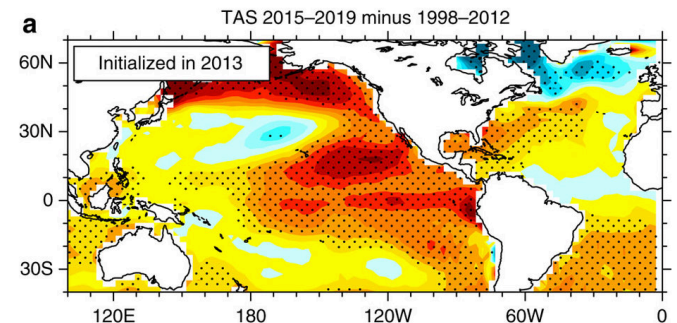
2017 Plans

Winter 2016/2017:

- Agree on code analysis of interview data.

- Start exploring design storms and clustering(?)

- Explore application of geostatistical framework to snowpack/drought.

- Apply decadal predictions to Denver Water's WEAP.

Spring/Summer 2017:

- Develop presentations of design storms. Collect data on interaction with presentations and modify the presentations.

- Collect data from Denver Water on decadal predictions in their framework and modify the presentations.

Fall/Winter 2017/2018:

- Explore how initial results extend to CA partners with different decision spaces. Use CH2M past or current projects.

AGU: Tuesday, 13 December 2016

A23G-0305: Erin Towler: Incorporating Decadal Predictions into Water Management Decisions

AMS: Tuesday, 24 January 2017

780: Graham Andrews: Emerging decadal climate information: What's the potential for flood risk management?

Reminders

Acknowledge grant on papers, posters, talks.

Next all-group UDECIDE Meeting: March

We have travel funds.