A One Health investigation of volcanic ash from Pavlof Volcano

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Introduction and Background

Volcanic ash is the most significant hazard posed to people, animals, and the environment by Alaskan volcanoes (USGS AVO). Currently, the specific health hazards posed by volcanoes in Alaska are inadequately studied compared to volcanoes in other regions. Volcanic ash is composed of small bits of rock, glass, and mineral crystals and it can contain potentially hazardous substances. This research seeks to characterize the ash from Pavlof volcano which fell on the Alaska Native village of Nelson Lagoon on March 28, 2016.

Photo courtesy of Nahshon Almandoss

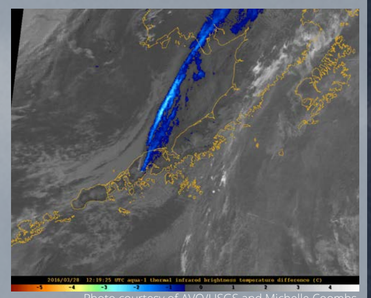
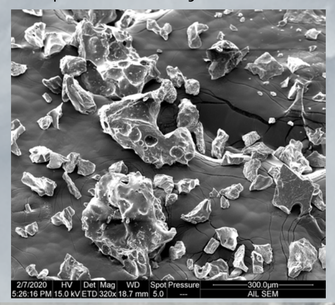


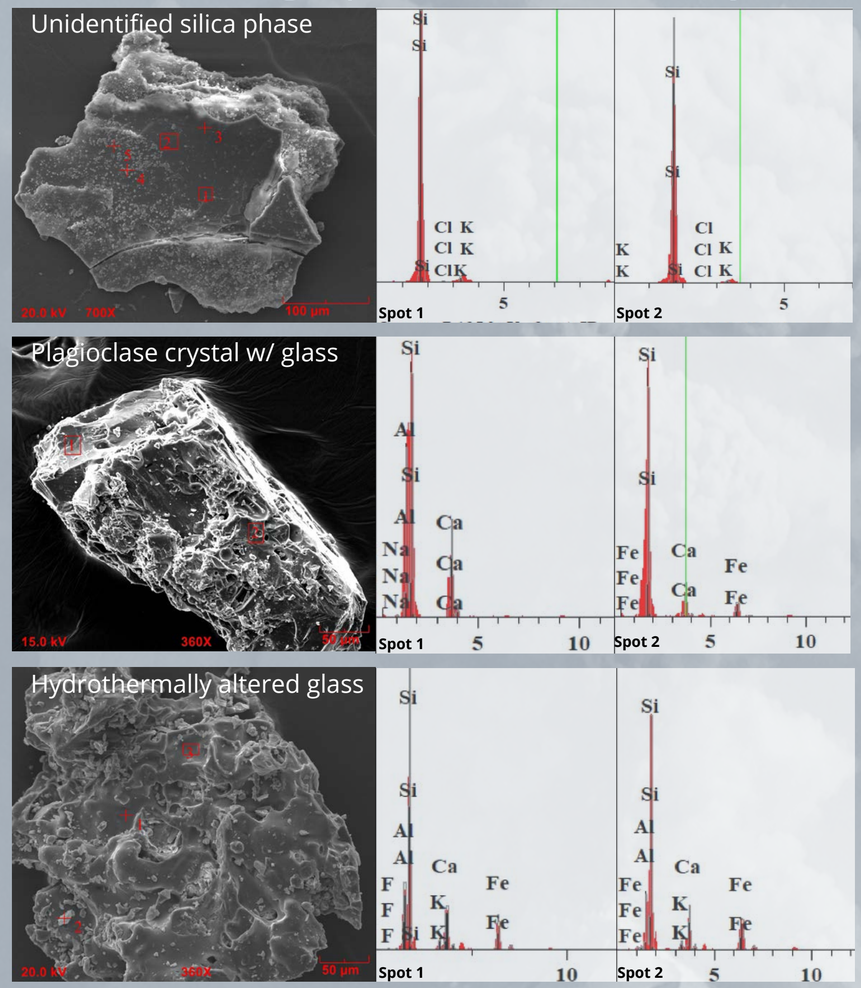
Photo courtesy of AVO/USGS and Michelle Coombs

Methods

The sample was first examined in a stereoscopic microscope, and notable particle shapes, textures, minerals, and surface coatings were tallied. Then, specifc caterogies of particles were mounted on stubs for examination in an FEI Quanta 200 environmental scanning electron microscope (ESEM). Micrographs of particles were taken and energy dissipative x-ray spectroscopy (EDS) was used to analyze the chemical composition of individual grains. EDS spectra were then compared to references in *Severin 2004* for identification. Here we present some of those micrographs and EDS spectra as preliminary data.



SEM Micrographs and Preliminary Results



The ash contains both hydrothermally altered and unaltered vesicular glass, plagioclase crystals, and a silica phase. The presence of altered and unaltered grains suggest that hydrothermal alteration of the magma or conduit fill material took place prior to and/or during the eruption. Hydrothermal alteration can produce crystalline silica polymorphs, like cristobalite, which may pose potential respiratory health hazards.

Future Directions in One Health

Prolonged exposure to respirable crystalline silica has been documented to raise risk of silicosis and other chronic lung diseases (Baxter & Horwell 2015). Given the presence of a silica phase, further study is warranted to assess its crystral structure. More research will then be needed to determine if Pavlof ash poses potential health hazards due to the silica phase. Following the methods used by *Damby et al. 2016* , this ash will be used in *in vitro* experiments to measure inflammatory responses and toxcity.

Additionally, volcanism is a known contributor to environmental mercury. Total mercury in this ash should be measured because mercury peaks were observed in some EDS spectra.

Citations

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