

Annual Report 2020



Alaska Climate Adaptation Science Center

Directors' Message

2020 YEAR IN REVIEW

Weather and climate. Alaska experienced yet another year of extremes. Numerous locations around the state observed continued record warm temperatures well into fall and early winter. Other locations received well above normal fall and winter precipitation, and record snow packs were seen in the Interior. Interior Alaska also experienced one of the coldest winters in decades. Impacts of these extremes could be seen in many ways, including exceptionally low autumn sea ice coverage and the second-to-latest ice-over date for the Beaufort Sea over the 41-year satellite record. Late, but rapid spring green-up led to a new world record single-day count for birch pollen in Fairbanks, though most recent discussions by Interior residents have switched to extremely healthy populations of mosquitoes.

Actionable science. In Year 3 of the AK CASC's current 5-year cooperative agreement, we continued our work with our federal and state partners on the co-production of actionable science to address natural resource management challenges in Alaska. Visit our projects page to learn about all of our research projects (akcasc.org/projects-overview). In this issue we feature continued developments in our Glacier Outburst Flood Modeling project in Juneau.

Translating our science. Year 3 saw a continued focus on communicating our science in ways that match the enormous diversity of people in Alaska, as well as a focus on building our science communication skills-from our Fellows to our Scientists. In this issue you will learn about some of these efforts including the Alaska Voices Project.

Building science capacity. We continue to invest in increasing our science capacity to meet the needs of Alaska and the nation. In Year 3 we celebrated the graduation of two of our Fellows from UAF. We also added two new postdoctoral Fellows to our Fellows program. Read more to learn about one of our graduating AK CASC Fellows - Ross Spicer.

Please visit us online or contact us directly about our research, communication, and outreach efforts.

PUBLICATIONS

AK CASC researchers published 21 peer-reviewed publications/reports during Year 3. See last page for some featured publications.

AK CASC WELCOMES NEW FACES

Mike DeLue joined the AK CASC as a new communications specialist based in Fairbanks.

KRISTIN TIMM REJOINING THE CASC AS POSTDOC FELLOW

We are excited that Kristin Timm has returned to the AK CASC this year to help lead the planning of our Co-Production Workshop.

TRIBAL E-BULLETIN LAUNCHED

Tribal Liaison Malinda Chase led the way in the launch of the new Alaska Tribal Resilience Bulletin. The bulletin features events, funding opportunities, and resources for resilience building of Alaska tribes and comes out every three weeks. Subscribe on the AK CASC [Tribal Outreach page](#).

BRT PROJECT CONCLUDES

Participants in the AK CASC [Building Resilience Today](#) project met in Fairbanks for a final training in January this year. Final recommendations, community reports, and support for action plans in participating communities is ongoing.

New study highlights findings and predictions for Juneau glacial outburst flood

In May 2020, AK CASC researchers published a paper in *Frontiers in Earth Science* exploring the evolving dynamics of Suicide Basin, a glacier-dammed lake in Juneau that releases annual outburst floods, causing inundation and erosion in the Mendenhall Valley.

A collaborative team of researchers from the University of Alaska Southeast, the City and Borough of Juneau, the National Weather Service, the U.S. Geological Survey, the Alaska Division of Geological & Geophysical Surveys, and the Alaska Climate Adaptation Science Center, which provided the primary funding for the study, have been monitoring the basin for several years to better understand and predict flooding events.

“We expect [glacial lake outburst floods] from Suicide Basin to pose a threat over the next decade, hence we plan to continue the monitoring over the years to come,” notes lead author and former AK CASC Fellow Christian Kienholz. Managing this risk into the future is a priority for the agencies involved to ensure continued success in keeping people and infrastructure safe.

Multiple factors influence the magnitude of future floods from Suicide Basin, making it difficult to assess what the future holds. The thinning of the ice dam, which is currently dropping by 5 meters annually, is lessening the capacity of the basin to store water.

However, floating ice in the basin is melting away rapidly, providing a larger reservoir to store water behind the dam. The area of the basin that can store water is also increasing slowly as Mendenhall Glacier retreats.



▲ Research on the Suicide Basin takes place both from the sky and on the ground. Here a researcher rappels into the basin to take measurements.



▲ The Mendenhall Glacier and Suicide Basin sit above the Mendenhall Valley community of Juneau, as well as Juneau International Airport.

“Tracking these changes in the basin gives scientists and city managers an idea of the volume and potential drainage scenarios of future events,” said AK CASC Scientist Eran Hood.

These possible outcomes highlight the need for continued monitoring of Suicide Basin, and data to help understand the drainage mechanisms that drive floods. Continuing efforts of previous years, the research team intends to conduct drone surveys of the basin using high-resolution fixed-wing drones to map the ice elevation and underlying topography of Suicide Basin. This work also led to AK CASC Scientist Gabriel Wolken being featured in a case study by drone company Wingtra for his work producing digital elevation models of the basin.

The multi-agency response is a model of how a collaborative approach can work to address the evolving challenges posed by environmental hazards. The findings and methods from this research will improve forecasting capabilities at other outburst flood areas around the state, which may grow in number as climate change causes rapid glacial retreat and the formation of new ice-dammed basins.

AK CASC tradition of training continues

Training opportunities for scientists and community partners have long been part of the AK CASC. This year the AK CASC has built on the momentum with trainings on science communication, uplifting Indigenous voices, and the use of Google Earth Engine in research.

A workshop with the Alan Alda Center for Communicating Science, co-hosted with Alaska EPSCoR, focused on developing science communication capacity among the organizations' researchers and staff. The group of 32 researchers and staff studied storytelling techniques as well as strategies for connecting with a variety of audiences.

In late February Libby Roderick and Ilarian Mercurieff of the Difficult Dialogues Initiative led the Difficult Dialogues and Stop Talking trainings in Fairbanks. The Difficult Dialogues training presented tools for reframing conversations which often find themselves either silenced or derailed if not approached carefully. The Stop Talking training, meanwhile, focused on introducing participants to Alaska Native ways of teaching and learning in the context of both education and research.

Participants described issues with how researchers have tried to work with Alaska Native communities in the past. Some shared stories of the failure of researchers to consider the needs and priorities of their potential collaborators, as well as the constraints of the broader research funding structure within which scientists operate. Others shared stories of current efforts to address these issues at every stage of research, and to better integrate Indigenous wisdom and knowledge at a more foundational level.

Alaska and Pacific Islands CASCs make cross-network connections

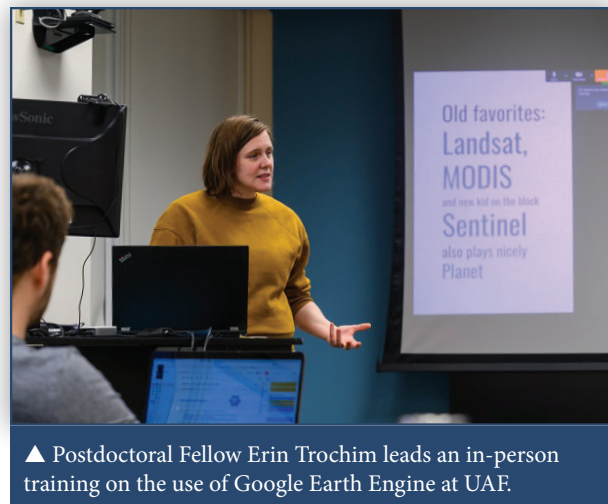
In October 2019, scientists and staff from the Alaska and Pacific Islands CASCs gathered in Juneau, Alaska to foster cross-CASC collaborations. Both CASCs cover huge territories, with the Pacific Islands CASC covering a broad area including Hawai'i, Guam, Palau, the Marshall Islands, and beyond.

Much of the focus of this meeting was on the comparisons between Southeast Alaska and Hawai'i. Aside from the stark differences in latitude and climate, the states share more commonalities than one might expect. Themes emerged from both regions, including drought, natural hazards such as landslides and coastal erosion, and challenges in modeling due to lack of data.

The year's trainings didn't only include outreach and communication skills though, as the AK CASC's own Erin Trochim led a 3-part training on the use of Google Earth Engine (GEE) as a research tool. GEE can load global satellite imagery like Modis, Landsat, and Sentinel, as well as climate, landcover, and topography layers with a single line of code, in a fraction of the time.

Although the training was aimed towards GIS professionals, managers, and subject matter experts whose work has spatial applications, there are also communication applications of the tool. Striking visuals from complex data become easy to create in GEE. "You can do very sophisticated science, and also communicate it better," noted Trochim.

The AK CASC is committed to providing ongoing training opportunities for its researchers and collaborators. Participants in all of this year's trainings expressed appreciation and growth after the opportunity to learn from these skilled trainers. Moves to incorporate the lessons learned over these days into AK CASC communications and research are already taking place.



▲ Postdoctoral Fellow Erin Trochim leads an in-person training on the use of Google Earth Engine at UAF.

Scientists and staff from both climate adaptation science centers first gathered in Honolulu, Hawai'i in April 2019 to explore these common themes and increase collaboration between the CASCs.

From these meetings, the CASCs have explored ways to share knowledge, resources, and build a unique joint science agenda that capitalizes on research themes across Hawai'i and Alaska.

The AK and PI CASCs will be hosting a Joint Fellows Program to provide Fellows with opportunities to investigate shared research themes in both states. A new request for proposals was also conducted in early June to support concurrent research between the CASCs.

NORTHERN NOTES

AK CASC AT AGU
AK CASC Scientists and Fellows presented and led sessions at the 2019 American Geophysical Union Fall Meeting. Topics presented spanned a wide range of areas including thermokarst formation, citizen snow science and dynamic vegetation modeling.

AK CASC FELLOW JOANNA YOUNG COMPLETES HER PHD
Joanna Young successfully completed her PhD. We are excited that she will continue her research on glacio-hydrological changes in Southeast Alaska as an AK CASC Postdoctoral Fellow. Additionally, Joanna will also serve as Director of the Inspiring Girls Expeditions of Alaska as the AK CASC becomes the program's new home.

COMMUNICATION SPECIALIST MOLLY TANKERSLEY FEATURED IN SCIENTIFIC AMERICAN
Tankersley published an article titled [Unravelling the History of Avalanches in Juneau](#) in the Scientific American Observations blog in October 2019.

THE AK CASC SAYS GOODBYE TO FELLOW ERIN TROCHIM
Erin Trochim is concluding her postdoctoral research with the AK CASC. We wish her well in her future endeavors, and look forward to future opportunities for collaboration.

Research meets storytelling with a new podcast

A researcher's dream of combining science and storytelling came to fruition as a podcast this May. Alaska Voices shares stories of life, work, education and more. It will feature conversations with scientists, community members, and students from across the state.

The podcast has been years in the making. In 2016, Jessie Young-Robertson, then a researcher with the former UAF School of Natural Resources and Extension, shared her idea with colleague and AK CASC Co-Investigator Bob Bolton. As the project took shape, the pair recruited a team and started recording.

The story-based project grew to include conversations on navigating an academic career, scientific field work, relationships, life and education in rural Alaska communities, climate change, women in science, and more.

"I'm excited for these stories to make it out into the public," Young-Robertson said. "I've spoken with some interview volunteers as well, who can't wait to hear their conversations on the podcast. People like to share their stories. We're just glad we can amplify their voices."

Each podcast began as a 30-minute to one-hour recorded conversation between two participants. These conversations were edited down to five-to-10 minute podcast episodes for release twice per week through Spotify, Apple Podcasts and other platforms.

Featured publications

Herman-Mercer, N., Loehman, R.A., Toohey, R.C. and Paniyak, C. 2020. Climate and disturbance driven changes in subsistence berries in coastal Alaska: Using Indigenous knowledge to inform ecological inference. *Human Ecology*, 48: 85–99, <https://doi.org/10.1007/s10745-020-00138-4>

Hill, D.F., Burakowski, E.A., Crumley, R.L., Keon, J., Hu, J.M., Arendt, A.A., Wikstrom Jones, K., and Wolken, G.J. 2019. Converting snow depth to snow water equivalent using climatological variables. *The Cryosphere Discussions*, <https://doi.org/10.5194/tc-2018-286>

Tankersley, M. 2019. [Unraveling the history of Avalanches in Juneau](#). *Scientific American Observations*, Online October 31, 2019.

Thoman, R.L., Bhatt, U.S., Bieniek, P.A., Brettschneider, B.R., Brubaker, M., Danielson, S.L., Labe, Z., Lader, R., Meier, W.N., Sheffield, G., and Walsh, J.E. 2020. The record low Bering Sea ice extent in 2018: Context, impacts and an assessment of the role of anthropogenic climate change. *Bulletin of the American Meteorological Society*, 101(1): S53-S58, <https://doi.org/10.1175/BAMS-D-19-0175.1>

Ziel, R.H., Bieniek, P.A., Bhatt, U.S., Strader, H., Rupp, T.S., and York, A. 2020. A comparison of fire weather indices with MODIS fire days for the natural regions of Alaska. *Forests*, 11:516, <https://doi.org/10.3390/f11050516>

▲ Find more publications at akcasc.org.

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Visit the Alaska Climate Adaptation Science Center at
akcasc.org or usgs.gov/casc



▲ Jessie Young-Robertson and Bob Bolton worked hard and headed a large team to bring Alaska Voices to air.

The Alaska Voices project grew out of a collaboration between the Alaska Climate Adaptation Science Center and StoryCorps, a nonprofit that promotes storytelling nationwide. More than 60 long-form conversations were archived under the StoryCorps umbrella in the Library of Congress.

Audio engineer Kelsey Skonberg made final audio edits for the podcast which are also hosted on the podcast's own [website](#). There you can also find details, contact information and links to interviews the podcast team has done on various radio and podcast platforms in preparation for the show's launch.

Meet Fellow Ross Spicer

Originally hailing from California, Ross Spicer came to UAF for an undergraduate degree in computer science. He became involved with the International Arctic Research Center while assisting in the improvement of data processing tools with Bob Busey.

Ross specialises in the computational work which underlies modeling of landscape change in permafrost-rich areas. While working with the Geographic Information Network Alaska, GINA, his work focused on web development, which eventually led to his involvement in the Alaska Thermokarst Model. As he worked with Bob Bolton at the AK CASC to improve the model both his fascination with this work and his valuable skills grew.

Today Ross focuses on the development of thermokarst, small pond-covered landscapes which form as permafrost melts as a result of warming temperatures or other climatic factors. He enjoys studying landscape change initiation, and what initiates the process of freezing and thawing inherent in the thermokarst cycle. As a result, following completion of his MSc research, Ross has continued his involvement in thermokarst and permafrost projects with the AK CASC and the Geophysical Institute Permafrost Lab. This work is helping us to better understand these two intimately connected Arctic phenomena.



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