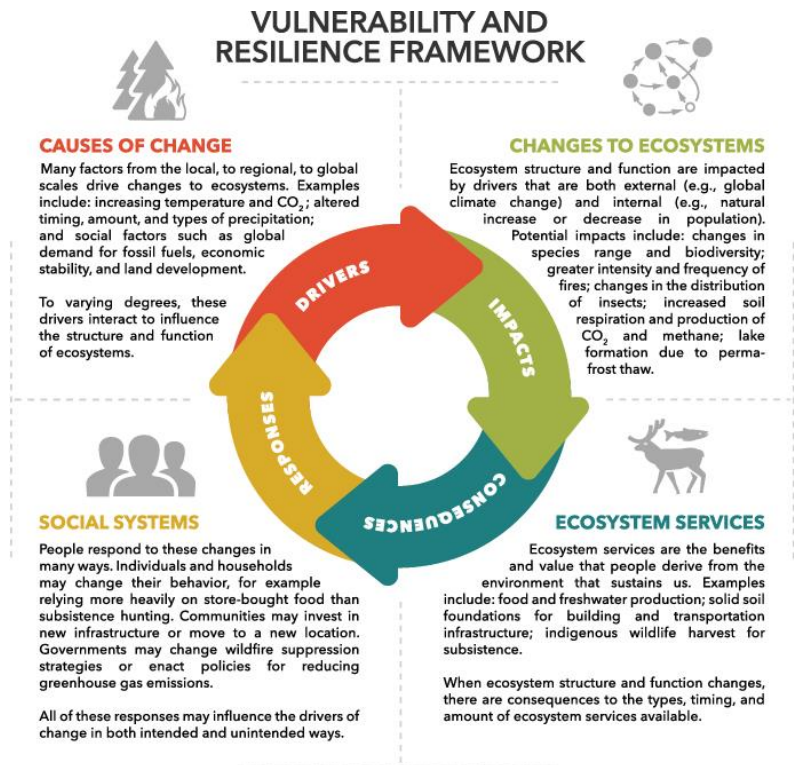


NASA ABoVE Science Communication and Engagement Resources Packet

August 2022

As ABoVE's Vulnerability and Resilience Framework notes, environmental changes have consequences for social systems, such as households, communities, governments, and society as a whole. To ensure that the data and analyses that ABoVE researchers produce are relevant to end users, ABoVE investigators like you work in collaboration with communities, land managers, and other decision-makers. This collaboration might involve relationship-building, science communication, research planning, or community assistance with field work and data analysis.




This living document provides resources to make any and all of those processes more effective. The resources presented here are in no way comprehensive, but they serve as a jumping off point for investigators and researchers beginning the science communication piece of the ABoVE framework. Please feel free to contact [Support](#) with any resources and/or suggestions.

-Alexandra Kiefus, NASA Carbon Cycle & Ecosystems Office ABoVE Intern,
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General Science Communication



[Earth to Sky](#) “actively fosters collaborative work between scientists, interpreters, communicators, and informal educators from NASA, NPS, and other place-based organizations” (Earth to Sky 2022). They “nurture and expand a community of practice that uses the science and communication skills and capabilities of each of the partners to enrich public engagement in natural and cultural heritage sites across the United States” (Earth to Sky 2022).

Pursuing a balance between advocacy and inquiry
Presuming positive intentions

Paraphrasing

Paying attention to self and others

Probing for specificity

Pausing

Putting ideas on the table

Earth to Sky’s [Seven Norms of Collaboration](#) guide scientific conversations and knowledge sharing.



Authentic Task Approach Characteristics
http://www.wested.org/online_public/1-9818.ttd.pdf

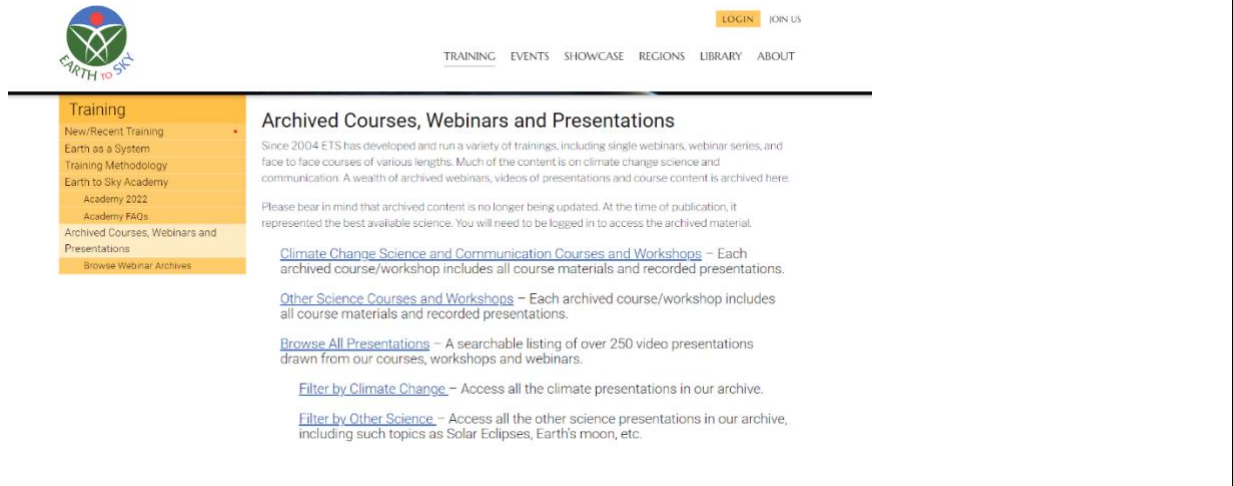
Less emphasis on...	MORE emphasis on...	Course Features
Conference planner/funder needs	Participants' needs	Participants define beforehand what they will work on in the context of their own work
Pre-determined general topic with the hope that everyone "gets what they need"	Content sessions determined by specific participant tasks	Course planners analyze tasks to determine specific concurrent and general sessions
"Sit and get" presentations	Active engagement and learning while doing	Team time to work on tasks and develop strategies for implementation at work site
Looking for answers and solutions from others	Discovering and creating solutions with others	Reflective partners (structured opportunities for participants to provide feedback to one another) Appointment cards (structure to provide participants with opportunities to schedule time with resource experts)
National and state perspectives	Local context, challenges and critical issues	Teams clarify tasks and define criteria for success
Generic understanding of existing knowledge	Application of existing knowledge	Development of Action Plans Providing adequate time to reflect
Concerns about information (how much, what level, etc)	Concerns about how to use the information and skills learned	Creating a product that focuses on implementation at work site
Shallow treatment of a lot of information	Intensive study of information that focuses on specific tasks	Customized course design Resource-rich environment (materials and subject matter experts)

Earth to Sky Contacts:
Anita Davis: anita.l.davis@nasa.gov 301-614-6669 Ruth Paoleroni: rpa@csd.berkeley.edu 510-643-5660

Their [Authentic Task Comparison Chart](#) helps scientists and interpreters increase the effectiveness of their workshops, conferences, and planned activities.

Earth to Sky has authored [Best Practices for Effective Development](#) guidelines and an accompanying [Workshop Planning Tool](#). Steps include goal setting, establishing roles, and integrating participant feedback. According to Earth to Sky, “commitment to these principles will help you create training opportunities that promote change or growth, reach clear outcomes, and help people develop new relationships” (Earth to Sky 2022).

Finally, Earth to Sky has two lists of curated resources. Their [Climate Change Quicklinks](#) from credible sources help communicate climate change to a broad audience. These resources might be useful for presentations, introductions, and seminars, depending on the audience. Additionally, their [Archived Courses, Webinars, and Presentations](#) (mostly on climate change science and communication) can be filtered by topic.





[The Alan Alda Center for Communicating Science](#), an initiative at Stony Brook University in New York, provides professional development programs to “help you connect to anyone, anywhere, to bring science and its wonders within everyone's reach” (Alan Alda Center 2022). Interested parties can book training for their organization to expand skill sets and learn to effectively engage others on climate change.

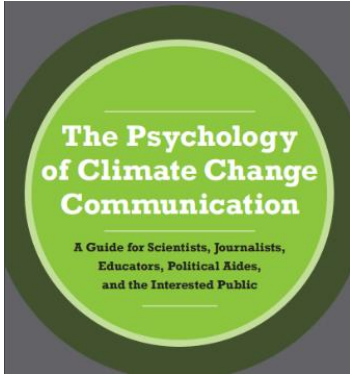


The American Geophysical Union's [Sharing Science Program](#) is a “science communication and outreach program that offers resources, webinars, workshops, hands-on support and opportunities to help scientists communicate more effectively with diverse audiences about Earth and space science and its importance and impact on society” (AGU 2022). Scientists can request workshops for their institution or group, participate in training courses, and even apply for small science communication grants.

Climate Change Communication



The Intergovernmental Panel on Climate Change authored [“Principles for Effective Communication and Public Engagement on Climate Change”](#) in 2018. It discusses 6 main guidelines supported by the primary literature. In their words, “by synthesising evidence and recommendations from primary social science research, and existing communication ‘guides’ and resources, this Handbook sets out a series of principles for effective communication and public engagement, tailored specifically for IPCC authors” (IPCC 2018, 3).




[The Psychology of Climate Change Communication](#) by the Center for Research on Environmental Decisions offers 8 guidelines informed by psychological principles to help people communicate climate change. Their discussion of appropriate vocabulary (right) and conclusion are both particularly helpful.


PROMOTION	PREVENTION
ideal	ought
attain(ment)	maintenance
maximize gains	minimize losses
hope	responsibility
wish	necessity
advance(ment)	protect(ion)
exper(ience)	vigilant/vigilance
avoid missed opportunities	avoiding mistakes
promote	prevent
aspire/aspiration	duty
support	obligation
nurture	defend
add	safety
open	security
	must
	should
	cautious
	careful
	stop





The [National Park Service guide](#) for interpreters highlights audience engagement, thematic questions, and the importance of embracing rather than rejecting controversy. It even provides “examples of potential strategies and techniques for interpreting the significance and relevance of climate change” in national parks (NPS 2016, 12).

Arctic Science Communication and Engagement


	<p>The Interagency Arctic Research Policy Committee, chaired by the NSF but a multi-agency effort, drafted “Principles for Conducting Research in the Arctic” to guide research activities. They “reflect the expectations of the IARPC agencies” and are “based on input received from federal agencies and the public. Federal agencies will determine the most appropriate way to apply the Principles when supporting research in the Arctic” (NSF 2018).</p>
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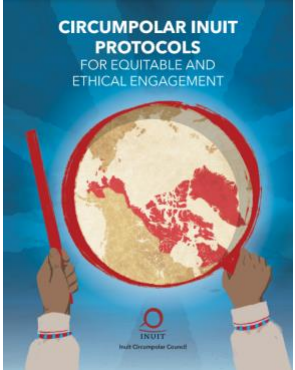
	<p>The Arctic Research Consortium of the United States compiled a list of resources, recommendations, and best practices for “good communication and cooperation with northern communities”. Members of Indigenous organizations provided feedback and suggestions on this list.</p>
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	<p>The National Science Foundation created a webpage called “Local and Indigenous Community Engagement and the Coproduction of Knowledge in NSF Funded Arctic Science and Research”. It is highly relevant to the goals and procedures of ABoVE and “contains information on a range of NSF programs, initiatives, external collaborations, and other resources that aim to facilitate effective and respectful engagement with local and Indigenous peoples in Arctic research, education, and outreach activities” (NSF 2022). It serves as a “starting point for NSF researchers” (NSF 2022).</p>
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	<p>Navigating the New Arctic (NNA), a polar program of the NSF, “tackles convergent scientific challenges in the rapidly changing Arctic, that are needed to inform the economy, security and resilience of the Nation, the larger region and the globe”. They provided funding for proposals that address their main goals of understanding Arctic change and “connections between natural and built environments and social systems” (NSF 2022). Their community office (NNA-CO) “builds awareness, partnerships, opportunities, and resources for collaboration” and “increases recognition of Indigenous knowledge and data sovereignty; promotes inclusive and collaborative research design and implementation; and coordinates effective knowledge dissemination, education, and outreach” (NNA-CO 2022). Their guiding principles and a podcast that centers Indigenous voices are particularly relevant to ABoVE.</p>
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Indigenous Engagement Resources

	<p>Woodwell Climate Research Center</p>	<p>The Woodwell Climate Research Center's 2020 Guiding Principles for Working in Northern Communities offers 11 principles for conducting research in this region of Alaska, links 9 existing resources (many authored by indigenous groups), and lists relevant conferences and meetings. It also includes contact information for entities in the region.</p>
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	<p>The Circumpolar Inuit Protocols for Equitable and Ethical Engagement includes 8 rules “informed through decades of Inuit input to governments, international fora, negotiations, and ICC-led workshops, meetings, discussions, conferences, and projects occurring across communities, regionally, nationally and internationally” (Inuit Circumpolar Council 2022, 8). Additionally, “people from across Inuit Nunaat” have reviewed and approval these rules (8).</p>
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<p><i>IN THIS PLACE</i></p> <p>A Guide for Those Who Would Work in</p> <p>The Country of The Kaktovikmiut</p> <p>An Unfinished and On-going Work Of the People of</p> <p>Kaktovik, Alaska</p>	<p>In This Place, a powerful document written by the indigenous Kaktovikmiut of Alaska, presents the mindset, needs, and demands of the people of Kaktovik. It contextualizes fieldwork and any occupation of Native Land using a crucial decolonialized perspective on land management.</p>
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Boundary Organizations in the ABoVE Domain

Boundary organizations are dedicated to mediating the interaction and collaboration between scientists, decision-makers, and any other stakeholders or rightsholders. Successful boundary organizations facilitate science communication, relationship building among researchers, communities, and decision-makers, and the co-production of knowledge.



The [Alaska Fire Science Consortium \(AKFSC\)](#), a longtime collaborator of ABoVE, has four main goals:

1. Coordinate current science delivery efforts.
2. Facilitate two-way communication between scientists and a diverse array of fire and land/resource managers.
3. Provide an organized, centralized arena for effectively delivering fire science information.
4. Work with managers to ensure that delivery and outreach mechanisms are practical and that they continue to evolve to with needs of the management community.



[The Northwest Boreal Partnership](#), part of the Northern Latitudes Partnership, “is a collaboration of diverse individuals and organizations supporting healthy lands and peoples across southcentral and interior Alaska and northwestern Canada. By working together on common goals, we aim to create positive lasting environmental and social change by supporting stewardship of our lands, waters, and communities through collaborative science and knowledge projects, sharing critical information and resources, relationship-building, and fostering international collaborations” (Northern Latitudes Partnerships 2022). They expand knowledge coproduction with indigenous groups and publish success stories about the results of their collaboration efforts.

Phase 3 Case Studies of Planned Activities

Below are examples of activities that PIs have planned for Phase 3 that might be useful or inspirational to others. These examples are not a comprehensive overview of Phase 3, but they showcase the unique capabilities of ABoVE as a research campaign and provide a framework for the use of the resources listed above.



Kimberley Miner, Kyle Kovach, and Polar Knowledge Canada (POLAR): Whitehorse, Yukon

Kimberley Miner at NASA's Jet Propulsion Laboratory is partnering with Polar Knowledge Canada (POLAR) for ABoVE outreach in the Yukon. Concurrent with outreach, Kyle Kovach and the University of Wisconsin field team will be leading Yukon ABoVE field research. Kimberley will land in Whitehorse on July 29 to meet with students, indigenous groups, and local organizations - from Parks Canada to the Champagne and Aishihik First Nations (CAFN) - with a twofold purpose: to listen to

community interests and to explain the ABoVE Campaign and its resources, data, and applications.

This initial outreach trip focuses on listening to the science needs and interests of diverse groups to kick off collaborations across scales. Since ABoVE research covers a large area in the North, these stakeholders offer a wide range of perspectives and manage different land and traditional territories. Kimberley will bring gifts to each meeting.

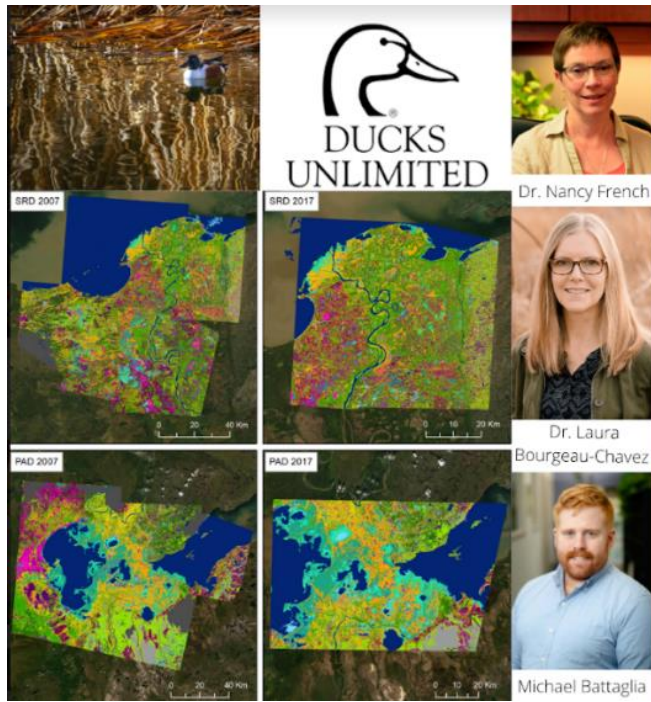


Dr. Ken Tape: Beavers in the ABoVE Domain

In Phase 3, Tape and his colleagues will study how beaver ponds affect a range of factors across the ABoVE domain. Unlike other animals that simply respond to climate change, beavers exert a force back on nature; their ponds alter the landscape dramatically and are visible from space. Tape's team has detected beavers and their ponds in ABoVE domain, a very manual process that relies on ABoVE satellite imagery. Now, they hypothesize that beavers essentially create oases in the Arctic, and they will use several remote sensing methods to determine the effect of this warmer disturbance on

permafrost thaw, methane emissions, and plant functional diversity.

Dr. Tape’s research affects indigenous rightsholders and governments alike; beavers hold spiritual significance for indigenous groups, affect land management efforts, and may be important to certain subsistence activities. Tape’s project includes collaborating with cultural anthropologists from the Alaska Department of Fish and Game to coproduce beaver knowledge with members of three villages in Alaska (Shungnak, Kotzebue, and Noatak). Additionally, a member of Dr. Tape’s team will accompany the author Seth Kantner on a trip to four Alaskan villages (Noorvik, Ambler, Shungnak, and Kobuk) to share research results. Other collaborators on Tape’s project include the National Park Service, the US Geological Survey, the Government of the Northwest Territory, the Nunavik Hunting Fishing Trapping Association (Anguvigaq), and the Gwich'in Renewable Resources Board (GRRB), among many others.



Dr. Nancy French, Michael Battaglia, and Dr. Laura Bourgeau-Chavez: Wetlands for Waterfowl with Ducks Unlimited

In Phase 2, Dr. French, Michael Battaglia, and Dr. Bourgeau-Chavez conducted a study to better understand waterfowl habitat by creating wetland classification maps. They differentiated between dry land, inundated areas, and open water, and they worked with Ducks Unlimited Canada to distribute the maps they created.

Now, Phase 3 focuses on engagement and the adaptation of those maps for stakeholder use. Specifically, the team will work with local communities, research scientists (like hydrologists), and regional policymakers, with assistance from Ducks Unlimited Canada, to improve the validation of their two mapping products (wetland

type and inundation dynamics). The team will also work with stakeholders to refine products to be valuable for their use. Ducks Unlimited helps facilitate local community engagement through their Guardian's program, a Canada wide effort where local people collect observational data.

Improving the application of data and determining mapping formats and methods most valuable to communities are the main goals of Phase 3. French and Battaglia will continue to explore the needs and possibilities of stakeholders and rightsholders in the Peace–Abascatha Delta.



Dr. Laura Prugh: Land Management Agencies in Alaska

In Phase 3, Prugh will continue her work to investigate how snow affects wildlife dynamics - specifically predator-prey interactions. Her field work in Denali will reveal whether these changing conditions favor predators or prey.

The results will inform the National Park Service's inventory and monitoring programs. With Prugh's information, they can better prepare for a more severe winter and a resulting species die-off, for example.

On behalf of CCE ABoVE, thank you in advance for your time and future contributions.
-Alex Kiefus and Libby Larson, August 2022