Thermodynamics: Analysis of Wildfire Ash, and the Melting Effect on Alaska's Mount Hunter

Vyas, Leena (School: Tippecanoe High School)

The laws of thermodynamics and Stokes' Law with Cunningham Slip Correction Factor are used to support an updated atmospheric climate change model to include the effect of wildfire smoke ash from Canada on the melt rate of snow on Mount Hunter in Alaska's Denali National Park. Wildfire and temperature data from various publicly available scientific and government sites were statistically analyzed. This analysis shows smoke ash clouds from wildfires rise into the stratosphere, remain for months, and migrate with prevailing winds. Mathematical computations show a positive correlation between particle size and the settling velocity. Settling ash affects the albedo, the proportion of incident light or radiation that is reflected by the earth. As the ash settles on the ground, the snow, once bright white, is now "dark snow" which changes its ability to reflect sunlight. This dark snow is heating up in the sun and increasing the melt rate of snow on Mount Hunter where the temperature and snowmelt are higher than the average global warming rate predicts. Experiments using wood ash, snow, and ice were conducted to support the metadata statistical analysis. Experimental results support the hypothesis by showing that changes in albedo due to settling ash cause snow to melt at a faster rate and have higher temperatures. When ash from wildfires rises up into the stratosphere and is carried by the prevailing winds it affects the melt rate of snow and ice in other areas far from the original cause, and beyond the global warming predictions.

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