

APRIL MONTHLY LUNCHEON GEOPHYSICAL SOCIETY OF ALASKA

SPEAKER

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TITLE

Reconstructing massive avalanches at Iliamna Volcano using seismic and acoustic signals

ABSTRACT

Surficial mass wasting events are a hazard worldwide. Seismic and acoustic signals from these often-remote processes, combined with other geophysical observations, can provide key information for monitoring and rapid response efforts and enhance our understanding of event dynamics. In this talk I will present seismoacoustic data and analyses for two very large ice–rock avalanches occurring on Iliamna Volcano in May 2016 and June 2019. Iliamna experiences massive, quasi-annual slope failures due to glacial instabilities and hydrothermal alteration of material near its summit.

The May 2016 and June 2019 avalanches were particularly large and generated energetic seismic and infrasound signals which were recorded on numerous stations at ranges from ~9 to over 600 km. The two avalanches are remarkably similar, facilitating direct data comparison and evaluation of modeling approaches. For both events, we invert long-period seismic signals to obtain a force-time representation of the source. We use this force-time function to derive constraints on avalanche acceleration, velocity, and directionality which are compatible with satellite imagery and observed terrain features.

Acoustic data suggest that infrasound from these avalanches is produced after the mass movement regime transitions from cohesive block-type failure to granular and turbulent flow — little to no infrasound is generated by the initial failure. In my talk I will also demonstrate how seismoacoustic data might be used to facilitate rapid response efforts for these hazardous events.

BIOGRAPHY

Liam Toney (<https://liam.earth/>) is a third-year PhD student at the University of Alaska Fairbanks (UAF) Geophysical Institute. He holds a BA in Physics from Pomona College. Liam studies the seismoacoustics — that is, seismic and acoustic waves — of surficial Earth processes such as avalanches and volcanic explosions. At UAF, he is affiliated with the Alaska Volcano Observatory and the Wilson Alaska Technical Center. He is also affiliated with the U.S. Geological Survey Landslide Hazards Program.