ACKNOWLEDGEMENTS

United States

Gregg Garfin
Climatologist
Climate Assessment for the Southwest (CLIMAS)

Sarah LeRoy
Research Associate
Climate Assessment for the Southwest (CLIMAS)

Mark Shafer
Director of Climate Services
Southern Climate Impacts Planning Program (SCIPP)

Meredith Muth
International Program Manager
Climate Program Office (NOAA)

Victor Murphy
Climate Focal Point
NOAA-National Weather Service Southern Region

Isaac Palomo
Undergraduate Research Assistant
Climate Assessment for the Southwest (CLIMAS)

México

Mexico National Meteorological Services (SMN)

Martín Ibarra | Idalia Ledesma | Alberto Chablé
Seasonal Forecasts

Reynaldo Pascual | Minerva López
Drought

Julio Martínez
Diagnostic Observations

Darío Rodríguez Rangel
Fire

Juan Saldaña Colín
Climate Services

Rio Grande | Bravo

CLIMATE IMPACTS & OUTLOOK

February 2018

Summary

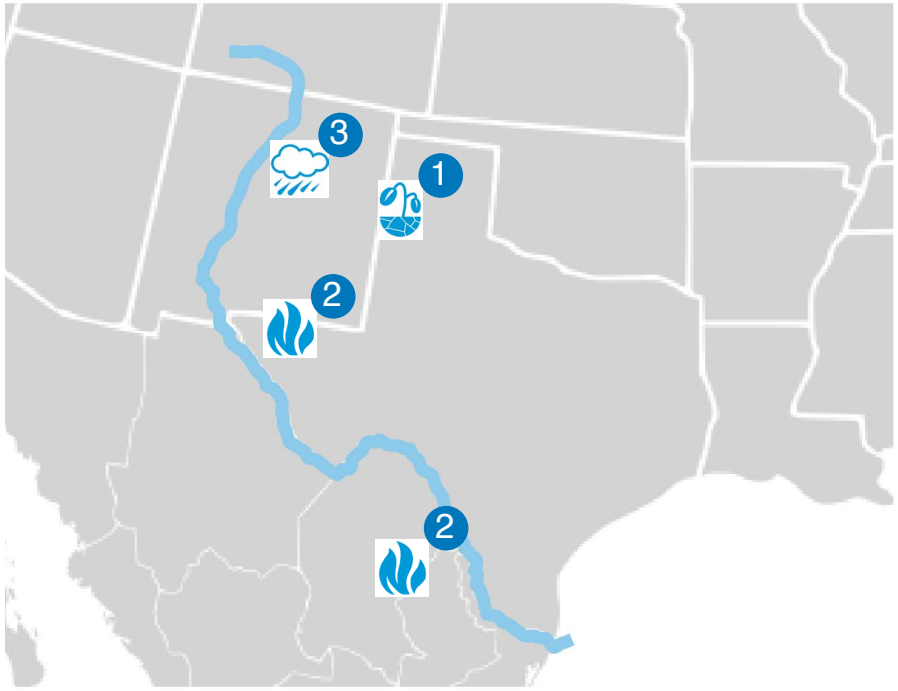
Forecasts favor above-average temperatures and below-average precipitation for the Rio Grande/Bravo Basin through May.

AT A GLANCE

1 **New Mexico, North Texas**
Severe to extreme drought conditions developed over the past month, and drought is likely to persist in these regions through May.

2 **Rio Grande/Bravo Region**
High fuel loads from warm, dry conditions, coupled with the increasing frequency of wind events common during early spring in the region, will increase the risk of intense, fast-spreading fires through April.

3 **New Mexico, North Texas**
Precipitation was 0-25% of average from November – January.



REGIONAL CLIMATE OVERVIEW
NOVEMBER | DECEMBER | JANUARY

Temperatures over the past three months (November 2017-January 2018) were 2–6 °F (1.1–3.3 °C) above average for most of New Mexico and 0–4 °F (0–2.2 °C) above average for North, West, and areas in Central Texas (Figure 1; left). Temperatures were 0–2 °F (0–1.1 °C) below average for South, East, and areas in Central Texas. Precipitation over the same time period was 0-25% of average for most of New Mexico and North Texas, and 50-70% of average for most of the remainder of the state (Figure 1; right), as a La Niña-related storm track sent storms North of the Rio Grande Basin.

Temperatures from February 1–13 were 4–8 °F (2.2–4.4 °C) above average across most of New Mexico and westernmost Texas, and 0–6 °F (1.1–3.3 °C) below average for the remainder of Texas (figure not shown). Precipitation over the same time period was 0–5% below average for almost all of Texas and New Mexico.

Five frontal passages in November, seven in December and January, and three winter storms in January were the main weather systems over northern Mexico from November 2017 to January 2018--less than average. Most of these systems arrived in the Northeast, which resulted in lower than average temperatures. Alternatively, the Northwest region was warmer than normal. Anomalies greater than 9 °F (5.0 °C) were concentrated in Chihuahua, Sonora and Durango, while northern Coahuila and southern Chihuahua had slightly below-average temperatures. The rest of the Northeast was close to average (Figure 2, left). The greater number of days with temperatures below 32 °F (0 °C) were concentrated in Chihuahua and Durango, mainly (Figure 2, right).

The last three months have been drier than normal across the Mexican Pacific side, especially in the Northwest--the main area experiencing drought conditions. Chihuahua, Zacatecas and Coahuila received above-average precipitation throughout November to January. Rainfall deficits were also present in the southern part of the Northeast (south of Tamaulipas and east of San Luis Potosí).

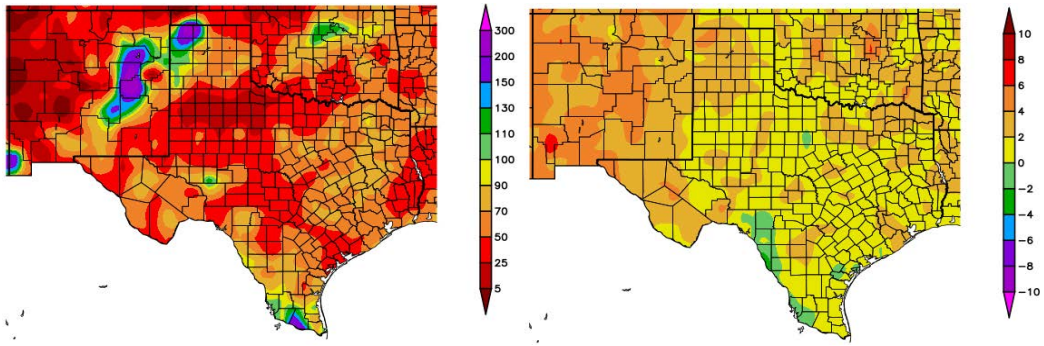


Figure 1 (above): Departure from average temperature in degrees F (left) and percent of average precipitation (right), compared to the 1981–2010 climate average, for 11/1/2017–1/31/2018. Maps from HPRCC.

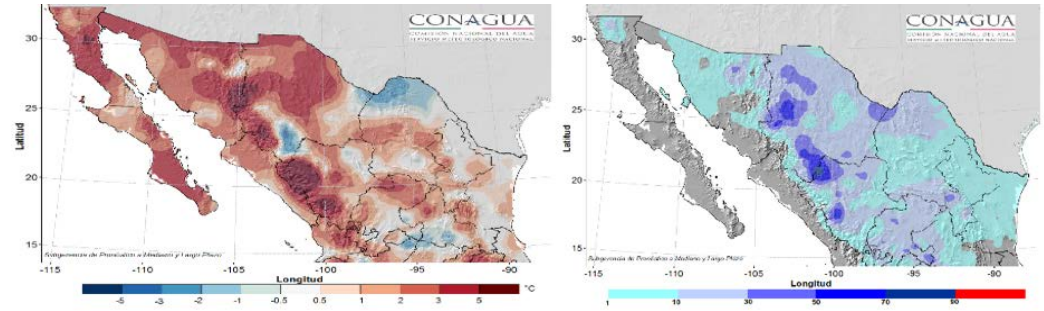


Figure 2 (above): Temperature anomalies in °C (left) and number of days with minimum temperatures at or below 0 °C (32 °F) (right) for November–January. Maps from SMN.

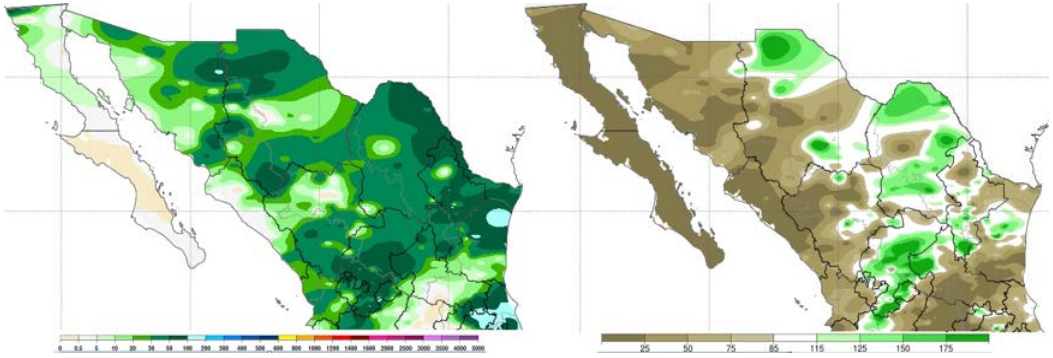


Figure 3 (above): Accumulated precipitation in mm (left) and percent of normal (right) for November–January. Maps from SMN.

On February 15, as a result of the interaction between cold, wet air associated with the jet stream, 32.5mm of rain fell at the Santa Rosa 2 station, in Trincheras, Sonora. This exceeded the monthly maximum historical record of 29.0mm on February 3, 1998 (Figure 4).

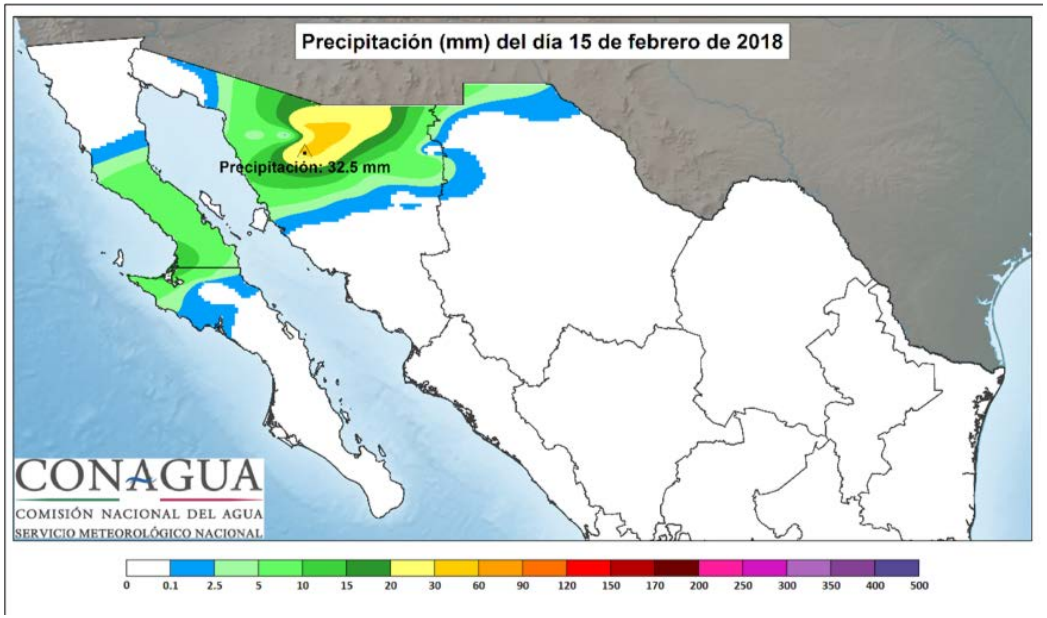


Figure 4 (above): Rainfall of 32.5 mm occurred on February 15, which exceeded the monthly historical maximum record of 29.0 (mm).

DROUGHT

Very dry conditions during the past month have led to more intense drought conditions in New Mexico and Texas, according to the North American Drought Monitor (NADM) (Figure 5). Moderate to severe drought conditions are now present in almost all of New Mexico, and extreme drought conditions have developed in northern Texas. Mexican states bordering the Rio Bravo remain mostly drought-free, from below-average temperatures and above-average precipitation from October – December. However, abnormally dry conditions exist in parts of Tamaulipas and Chihuahua. Conditions are predicted to persist through May in New Mexico and the West half of Texas, according to the U.S. Seasonal Drought Outlook, and drought is predicted to develop in South and West Texas.

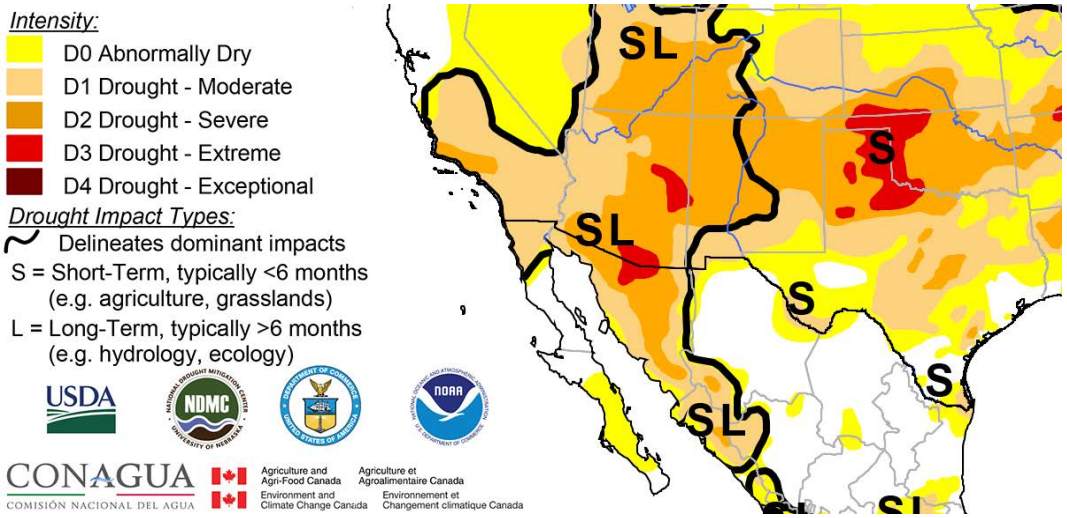


Figure 5 (above): North American Drought Monitor, released February 9, 2018.

FORECAST
MARCH | APRIL | MAY

TEMPERATURE

The one-month NOAA temperature outlook (March; Figure 6) favors chances for above-average temperatures for most of New Mexico and the Texas-Mexico border through March. Chances for above-average temperatures increase further into the spring, according to the three-month NOAA temperature outlook (March-May; figure not shown), reflective of the influence of La Niña conditions in the tropical Pacific Ocean.

The forecast from CONAGUA´s Servicio Meteorológico Nacional (SMN) for March predicts below-average minimum temperature anomalies in the Baja California Peninsula, Northwest Sonora and western Chihuahua, and above-average conditions in Tamaulipas, Nuevo León, Coahuila and Chihuahua. For April, SMN predicts above-average minimum temperatures in most of the northern border states, but mainly in Tamaulipas, Nuevo León, Coahuila and Chihuahua, as shown in Figure 7.

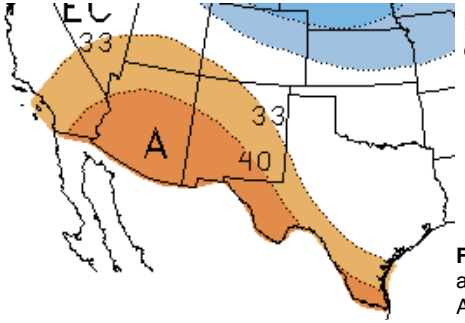
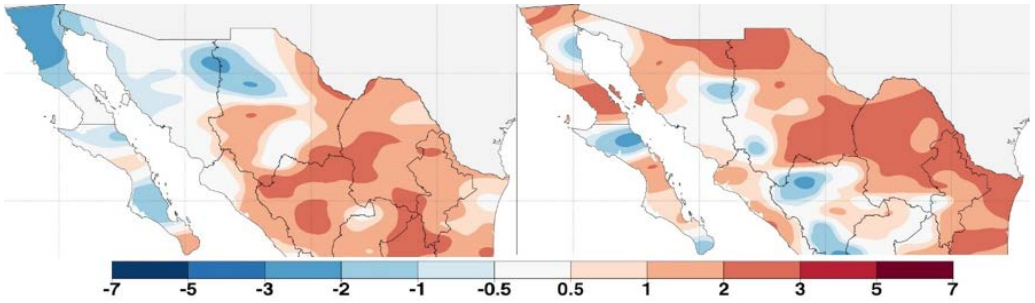


Figure 6 (left): NOAA one-month temperature outlook (March). Forecast made on February 15, 2018 by CPC.

Figure 7 (below): Predicted minimum temperature anomalies for northern Mexico (in °C) for March (left) and April (right). Forecast made on February 1, 2018 by SMN.



PRECIPITATION

The NOAA one-month precipitation outlook predicts increased chances for below-average precipitation for Central and southern New Mexico, and West and South Texas (March; Figure 8). Chances for below-average precipitation increase further into the spring, according to the three-month NOAA temperature outlook (March-May; figure not shown). Precipitation forecasts reflect the projections for continued La Niña conditions in the tropical Pacific Ocean, with a transition to neutral conditions by May. La Niña conditions tend to lead to below-average precipitation in the Southwest U.S. and northern Mexico.

For March, the SMN precipitation outlook predicts above-average conditions in eastern Chihuahua, Coahuila, western Nuevo León and southern Tamaulipas, and below-average conditions mainly in the Baja California Peninsula, Sonora, Chihuahua and northern Coahuila. Precipitation forecasts for April show above-average conditions in Northwest Baja California and Northeast Chihuahua, and below-average conditions in the rest of the Baja California Peninsula, Sonora, Chihuahua, Coahuila and Tamaulipas, as shown in Figure 9.

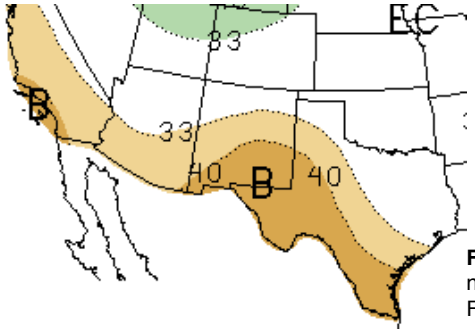
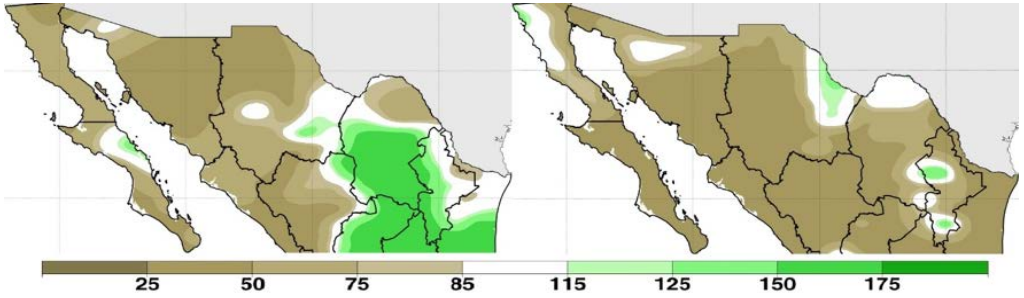


Figure 8 (left): NOAA one-month precipitation outlook (March). Forecast made on February 15, 2018 by CPC.

Figure 9 (below): Predicted precipitation anomalies for northern Mexico (in %) for March (left) and April (right). Forecast made on February 1, 2017 by SMN.



FIRE

According to the North American Seasonal Fire Assessment and Outlook, fires have already occurred in Texas in January, due to dry fuels and little winter precipitation. Fire risk will expand across the Southwest U.S. region and northern Mexico through April, due to below-average precipitation that will intensify drought conditions in the region (Figure 10). High fuel loads, coupled with the increasing frequency of wind events common during early spring in the region, will increase the risk of intense, fast-spreading fires. In Mexico, forecasts for warm and dry conditions greatly increase fire potential across northeastern Mexico from the Big Bend region to the Gulf Coast through April.

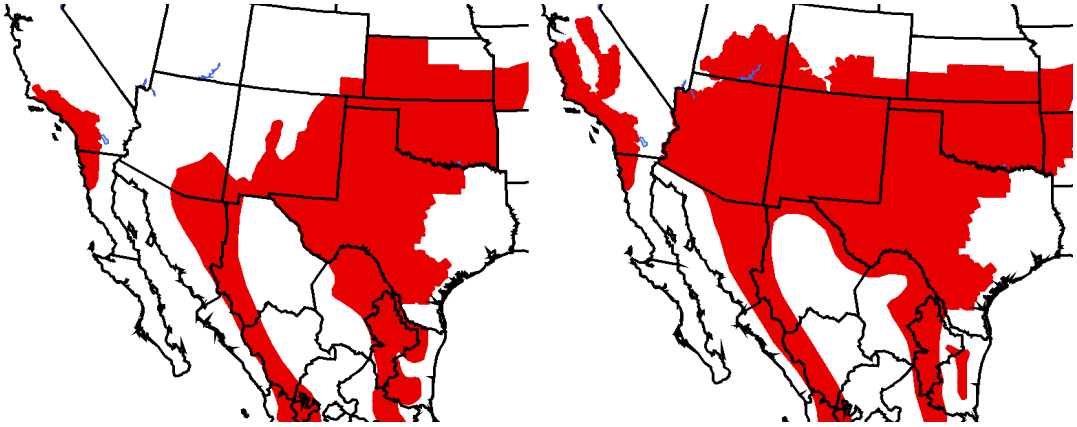


Figure 10 (above): Fire outlook for March (left) and April (right). Red shading indicates conditions that favor increased fire potential. Green shading indicates conditions that favor decreased fire potential. Forecast made on February 12, 2018 from NIFC and SMN.

EL NIÑO-SOUTHERN OSCILLATION (ENSO)

As of early-February, the tropical Pacific Ocean and atmosphere remained consistent with weak to moderate La Niña conditions (IRI; NOAA). However, forecasts indicate a transition from La Niña to ENSO neutral conditions during the March-May season (Figure 11). Current La Niña conditions are still expected to affect temperature and precipitation over the next few months in states along the U.S. southern border and in northern Mexico, as illustrated in the latest forecasts that call for above-average temperatures and below-average precipitation through May.

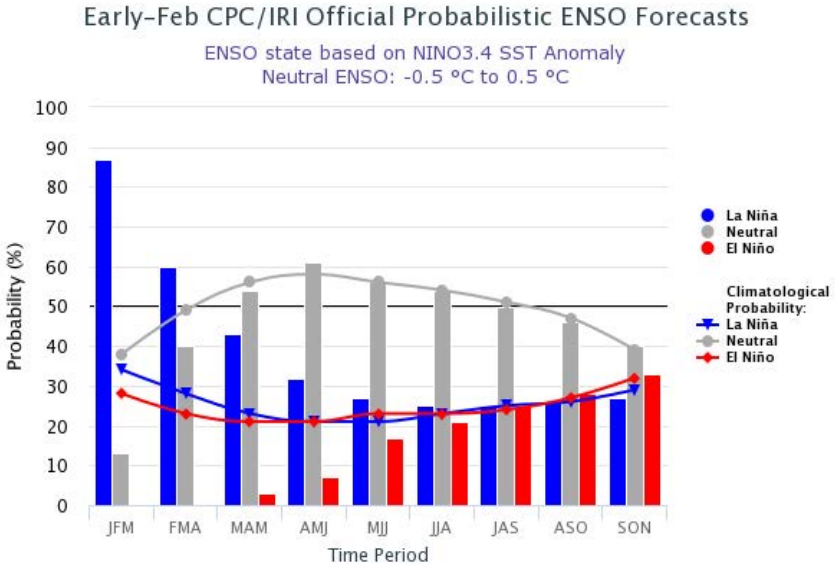


Figure 11 (above): ENSO probabilistic forecast from IRI.

For more information in:

English: http://iri.columbia.edu/our-expertise/climate/enso/enso-essentials/ and http://www.ncdc.noaa.gov/teleconnections/enso/.

Español: http://smn.cna.gob.mx/es/climatologia/diagnostico-climatico/enos and http://www.smn.gov.ar/?mod=biblioteca&id=68

RESEARCH

AERIAL IMAGERY AS A METHOD FOR ESTIMATING RIVER DISCHARGE

New research, published in *Water Resources Research*, has found that coupling high resolution overlapping aerial imagery with hydraulic modeling can provide accurate estimates of river discharge in a time of gauging station decline and increased hydrological variability. Monitoring water resources has become very complex as preferred methods of monitoring water resources, such as gauging stations and remote sensing, are becoming too expensive to maintain and focus mostly on larger rivers of the world. Smaller river basins are not so easily measured and there is a limited understanding of the processes controlling river water quantity and quality. The author's approach helps estimate all levels of scale in river discharge, especially in ungauged watersheds around the world. Although the authors have tested this method within an Arctic tundra watershed, it can still be applied in most alpine, desert, and ephemeral streams.

ADVANCES AND CHALLENGES IN DROUGHT PREDICTION

A recent review article in *Review of Geophysics* focuses on the different methods and challenges of drought prediction, and what advances have been made in improving the accuracy of forecasts. Statistical and dynamical methods are commonly used for predicting droughts, and each have their benefits and challenges. A recently-developed hybrid method, that merges the forecasts from both methods, has shown promise in improving drought prediction. Improved drought prediction requires a deep understanding of drought mechanism, refined observations from data assimilation, better models through parameterizing key components in natural and anthropogenic systems, novel methodologies to select ensembles and combine forecasts from multiple sources, and suitable uncertainty quantification through probabilistic prediction.

ANNOUNCEMENTS

WATER AND THE U.S.-MEXICO BORDER

The event will feature border region water leaders and policymakers discussing the U.S.-Mexico Colorado River agreement and border sustainability initiatives, among other topics. The event will be held March 1-2, 2018 in El Paso, TX.

NORTH AMERICAN DROUGHT MONITOR FORUM

The meeting will focus on trilateral advances in the North American Drought Monitor. The forum will be held May 1-3, 2018, in Calgary, Alberta, Canada.

NEWS

Drought Conditions Spread Across the West - Are We Ready?, February 14, 2018

What repercussions New Mexicans can expect of current drought, February 10, 2018

Record low snowpack foretells troubling spring, summer, February 11, 2018

Texas A&M experts say extended drough could bring fire risk, agricultural impact, February 11, 2018