UNIVERSITY TRANSPORTATION CENTER

RESEARCH BRIEF

Elucidating Snow Heights for Avalanche Assessment from Automated Data Processing from UAS and New Winter Hazards Station

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Background

Alaska Department of Transportation maintenance and operation (M&O) crew near Atigun Pass battles with more than 180 avalanches a year that block the road. Road blockage due to snow is also a consequence of blowing snow that aggregates as snowdrifts on the road. Our focus is on Atigun Pass, where the Dalton Highway crosses the Brooks Range, the most northern mountain range in the North America Content, and well above the Arctic Circle. Atigun Pass is a unique environment because blowing snow is the principal factor in creating avalanche conditions. Blowing snow at the pass also generates snowdrifts that block the road, occasionally occupying the small M&O crew for days on end. The M&O crew applies avalanche preventative measures to prevent avalanche engulfing passing-through vehicles by manually triggering controlled avalanches using a Howitzer artillery. While shooting the Howitzer typically leads to accurate (tens-hundreds of yards) strikes, the timing of the shooting is based on experience, bias considerations, and lack of dry data of critical snow conditions. Thus, in this work, we plan to build detailed avalanche and blowing snow metrics to optimize decision-making of avalanche-risk states and perhaps optimize the use of the Howitzer.

Research Project

The redistribution of snow by blowing snow is a significant force in creating avalanche conditions and generating snowdrifts on the Atigun Pass Road. We aim to create two new tools to optimize the effort in keeping the road free of snow. The first tool applies UAS (unmanned aircraft system) in conjunction with in-house developed software to elucidate snow surface height (digital elevation models). The software will keep track of hazardous snow features such as a hanging cornice or how much snow loaded is in a gully above a road. The second tool is a new Winter Hazard Station (WHZ). We placed the WHZ near the pass, close to the brunt of peak wind conditions—the WHZ measures; local meteorological conditions, direct blowing snow, and sampling through delayed-camera views. The WHZ will routinely push the data to the M&O station via a radio link. WHZ data will also be digested automatically in conjunction with the UAS generated snow-height maps to better understand the force of blowing snow in the region and develop forecasting tools.

ABOUT THE AUTHORS

The research team consisted of Billy Connor of the University of Alaska Fairbanks.

ABOUT THE FUNDERS

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EXPECTED DATE OF COMPLETION

March 2022

FOR MORE INFORMATION

https://depts.washington.edu/pactrans/research/projects/elucidating-snow-heights-for-avalanche-assessment-from-automated-data-processing-from-uas-and-new-winter-hazards-station/