

Engaging rural communities in permafrost and climate monitoring in the Upper Kuskokwim region, interior Alaska

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Alaska's land, water, plants, wildlife, and seasons are undergoing a great upheaval, and its people, especially the tribal communities living in remote villages are directly and severely impacted by these widespread environmental changes. These environmental changes are not only widespread but also often so rapid that we cannot possibly have enough scientist and professional on the ground to detect and predict these changes before their effects are obvious. Especially environmental changes occurring in and around the remote communities in Alaska are directly affecting the tribal livelihood, recreation and subsistence practices and thus have the most impact on the socio-economic conditions of these communities. In order to detect, monitor, and forecast these environmental changes to better prepare the communities to respond and adapt we need to engage the community members in scientific monitoring and assessment process. We could potentially build adaptive and resilient communities by observing and monitoring processes and indicators that the communities want to monitor.

With the above strategy in mind, the Geophysical Institute Permafrost Laboratory at University of Alaska Fairbanks and Telida Village Council secured funding from the National Science Foundation in September 2015 to build community capacity to monitor permafrost and related environmental changes in the vicinity of the Telida village in the Upper Kuskokwim region of interior Alaska. The overarching goal of this project is to help the tribal communities take the lead in assessing and responding to the environmental changes that are coming with warming climate and thawing permafrost. Permafrost being a subsurface feature, the best way to assess the permafrost condition is by scientific observation and instrumentation. The project will help build the tribal capacity to monitor changes in local climate and permafrost by providing the Tribes the scientific knowledge and skills necessary to acquire, analyze, and interpret scientific data through training and education. We will use the local knowledge on permafrost and landscape change to identify key sites for detailed field observations and instrumentations. In consultation with the participating community members, the project will establish local climate and permafrost observation system, map land cover and permafrost in the Upper Kuskokwim region. It will also develop a geo-hazard map for the region to facilitate safe subsistence and recreational practices and land use.

The community is aware that in their region permafrost is discontinuous i.e. near-surface permafrost is generally present in lowlands where black spruce and sphagnum grow in peat that is a foot or thicker and found sporadically in areas of birch, aspen, willow and cottonwood stands. Permafrost is thawing out and affecting their means of travel and subsistence food resources. The community wants to have a better and scientific understanding of relationship between permafrost degradation and impact on their physical environment and tribal way of life. The members of the community involved in this project, Charlene Dubay and Teresa Hanson, are convinced that the best way to assess and respond to environmental

changes is by building community capacity, getting involved in research, and incorporating scientific data and knowledge in planning for the future.

The permafrost related environmental impacts that the community is aware of are a) drying of lakes which affect their fishing and trapping, b) lower water level in Rivers which affect their main mode of transportation in summer, c) appearance of sinkholes that pose threat to the safety of the community members and their properties, and d) eruption of a sand dune in the middle of the Telida village air strip.

The community has not done anything significant to deal with permafrost changes yet, but it wants to take necessary steps to improve their understanding of climate change and permafrost thaw, and to minimize the impact of permafrost degradation on their environment, subsistence food resource, and transportation. Using scientific data and knowledge, the community members want to develop the best practices for assessing and responding to the changes, and better prepare for the changes coming with warming climate and thawing permafrost.

In summary, the project will offer the traditionally-underserved tribal communities of the Upper Kuskokwim region and the Tribal Council an opportunity to engage in climate research. It will provide them the motivation, resources, climate science knowledge and skills to study the impact of climate change on their tribal way of life and environment. The data, knowledge, and skills gained through this project will benefit the tribal communities in adaptive management of subsistence resources, implementation of safe land use practices, and planning for the future. The scientific community will also benefit hugely by having an improved understanding of permafrost dynamics, access to field data and maps from this understudied remote part of Alaska. The lessons that will be learned from this project will contribute to the development of best practices and standard in building successful community based permafrost monitoring programs. In addition, the project will provide outreach and workshops on climate change to the community members using examples from their own communities to advance their climate science knowledge and encourage them to use scientific data and knowledge to plan for the future.