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Volcanic Ash Research Shows How Plumes End Up in the Jet Stream

ScienceDaily (July 3, 2010) — A University at Buffalo volcanologist, an expert in volcanic ash cloud transport, published a paper recently showing how the jet stream -- the area in the atmosphere that pilots prefer to fly in -- also seems to be the area most likely to be impacted by plumes from volcanic ash.

"That's a problem," says Marcus I. Bursik, PhD, one of the foremost experts on volcanic plumes and their effect on aviation safety, "because modern transcontinental and transoceanic air routes are configured to take advantage of the jet stream's power, saving both time and fuel.

"The interaction of the jet stream and the plume is likely a factor here," says Bursik, professor of geology in the UB College of Arts and Sciences. "Basically, planes have to fly around the plume or just stop flying, as they have, as the result of this eruption in Iceland."

In some cases, if the plume can be tracked well enough with satellites, pilots can steer around the plume, he notes, but that didn't work in this case because the ash drifted right over Britain.

Bursik participated in the first meetings in the early 1990s between volcanologists and the aviation industry to develop methods to ensure safe air travel in the event of volcanic eruptions. He and colleagues authored a 2009 paper called "Volcanic plumes and wind: Jet stream interaction examples and implications for air traffic" in the *Journal of Volcanology and Geothermal Research.*

"In the research we did, we found that the jet stream essentially stops the plume from rising higher into the atmosphere," he says. "Because the jet stream causes the density of the plume to drop so fast, the plume's ability to rise above the jet stream is halted: the jet stream caps the plume at a certain atmospheric level."

Bursik says that new techniques now in development will be capable of producing better estimates of where and when ash clouds from volcanoes will travel.

He and his colleagues have proposed a project with researchers at the University of Alaska that would improve tracking estimates to find out where volcanic ash clouds are going.

"What we get now is a mean estimate of where ash should be in atmosphere," says Bursik, "but our proposal is designed to develop both the mean estimate and estimates of error that would be more accurate and useful. It could help develop scenarios that would provide a quantitative probability as to how likely a plane is to fly through the plume, depending on the route."

Bursik also is working with other researchers at UB, led by UB geology professor Greg Valentine, on a project called VHub, a 'cyber infrastructure for collaborative volcano research and mitigation.'

VHUB would speed the transfer of new tools developed by volcanologists to the government agencies charged with protecting the public from the hazards of volcanic eruptions. That international project, which Valentine heads up at UB, with researchers at Michigan Technological University and the University of South Florida, was funded recently by the National Science Foundation.

Bursik's co-authors on the jet stream paper are Shannon E. Kobs and Aaron Burns, both former UB graduate students in geology, L.I. Bazanova and I.V. Melekestves, of the Russian Academy of Sciences, A. Kurbatov of the University of Maine, Orono, and D.C. Pieri of the Jet Propulsion Laboratory at California Institute of Technology.

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