

Future data for local and USDM authors to consider for drought. March 2021

Attendees:

NDMC/UNL: Curtis Riganti, Kelly Smith; DRI/WRCC: Dan McEvy, Dave Simeral; NOAA NWS AK: Gene Petrescu; NOAA NWS AK-Pacific RFC: Jessica Cherry; NOAA NIDIA: Britt Parker; NOAA NCEI Richard Heim; UAF ACCAP Rich Thoman, Tina Buxbaum; UAF AK Climate Research Center: Martin Stuefer, Julia Simonson, Ulyana Horodyskyj Pena; Fed Reserve Bank of San Francisco Craig Nolte; Ag-AgriFood Canada: Trevor Hadwen, Alyssa Klein; USDA NWCH: Holly Prendeville, Anna Maher, Paris Edwards

Data for local or USDM authors to consider:

The [Department of Interior National Park System Inventory and Monitoring Network \(IMN\)](#) has stations are at high elevation with limited liquid precipitation (lots of snow). Need climatologies generated from these sites. Could use PRISM normal as a proxy for station base. Most stations don't record frozen precipitation at stations but do have snow pingers for snow depth but no precipitation totals. WRCC has these data: <https://wrcc.dri.edu/NPS.html> and also found here: <https://wrcc.dri.edu/wraws/akF.html>

[Mesowest](#) has RAWS data access, via map-based interface, for near real time observations

[EPA's iGAP](#) (Indian General Assistance Program, monitoring is a large component of this program throughout the US).

[DOT FFA](#) sites are maintained for wind and camera but not temperature and precipitation

Need to reach out to [AK Indian Health Services](#) and [Alaska Native Tribal Health Consortium](#) about monitoring wells and reporting information to understand drought conditions.

Reach out to the state to identify any long-term data sets.

Remote sensing & models: Leaky bucket model data (monthly)-percentiles of temperatures and precipitation and soil moisture, and verify it is consistent with other data. ERA5 modeled data though it is not usable in the winter, especially Leaky Bucket soil moisture. SMOS-soil moisture anomalies, but subject to snow cover and can't product a product in winter. Land surface temperatures important in some regions due to shallow water that evaporates quickly with higher temperatures.

Remote sensing data – use mostly in summer, should be considered. Limited operationally. Includes NASA SPoRT soil moisture, updated daily.

Climate Forecast System (CFS)-Reanalysis products (i.e., PNP-precipitation) are available via [Climate Engine](#): NDVI products, via MODIS and Landsat are also available on Climate Engine. There is an API to get an API token to use it to get maps into one stop shop format, will take some work to learn API. [Climate Engine API](#)

Future data sources from ongoing projects

Alaska Climate Research Center plans to reach out to Western AK, for CoCoRHaS. They plan on having future site visits to engage communities. Mesonet stations developing normal for stations (Julia).

Martin Stuefer has NFS funds to repurpose [US array seismological stations](#), many have weather stations connected to them. About 90 stations. \$0.5 million in communication fees alone to maintain network. Will develop climatology for sites.

Remote sensing: Ongoing NSF fire and ice project is focusing on coastal margin and freshwater inputs. Ocean water quality. Goal develop new and better.

Jessica Cherry: River Forecast Center working towards new product for better precipitation. Fused model radar product is underway MRMS relies on HER model output. Trying to compute snow loading through winter precipitation models. Gauges work poorly in winter and tend to throw out that data. If looking for snow drought there may be other options to calculate accumulated precipitation to fill in gaps where NRCS doesn't do surveys.

IMIC database. UAF Motivation for database about network design and data gaps. Currently an unfunded effort. Likely will be archived in current form at IARC or other center.

Gene Petrescu: Satellite-derived data from current project with NIDIS & Climate office for reanalysis of ERA5 to drive some drought monitoring assessment products.

In Canada, we are trying to utilize more and more remotely sensed products to assist in areas that have poor station coverage. In addition, we find using the remotely sensed data to help with determining or clarifying impacts. Data sets including NDVI anomalies, VegDRI, and even GRACE data has proven useful. (Trevor Hadwen)

Work to grow citizen science programs; especially those related to berries and invasive species.

Future research opportunities to better understand drought in Alaska

Snow drought: Does low precipitation during winter count as drought? In the winter, low precipitation or low snowpack would be D0 (abnormally dry) and not likely beyond that unless it carried on beyond into later seasons. Mainland AK low elevation snow drought, no precipitation or precipitation falling as rain when it usually was snow...result in impacts to communities, overland travel, subsistence activities esp. in autumn at river-level elevation. No snow in urban areas can lead to freezing at deeper temperatures (breaking pipes).

Guidebook for USDM authors on how to approach snow precipitation in western AK.

Evaporation

How does rising temperature affecting water demand side of the drought equation (evapotranspiration) (drought being an imbalance between water supply [precipitation] and water demand [evapotranspiration]) especially in 24-hour sunshine? How important is evapotranspiration in summer and how best to get it into drought monitoring?

Evaporation during warm season needs to be part of the equation (flash droughts in CONUS where wind, sun, temps, & low humidity are important factors), how wind factors in with evaporation in AK, need to be looked at.

Wind

What is wind climatology doing? Increasing, more variable, decreasing? Develop tools to monitor ET. What are wind impacts (i.e. changes in direction, timing, speed, etc.) esp. on evaporation? No or low winds can affect lake mixing and lead to a warm top layer of water and much cooler lower layers.

Hydrology

Melting glaciers are complicating hydrology, higher stream flow could be due to glacial melt in times of drought/heat waves. Need to take care using & interpreting stream flow data in AK. USDM authors could benefit from know which gauged streams are glacier fed, snow fed, rain fed, and influenced by permafrost. Identify where glaciers have melted off and are no longer an input to streams, versus currently an input, will affect interpretation of data.

A better idea of what streamflow components and drivers are, including glacial inputs and other inflows to improve stream forecasting.

There's an existing working collaboration with Crane Johnson at the River Forecasting Center to model water and DWR will look to him to think about the future.

Understanding hydrology is important for NW AK

More research on soil moisture, permafrost / frozen for large portion of year. Soil moisture may become a more important issue as climate continues to warm and more permafrost melts, will it become a good indicator now or in future? More tools to monitor soil moisture

and significance of it. How might the melting of the permafrost affect groundwater as a drought indicator and water resource?

How changes in freshwater inputs (warm water, low water, timing of water, glacial inputs, permafrost inputs?) affect estuarine and marine systems?

Large land area of Alaska

Issues representing Alaska as large chunks, failure to recognize how large it is, how diverse the physical geography/ecosystems are. Recently, efforts made to study smaller scale systems in Alaska, better understanding needed of sub-ecoregion scale things. There is a need for data at a finer spatial scale to capture these smaller scale features.

Other topics

Opportunities for Canada and Alaska to collaborate more.

Can satellite imagery help inform about drought conditions?

Algal blooms, Martin part of NFS EpSCOr project. Underway!

Narrowing waterways for shallow rivers (NW)

Economic way to track home well depths (incorporate STEM and students)

Improvements to predictive modeling to help the water and fire conditions outlook.

As a drought community, can we work to address how USDM provides benefit to remote communities?

How will the local villages benefit by providing the impact info to the USDM?

What is the service they would receive?

CoCoRHAS struggling with this in AK. Community competition. Show how data will be used. Give a sense they are helping. Community pride. Need more of an education part of what these data mean and how it is important to community. Can compare what you see versus what your neighbors see.

Incentivizing things can create a lot of skeptics in terms of users. Build community around learning and appreciate environment. What is normal? What matters?

Drought relief programs are set up for commercial agricultural interests, not subsistence non-commercial agriculture. So, what we (as a drought community) need to do, and what we need to recommend out of this workshop (one of the recommendations), is that the states (Alaska in this case) and federal agencies need to set up programs that provide drought relief to the non-commercial sectors like the subsistence agriculture in Alaska, programs that address this critical gap.

More data sharing would also be helpful.

Citizen science expansion would be an effective way to help fill out data needs.