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'Understanding volcanoes and society: the key for risk mitigation'



Operational forecasts of the resuspension of volcanic ash deposits from the 1912 Novarupta eruption

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The 1912 eruption of Novarupta-Katmai produced 17 km³ of ashfall and 11 km³ of pyroclastic-flow deposits that filled nearby valleys, creating what is today known as the Valley of Ten Thousand Smokes (VTTS). These deposits continue to pose hazards when strong winds in the region resuspend ash in times of suitable soil conditions (dry, exposed). Occasionally, the resuspended ash can be lofted to several kilometers altitude, extending to 250 km downwind, where it becomes an aviation hazard. Satellite observations and pilot reports indicate that such events occurred on at least 20 occasions since 2003. The longest-duration (>20 hours) events occurred in autumn months of September and October. Predicting the resuspension of ash requires knowing when the ash is dry/exposed, the strength of surface winds, and the threshold friction velocity (u_t^*) which characterizes the onset of ash emission due to surface shear stresses. We have sampled source deposits and installed instruments in the Katmai region to record meteorological/soil parameters to better predict resuspension events. We constrain parameters of the ash emission model using high-resolution simulated wind fields for events in the past decade. For events since Feb., 2015, we use an archive of high-resolution numerical weather forecast products, along with the real-time wind speed measurements from the VTTS and two air quality monitors (EBAMs) deployed downwind, to further constrain the model and better forecast this hazard. Daily forecasts of resuspension likelihood are produced using the model Ash3d. These forecasts are used within the Alaska Volcano Observatory for situational awareness and to inform duty scientists of the potential aviation hazards.