William Rose
Geological & Mining
Engineering and Sciences

Fine volcanic ash

Predicting the path of a serious hazard

Jet airplanes on Northern Pacific air routes fly over more than a hundred potentially active volcanoes. About ten days each year, volcanic eruptions create a fine ash—volcanic particles with a texture like flour and diameters smaller than 0.1 mm.

This fine ash heats the air it touches, carrying the air and the ash up—way up. Jets can't detect fine ash, and at night they can encounter it without warning. Jet engines can be stopped by such encounters and some jets temporarily lose all their engines.

William Rose has studied fluid mechanics, atmospheric science, remote sensing, and meteorology in order to understand fine volcanic ash—how it forms, how it travels through the air, and where it falls.

His inquiry entails international collaboration, and his research group is one of the world's largest scientific efforts focused on volcanology. As a result of this work, an international system of mitigation now operates around the world doing pilot communications. Rose and fifty other scientists are devising meteorological forecasting tools that will enable them to predict where the most dangerous fine particles will come to earth.

By sheer accident, a NASA research aircraft encountered a thirty-three hour-old drifting Icelandic volcanic cloud while travelling across the Arctic in February 2000. Highly instrumented for atmospheric research, the aircraft was able to obtain unique data about how volcanic ash "overseeds" rising clouds, converting them to small ice particles and a stratospheric cloud that destroys ozone. "Since jet airplanes will never willingly fly into volcanic clouds, this was a research bonanza," says Rose.

Fine ash is a serious health hazard, as well. "We want to know where it falls," he notes. "As we saw clearly in the 9-11 incident, the fine particles created by the blasts are a long term health hazard to rescue workers."