PRES2iP: Prediction of Rainfall Extremes at Subseasonal - to - Seasonal Periods - Year #1

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STAKEHOLDERS

I. Workshop information

When? 11-13th July 2018

Where? Norman Research Campus

Who? Stakeholders and decision makers from different fields: water resources, emergency managment, tribal environmental professionals, scientists, educators.

What? 1.5-day meeting with our stakeholders to proritize the types of S2S extreme precipitation events that will be studied during this 5-year project, based on the local and regional impacts of most concern.

Figure 1. The geographiscal distributon of PRES2iP workshop participants from different sectors.

II. Discussion topics:

1. What does extreme precipitation mean to you?
- There was no consistent definition in terms of the amount, frequency or duration, the variety of answers was extensive.

2. How do stakeholders make decisions?
- Begin making plans 2 weeks to 2 months in advance but do not make decisions until there is more certainty in the forecasts such as 3-5 days in advance.

3. Uncertainty and Impacts

Uncertainty:
- Most of the emergency managers planned for the worst-case scenario and, hence, desired weather/climate products that included worst-case predictions.

- Others focused their attention on the most-likely scenarios but still wanted to have the worst-case in their minds in case they had to switch into a more aggressive decision mode.

Impacts:
- changes in water quality,
- loss of utilities and need for public works restoration and cleanup,
- additional landslide and debris flow hazards,
- decreases in tourism,
- changes in transportation and navigation,
- personnel staffing challenges,
- public safety issues

4. Roleplaying scenarios - group activity

A role-playing activity was designed to examine how decision makers interpreted and used some of the long-range and short-range products resulting from NWS forecasts of extreme precipitation.

III. Outcomes:

1. Many stakeholders **define extreme precipitation by its impacts** rather than some statistical definition.

2. Those working across large regions (e.g., multi-state) seemed to have more interest in **earlier forecasts (e.g., 3 months in advance)** even if they had high uncertainty.

3. Many participants **misinterpreted products** primarily as related to probabilities. A strong theme arising from participants was the need for a layperson-readable forecast discussion that would describe the reasoning behind long-term forecasts and what the forecasters were concerned about for a worst-case scenario to occur.

TRANSITION

FUTURE

I. Transition to research :

The workshop has identified and helped us prioritize our research activities. Specific areas of research that will be incorporated into the science, based directly on workshop discussions include:

1. Need to consider how to define extreme precipitation based on impacts-based decision making and/or include analysis of impacts within statistically defined extreme events. As noted by our stakeholders:

- Quote: "Extreme rainfall does not equal an extreme event."

2. The distribution of precipitation within an event has important impacts. This will be investigated.

3. Other important factors for an extreme event include: antecedent conditions including burn scars, the time between events, rain-on-snow events, time of year.

4. Worst-case scenario is important for stakeholders. We need to understand and convey worst-case, most-likely, and best-case scenarios and the chance of occurrence.

5. Confidence and uncertainty is important for planning and decisions. However, as noted by one stakeholder:

- Quote: "Certainty can be even harder to deal with. If someone is certain that something is not going to happen then it is hard to change their mind."

- Quote: "Consider making it a little longer to provide more time for activities."

II. Network Building:

1. We have begun building a stakeholder-researcher network that encourages two-way communication and transparency in the research process. Evaluation forms that were collected after the workshop revealed that this type of network is strongly needed:

- Quote: "I have learned a lot, I feel all the workshop members made themselves available for participants. "The Ivory tower opens its doors"."

2. 95 % of the participants that completed the evaluation rated the workshop "Excellent" or "Very Good".

- Quote: "This built a huge bridge to help us understand your needs at the same time help you understand our needs."

- Quote: "Face to face engagement builds relationship & trust."

3. Communication with the stakeholders will continue throughout the project, and before the second workshop in 2020. Stakeholders preferred method of communication is email and occasional webinars. This will be implemented.

SCIENCE

I. Synoptic patterns associated with S2S :

Step 1. Created an initial definition of extreme precipitation events for 14-day and 30-day precipitation periods using:

- Exceedence of percentile thresholds (95th and 99th), as shown in **Figure 1** for the 99th percentile of 30-day events
- Spatial extent
- Number of days with precipitation in the period

Step 2. The CONUS is portioned into geographic regions to compare and contrast synoptic patterns associated with events across the country.

Step 3. ERA-Interim reanalysis data is used to understand the atmospheric state before and during extreme precipitation events.

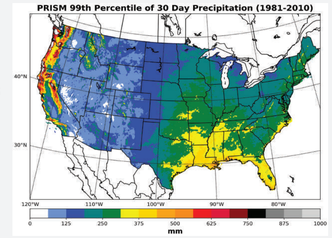

Figure 1. The 99th percentile threshold for running 30-day precipitation totals from Parameter Elevation Regression on Independent Slopes Model (PRISM) daily dataset from 1981 - 2010.

Step 4. Using lagged and total event composites, common signals identified so far include:

- Deep troughing to the west of the region that the event occurs (e.g. **Figure 2** for 14-day Northeast events)
- An energized subtropical jet stream, and enhanced moisture flux to the region (e.g. **Figure 3** for 14-day West coast events).

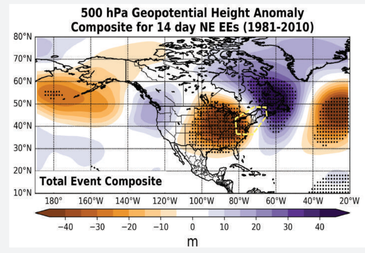

Figure 2. Composite of 500 hPa geopotential height anomalies for the Northeast region, as defined by yellow dashed area, 14 day extreme precipitation events. Stippling denotes significant anomalies based on a two-tailed Monte Carlo test with 5000 iterations and a p-value of 0.05. Anomalies are calculated with daily ERA-Interim data.

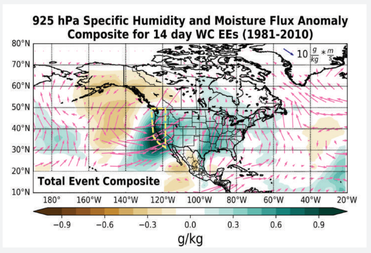

Figure 3. Composite of 925 hPa specific humidity anomalies (contoured) and moisture flux anomalies (vectors) for the West Coast region, as defined by yellow dashed area, 14 day extreme precipitation events. Anomalies are calculated with daily ERA-Interim data.

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You can find more about the project on:

http://pres2ip.com/ @pres2ip