#AGU22 tip sheet: Permafrost is becoming less permanent

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Here are some key permafrost presentations at this year's American Geophysical Union meeting by researchers of the Geophysical Institute at the University of Alaska Fairbanks, “America’s Arctic university.”

• THAWING ALASKA — The timing and rate of permafrost degradation are two of the major factors in determining the anticipated negative impacts of climate warming on Arctic ecosystems and infrastructure. Nearly 40 years of permafrost and active layer temperature observations in Alaska show the change. Most of the sites in Alaska show substantial warming of permafrost since the 1980s. The magnitude of warming has varied with location, but by 2020, new record highs for the entire period of temperature measurements at depths of 15 and 20 meters were recorded at all locations. This warming has triggered near-surface permafrost degradation and a talik development in many locations.

Call for interview with Professor Emeritus Vladimir Romanovsky.

• PERMAFROST’S FUTURE — Thawing and freezing of Arctic soils is affected by many factors, with air temperature, vegetation, snow accumulation and soil moisture among the most significant. Computer modeling developed at the UAF Geophysical Institute Permafrost Laboratory shows the potential impact of these changes in permafrost on northern Alaska ecosystems and infrastructure.

Call for interview with Associate Professor Dmitry Nicolsky.

• THE ICY FLOOD OF 2015 — The 2015 spring flood Sagavanirktok River on the North Slope of Alaska was exceptionally large, damaging infrastructure and creating localized thermal erosion of ice wedges. Its regional-scale and long-term impact on permafrost and ecosystem conditions remains unknown. In the face of climate warming and changing flood regimes, the 2015 spring flood presents an opportunity to identify the controls and drivers of post-flood terrain changes in continuous permafrost. Satellite observations show extensive terrain changes from 2015 to 2019. Post-flood subsidence varied markedly. Satellite observations revealed subtle to pronounced greening and wetting within the flood perimeter.

Call for interview with Assistant Professor Simon Zwieback.

• MAPPING ALASKA — The first year of work under a federally-funded project to create an interactive permafrost temperature forecasting map for the entire state of Alaska revealed estimates under different climate scenarios. The first year is focused on assessment of permafrost vulnerability to climate change, impact of surface condition changing on physical properties of permafrost and environmental changes across Alaska under the natural conditions. Ground-based observations and numerical freeze/thaw modeling were combined to understand the controlling physical processes and mechanisms.

Call for interview with Research Associate Professor Sergey Marchenko.

• ALASKA IS SINKING — Permafrost in Alaska has been warming and thawing at an increasing rate. Thaw of ice-rich permafrost induces long-term subsidence, which can radically change the hydrological and ecological functioning of landscapes. A general trend from 2017 to 2022 shows an average annual subsidence ranging between 1 and 2 inches, with the largest occurring in the warm summer of 2019.

Call for interview with Graduate Research Assistant Soumitra Sakhalkar.