Using Unpiloted Aerial Systems Structure from Motion Photogrammetry for Avalanches in Mount Washington, NH

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ABSTRACT

Unpiloted Aerial Systems (UAS) collected structure from motion (SfM) photogrammetry is a proven effective high resolution snow depth measurement technique with a potential for avalanche forecasting. In winter 2021/22, a series of flights were conducted in Tuckerman Ravine and Boott Spur Gullies avalanche zones on Mount Washington, NH, USA. The goal of these flights was to: (1) quantify wind slab depth across varying aspect terrain, (2) model wind slab distribution over the same terrain given actual meteorological conditions, and (3) engage with the Mount Washington Avalanche forecasters and backcountry skiers. Mount Washington east aspect glacial cirques were chosen for this project due to their predominant wind slab avalanche problem attributed to common hurricane force winds and ample snowfall in fetch areas above the cirques. Ground truthing was conducted to quantify the SfM effectiveness in measuring snow depth in this hostile mountain environment. It is found that UAS collected SfM photogrammetry is effective in quantifying wind slab depth with a 5 cm spatial resolution. Qualitative methods and results from stakeholder engagement will also be presented.

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