July Issue of the Southwest Climate Hub Bulletin

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What's Happening at The Hub:

Connecting Stakeholders with Climate Science

The USDA Southwest Climate Hub and the Southwest Climate Science Center are co-organizing a session on "Connecting Stakeholders with Climate Science: The Role of Climate Programs" at the annual AGU fall meeting in San Francisco, CA, Dec. 14-18, 2015. The session will focus on the synergies between the multitude of climate programs in the USA, and how successful partnerships at regional, national or international scales have resulted in tangible benefits to stakeholders. Please consider presenting in our session to share your program successes and challenges in connecting to stakeholders.

Abstracts are due by August 5, 2015.

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UPCOMING EVENTS

Western Water Assessment (NOAA RISA) - Utah Snowpack Monitoring Workshop
August 11, 2015
West Jordan, UT
→ Find out more

CA Climate Change Symposium
August 24-25, 2015
Sacramento, CA
→ Find out more

Western Water Assessment (NOAA RISA) - Wyoming Snowpack Monitoring Workshop
August 27, 2015
Lander, WY
→ Find out more

Western Water Assessment (NOAA RISA)

Analogs (MACA) statistically downscaled data to generate a period change analysis (1971-2000) vs. (2040-2069) of minimum temperature, maximum temperature, and change in precipitation upscaled to the county level. These data are provided for both seasonal and annual time periods. Data are intended to provide a general estimate of broad seasonal changes in temperature and precipitation at the county scale to aid planning and management amid uncertainty. Maps of standard deviation between models and within counties are intended to provide a range of certainty associated with the projections (forthcoming).

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Managing Agricultural Weather and Extremes in Arizona

University of Arizona Extension, NOAA's NWS Tucson Office, and CLIMAS presented a "Managing Agricultural Weather and Extremes" workshop to Cochise County stakeholders on May 28th. The workshop covered an update on NWS frost/freeze tools, an overview of severe weather events in Arizona, and an introduction to weather stations. The presentation and audience discussion on frost/freeze tools was a highlight of the meeting. Cochise farmers agree that the NWS frost/freeze products are improving, but they still underestimate the severity of freeze events.. They reported that a freeze event on April 15, 2015 was forecast to start in the early morning hours, but actually started in the late evening on their farms.

Everyone agreed that microclimates present a particular problem in getting a uniformly accurate temperature forecast. Some of the local grape farmers present use Mount Lemmon forecasts as an indicator of what may happen on their property. Another farmer uses the Chiricahua Mountains because he knows there will be cold air drainage onto his property.

Tucson NWS continue to listen and learn from the people who need their products and they look forward to hearing how their frost/freeze tools develop. One of the tools under development is the Point Forecast Matrix, which currently allows users to create Forecast Weather Tables for user-selected points on a map interface.

Another interesting discussion emerged on the subject of hail. Hail-producing storms in the Southwest are usually relatively limited in extent. They may ravage one farmer's crop but leave the neighboring farm untouched. Paul Brown from University of Arizona advises farmers to use hail pads to help with insurance claims. We found this online resource with instructions on how to make a hail pad:

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Response to Joaquin Palomino's "Dry farming: a

August 27, 2015
Broomfield, CO
→ Find out more

Tahoe Science Conference
September 21-23, 2015
Reno, NV
Abstracts due by 7/31
→ Find out more

Southwest Climate Summit
November 2-3, 2015
Sacramento, CA
→ Find out more

Online Water Course: Water in the Western United States
Date TBD
Coursera.org
→ Find out more

Upcoming EPA Climate Change & Water Workshops
Various Dates & Locations
→ Find out more

Water Resource Sustainability Issues on Tropical Islands
December 1-3, 2015
Honolulu, HI
→ Find out more

American Geophysical Union Fall Meeting
December 14-18, 2015
San Francisco, CA
→ Find out more

MEET OUR PARTNERS

Albert Rango

I come from a family that has dryland farmed for many generations. The small farmland where we grow our own food is in Many Farms, Arizona and the annual average precipitation is seven inches. The farm depends on winter precipitation for germination of seeds and monsoon season (summer precipitation) provides moisture for the rest of the growing season.

On our farm, unlike large corporate farms, the space between individual crops are further apart and are planted deeper in the ground to reach the moist soil (Figure 1). The crops that are usually grown are corn, squash, melons, cucumbers and tomatoes. I agree with Jim Leap and Joe Schirmer, large quantities of water is not always best for crops, limited water does produce juicier and tastier products.

Figure 1. Dryland farm

Joaquin Palomino's piece can be found on KALW. Click below to

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New Water Cycle Unit Curriculum is a Hit with New Mexico Middle School Students

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Students filled experimental containers with soil for the Evaporation Investigation activity in which they examined the effects of five variables on the rate of evaporation.

Students from a New Mexico middle school participated in a Mathematics Engineering Science Achievement (MESA) summer camp in which they learned about the effects of climate change on the water cycle through the new Southwest Regional Climate Hub Water Cycle Unit. Educators from the Asombro Institute for Science Education led the Water Cycle Unit activities over two days. Students in the camp participated in two experiments, several hands-on activities, and three games to gain understanding about the water cycle and climate change. One student commented to his mother when she picked him up from camp, “This was so fun; I didn’t even feel like I was learning!” The Water Cycle Unit Curriculum Unit Educator Guide is coming soon and will be available online.

A student modeled the enhanced greenhouse effect and investigated the effects of increased insulation on temperature using his lap, a thermometer, a towel, and a mylar space blanket.

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SW Climate Hub Presents at Water Conference

Southwest Climate Hub Staff attended the Universities Council on Water Resources, National Institutes for Water Resources and Consortium of Universities for the Advancement of Hydrologic

College of Agriculture and Life Sciences, Cooperative Extension, The University of Arizona

UC CE University of California Cooperative Extension

College of Tropical Agriculture and Human Resources, University of Hawai‘i at Mānoa

University of Nevada Cooperative Extension

UtahStateUniversity Cooperative Extension

Landscape Conservation Cooperatives

NOAA Regional Integrated Sciences and Assessments Program

USGS science for a changing world Climate Science Centers

WRRI

Center for Climate Adaptation Science and Solutions

Education

Asombro Institute for Science Education

Communications

Drs. C Robert Taylor, Ronald D. Lacewell and Rodrigo Rodriguez-Kabana provided a presentation on covered agriculture for coping with climate and water uncertainty, the use of which is on a strong upward trend. Covered agriculture is practiced on over a million acres worldwide and is particularly useful for fruit and vegetable crops. This photo from Almeria, Spain shows an 80,000 acre complex of covered agriculture.

Look for a more detailed article on this adaptation strategy in the September Southwest Climate Hub Bulletin.

Our presentation on the *Impacts of Climate Change on Southwestern Working Lands* summarized the first year of the USDA SW Climate Hub, including:

- Research on climate change impacts to water resources
- Workshops in partnership with cooperative extension
- Hydrology and climate change education module
- Adaptation tools database
- Climate Change library on JournalMap
- County level precipitation and temperature estimates for the nation

More information on each of these topics is in the *Extended Abstract of the Conference Proceedings*.

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RECENT RESEARCH

Co-producing Climate Knowledge: How to Structure Interactions Between Scientists and Decision Makers

When scientists and decision makers work together to co-produce climate knowledge and to assess the outcomes of their collaboration, the result is usable science. And when knowledge is

+POSITIVE

TOOLS & RESOURCES

The following are external tools & resources, not affiliated with the SW Hub.

- Western Water Assessment
- Weekly Water and Climate Update
- Public Policy Institute of California (PPIC) Drought Video
- USDA Disaster and Drought Information
- Yale Opinion Climate Map
- SMAP Mission Site
- The California Drought
- Climate Science Library
- U.S. Climate Resilience Toolkit
- Global Climate Change by NASA
- California Climate Data Archive
- Rangelands West
- California Climate & Agriculture Network
- Climate Adaptation Knowledge Exchange (CAKEx)
- NCA Videos
- NCA Impacts - SW
- NCA Impacts - Hawaii
- NCA Impacts - Ag
- Data.gov Food Resilience Theme Datasets
- Climate.gov NCA Teaching Resources

these groups. Scientists may believe they are interacting with stakeholders, but if decision-makers are not fully engaged in framing research questions and reviewing the findings then the resulting products may not find application in the real world.

Alison Meadows and colleagues at the University of Arizona have reviewed five approaches in participatory research literature for building constructive relationships between scientists and decision makers. They emphasize deliberate co-production of climate knowledge with assessment of processes and outcomes. Meadows et al., assert that when an established approach is used to guide collaboration between scientists and decision makers then we “get the right participation and get the participation right".

Updates to Extension's Role in Disseminating Climate Change Information to Farmers and Ranchers

A May 2015 article in *Climatic Change* highlights the role of U.S. Cooperative Extension Service in working with farmers and ranchers. Authors use survey results from both agricultural producers and cooperative extension agents. Surveys (conducted in the Midwest and Northeast) indicate that in the region, farmers and ranchers are more likely to seek advice from private retailers and consultants than extension. Authors report that a majority of extension educators believe climate change is occurring and that they should help farmers prepare. Because private agricultural advisors trust extension as a source of information about climate change, and farmers seek information from private agricultural advisors, working through advisors is the recommended way to ultimately reach farmers with climate change information. Extension educators must be better informed and trained about climate change.

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Assessing Climate Change Impacts on Water Availability of Snowmelt-dominated Basins of the Upper Rio Grande

Authors use the snowmelt runoff model to evaluate impacts of climate change on snow covered area (SCA), streamflow timing and runoff volume in 24 subbasins of the Upper Rio Grande. Simulations investigate four future conditions using models downscaled to existing climate stations. Twenty-four subbasins of the Upper Rio Grande containing appreciable snowmelt and a long-term gauging station are simulated. There is disparity between increased volume in wetter simulations (+7%) and decreased volume (<18%) in drier simulations. Future seven day peak flow is predicted to be 14–24 days earlier. Among the 24 subbasins there is considerable range in mean melt season SCA (->40% to -100%, total volume change (-30% to +57%) and runoff timing advancement indicating that climate change is best evaluated at the subbasin scale. Daily hydrographs show higher streamflow in March and April, but less from mid-May until the end of the water

REQUEST FOR SUBMISSIONS

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RECENT NEWS

Pope Calls for Action on Climate Change

On June 18, Pope Francis issued a long-awaited papal letter addressing concerns about climate change and environmental degradation. His letter brings global awareness to issues including the depletion of natural resources, quality of water available to the poor, and loss of biodiversity. In addition, he highlighted scientific studies that indicate global warming has been greatly influenced by the concentration of greenhouse gases as a result of human activity.

→ Read more on EOS

USDA Portal Enables Farmers and Ranchers to Request Conservation Assistance Online

The USDA has created the Conservation Client Gateway, an online portal that allows individual landowners and land users to request conservation technical and financial assistance from the NRCS. The online portal will supplement in

→ Read more about the portal on NRCS' website

California's Agriculture Feels Pain of Harsh Drought

According to the estimates by UC Davis Center for Watershed Sciences, farmers will have 2.7 million acre-foot less surface water than in a normal water year. On average, this is about a 33% loss of water resource and a loss of about 4% of California's $45 billion agricultural economy.

→ Read more on Homeland Security Newswire

CDFA Now Sending Weekly Drought Updates

The California Department of Food Agriculture is now sending a weekly newsletter covering current drought conditions, support & resources, updates on local government initiatives, and news related to the dire drought conditions in the state. You may sign up to receive the newsletter to remain updated on all California drought issues.

→ Click here and scroll to the bottom to sign up

NOAA Forms National Centers for Environmental Information

In April 2015, the National Climatic Data Center, the National Geophysical Data Center, and the National Oceanographic Data Center have merged into a new center operated by NOAA called the National Centers for Environmental Information (NCEI). This

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consistency with tools and management.
→ For more information, visit www.ncei.noaa.gov

NOAA Service Assessment for California Drought ighlights evapotranspiration and heat stress forecasts

A recent NOAA service assessment on the California Drought includes a section of survey results from the agricultural community regarding climate data services and needs. One example of a product of potential utility to the agricultural community, but not widely advertised include the Forecast Reference Crop Evapotranspiration (FRET) product. The National Weather Service offers this experimental product which provides 6-day ET forecasts. Find the forecasts from the drop-down menu at the top of the map under 'agriculture'. Cattle heat stress forecasts of USDA provide another useful tool to support management decisions.

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