

GSA Monthly Luncheon

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SPEAKER

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TITLE

Monitoring Geohazards In Alaska National Parks Using Structure From Motion From Aircraft

ABSTRACT

The NPS Alaska Region has been developing Structure from Motion (SfM) capabilities over the last few years to support a wide-range of science and outreach. The SfM applications range in scale from 3D models of fossils and artifacts to digital elevation models (DEM) and orthomosaics of glaciers, landslides, rivers, and coasts. Over the last two years, we collaborated with colleagues in the FWS and BLM to develop a manned-aircraft SfM system. Aerial SfM is an accessible tool for detailed mapping of NPS units in Alaska where mobilization is expensive to reach remote areas of Alaska National Parks. Using agency planes and pilots, a high-quality camera, and a survey-grade GPS; aerial SfM provides a low cost but accurate tool for generating accurate DEMs and high-resolution orthomosaics.

In 2017, we used the aerial system to measure glacier volume changes, ice-dammed lake level changes, changes in river morphology, and intertidal elevations. In 2018 we acquired aerial SfM over seven of the Alaska National Park units. We flew SfM for a variety of projects, which included monitoring and responding to geohazards. In 2018, we responded to a glacier outburst flood from an ice dammed lake in Kenai Fjords National Park. The flood breached a spit along the coast, which is a popular camping spot. We were able to calculate the volume of water from measuring the level of strand lines and flooding the DEM. We conducted change analysis of elevations along the Denali Park road to monitor landslide motions over a season. We were also able to get imagery and generate DEMs over the erupting Veniaminof Volcano. These projects have proven that SfM is an accessible, scalable technology that is useful for educating the public about the resources of Alaska National Parks and addressing timely management needs like geohazards.

BIOGRAPHY

Chad has been working as a geologist at the NPS Alaska Regional Office for four years providing geological technical assistance to Parks. Prior to this, he spent eight years at the USGS conducting geologic research and producing a new geologic map of Alaska. The NPS Geoscientist-in-the-Parks internship program brought him to Denali National Park in 2001 where he eventually worked for 5 years. He has experience geologic mapping, reclaiming streams, glacier monitoring, permafrost and soils mapping, surficial geologic mapping, monitoring landslides, and geotechnical assessments of roads and trails. Chad holds a BS in Environmental Engineering Geology and an MS in Geology and Geophysics from Western Washington University. His interests and experience span from stream restoration to the tectonics of North America. Through his career he has learned survey techniques using total station, PPK GPS, and RTK GPS. These skills, in addition to being an amateur photographer, led to the desire to develop SfM capabilities for the NPS Alaska Region.