

## Eyes in the Sky

### Boreal Fires researchers aid fire managers in remote sensing

Fortunately for the Alaska Fire Service, COVID-19 doesn't affect satellites.

While restrictions related to the virus have made it more difficult for fire managers to rely on traditional ground observations to keep track of conditions in the field, their satellite sensing capabilities are intact. And they're getting a boost from EPSCoR researchers, who are helping the fire service by contributing their own expertise to this increasingly important aspect of fire readiness and response.



photo by Philipp von Ditfurth

EPSCoR postdoc Chris Waigl, who is undertaking multiple remote sensing projects for the Alaska Fire Service.

"Many of the things that people were comfortable doing in the past have been severely restricted this year," explained Robert Ziel, a fire analyst for the Alaska Fire Science Consortium and also a member of the EPSCoR Boreal Fires research team. "The ability to assess snow cover, the ability to assess greenup, the ability to display these kinds of things and highlight them for decision makers, is taking on a greater level of importance because they're not

able to go out and see it for themselves."

In mid-April, members of the Boreal Fires team raised a simple question to Ziel and other fire agency representatives: what can we do to help? The brainstorming session that followed generated a number of potential projects, most of which involved tailoring or building remote sensing products for fire service use. And they mostly fell onto the shoulders of one researcher: postdoc Chris Waigl. "The end of these conversations that I



### From the PI

**Pips Veazey,**  
Principal Investigator

Hello everyone,

It's only been a couple of months since our last newsletter came out, but it feels like much longer. Since then we've all acquired face masks, started washing our hands a lot more, and taken up Zooming.

The coronavirus has proven a challenge for everyone, and researchers are no exception: social distancing and travel restrictions have made it challenging-to-impossible to stick to our original plans for summer fieldwork. But we at EPSCoR are proving ourselves a resilient and creative group, and many of us are finding ways to ensure the safety of our teams while continuing to gather data and to advance the Fire and Ice project. I thought I'd use this letter to give a quick roundup of how our components are navigat-

# Remote Sensing

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ran with, was that there were three products that would be really useful to the fire service if they had them available in a usable form,” Waigl explained.

Waigl’s first project was to provide maps of Alaska’s diminishing snow cover, a process that entailed processing data obtained from the U.S. National Ice Center and sharing it for upload onto [agency fire maps](#). The project provides fire managers with information on the onset of fire risk, but also helps them determine which remote weather stations are snow-free and are due to resume automatic functioning. Waigl has been updating and sharing the maps on a daily basis since early May and has established an almost fully automated process to continue providing them.

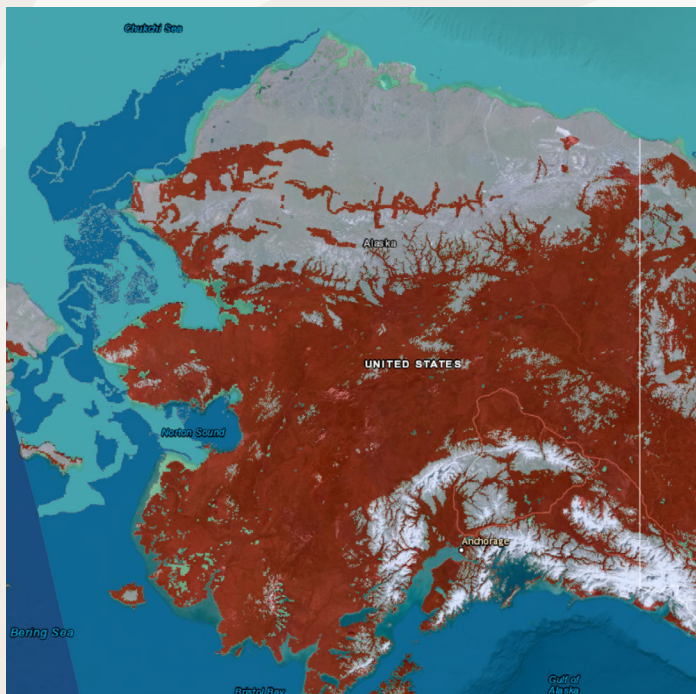
Waigl will follow that up with the second task, providing similar maps of the “Smokey Bear” fire danger ratings (i.e. low, medium, high, very high, and extreme) for the entire state. Maps of these ratings are produced by a group in Utah, and are not currently compatible with Alaska Fire Service maps. “They had to juggle two different websites to visually compare,” Waigl said. “But this data is also produced in a form that I can also transform into something they can use and that’s what I’m doing next.”

Waigl’s third and final project is the most ambitious, but it’s also one for which she is well-prepared. As a graduate student at UAF, she led a team that designed

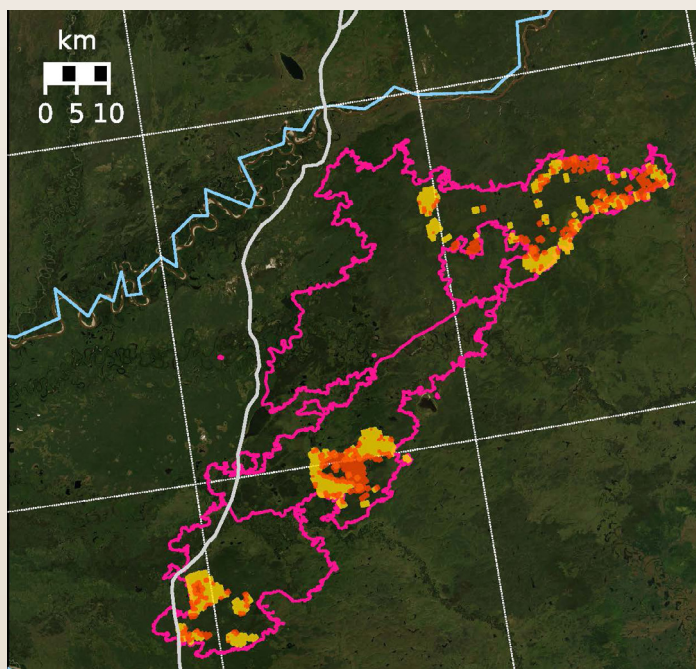
a process called [VIFDAHL](#) (VIIRS I-band Fire Detection Algorithm for High Latitudes), which tailors existing satellite fire detection techniques for Alaska’s specific conditions, enabling it to detect fires (especially low-intensity fires) with more accuracy than the available products. Waigl likens the process to turning up a stereo: she increases the sensitivity of the satellite’s thermal imaging, resulting in more fire detections but also more “noise,” false alarms caused by warm spots like sandbars and old fire scars. She then uses the VIFDAHL algorithm to filter these out. “I cranked up the signal and tried to exclude false positives in our particular ecosystem.”

Last summer, Waigl was initially hired by EPSCoR to use VIFDAHL to generate better maps of the Shovel Creek Fire near Fairbanks, which was a direct response to requests at a community meeting about the fire. She created a series of twice-daily maps of Shovel Creek, as well as

a number of other significant fires around the state, which indicate not just flaming fronts but also lower-intensity burns located away from the main fire centers. The project generated a few timely fire maps, but more



Top: Fire service map of Alaskan snow cover on May 22, 2020. Bottom: VIFDAHL map of the Chalkitsik fire complex, July 7, 2019. Orange points are low-intensity burns.



Top: screenshot by Tom Moran; Bottom: image courtesy Chris Waigl



significantly served as a valuable proof-of-concept on VIFDAHL, as well as object lesson in data processing and formatting.

“It demonstrated to the fire service that this was something they wanted, and what it also helped us do last year was to figure out what a suitable way is to produce this data so that the fire service can use it,” Waigl said.

That being the case, Waigl is embarking on a project to apply last summer’s VIFDAHL techniques on a larger scale. Waigl will use VIFDAHL to analyze both major fires around the state and nascent fires in high-risk areas, and to provide the data on at least a daily basis to the fire service to use in updating their main incident

map, which is also available for public view. In addition to timely fire data, Waigl also noted the VIFDAHL maps can be used for future research into fire ignition.

Ziel said Waigl’s efforts will be useful to the firefighters in a number of ways, providing them with up-to-date, easily accessible information that can be used to make informed decisions on when and where to allocate resources, both in general and for specific fire events. “They have aircraft that need to be prioritized on a given day, they have crews need to be dispatched to priority fires,” he said. “And so having that fire danger information in the context of those values allows us to more quickly identify which fires are most important.”

## Letter from the PI

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ing the new world of COVID.

Fortunately, some of our **Boreal Fires** research can continue unabated as it’s based around climate data and doesn’t require fieldwork. Our hyperspectral data gathering for the boreal fires component depends on a single-person airplane based in Fairbanks, while researchers gathering ground data plan to take separate vehicles and keep their distance from one another. Plans to travel to rural areas to research fire impacts are on hold, but our partners at the Tanana Chiefs Conference have been able to collect data (in particular drone footage) on our researchers’ behalf.

One obstacle to **Coastal Margins** research has been the closure of the Kasitsna Bay Laboratory, which serves as the home base for Kachemak Bay fieldwork; however, the South-central ‘Stream Team’ has continued their data collection by basing out of Homer instead, and a small intertidal team has received a special exemption to conduct a first round of fieldwork out of the Kasitsna Bay lab in early June. Researchers in Southeast are still developing plans for their fieldwork, which can be accomplished via day trips out of Juneau.

The **Diversity, Education and Workforce Development** component has had to shift some plans as well. This summer’s Girls on Water expedition has been moved to next year. Likewise, summer plans to pilot DEW course modules

and to hold teacher workshops are on hold until in-person schooling resumes. DEW staff are instead focusing on other projects, such as crafting more course modules and creating “success stories” of underrepresented students in STEM.

As for the central administration of the program, we’ve all been working from home since mid-March. One of our major accomplishments was supporting the team through a virtual Reverse Site Visit, in which an NSF panel grilled us about the progress of the Fire and Ice project. Since then our priorities have been working on the resultant NSF recommendations, keeping the project running smoothly each day, and putting together our annual budget for the NSF – a more complex undertaking than usual thanks to all the major late-breaking changes in research expenditures.

But we’re figuring it out, and I have nothing but good things to say about how EPSCoR’s staff, researchers and students have persevered through these troubled times. Stay healthy, stay sane, and I’m looking forward to the day we get to see one another in person.

Regards,



Pips

# Opportunities and Announcements

## DEW Seed Grants

Our Diversity, Education and Workforce Development component has awarded a pair of [seed grants](#) to UA personnel to provide educational opportunities to underrepresented groups.

A team led by IARC Research Assistant Professor Katie Spellman will be funded for “Fostering Science: Expanding Access to Science Camp to Youth in Care of the State.” The team will hold [a weeklong summer science camp](#) (pictured at right) at the Bonanza Creek Experimental Forest exclusively for youths in the Fairbanks-area foster care system.

UAA postdoc Anita Moore-Nall and a research associate will be funded for “Digital Storytelling: Bridging a Gap in Place-Based Science.” Moore-Nall will work with students at [Mt. Edgecumbe High School](#) in Sitka to create digital products focused on ecosystem change that are rooted in oral storytelling traditions.

Spellman and Moore-Nall join three earlier DEW grantees: UAA-KPC faculty Alison Gardell, UAF faculty Carie Green (featured in [our previous news-letter](#)), and Juneau-based UAF faculty Shannon DeMaster.



Photo by Christa Mulder/Bonanza Creek LTER

## Logo GIFs

We now have animated GIFs of both the Fire and Ice and Alaska NSF EPSCoR logos. They can both be downloaded from [our website](#).

## Fire and Ice Data Portal

If you haven't visited yet, swing by the new [Fire and Ice legacy data portal](#). The portal provides access to datasets and data projects collected by Fire and Ice researchers, as well as datasets from related projects and from previous EPSCoR endeavors.

## Game Jam!

We're excited to announce we will be hosting an online “Solstice Game Jam” on June 22-29. Game jams gather teams and individuals to design games – from complex videogames to classic board games – to share online. All ages and abilities are welcome. The event has a “Fire and Ice” theme, so participants are encouraged to incorporate fire and ice elements into their games. For more information email [chphillips@alaska.edu](mailto:chphillips@alaska.edu) or visit [our website](#), which also has a [link to register](#).



Image by Cassidy Phillips



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If you wish to be added to (or removed from) the EPSCoR newsletter mailing list or listserv, please contact Tom Moran at [tmoran3@alaska.edu](mailto:tmoran3@alaska.edu) or (907) 474-5581.