

Researchers study infrasonic signals to warn pilots of volcanic ash at high altitudes

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Ash spewed by volcanoes can reach altitudes that affect the safe transit of commercial aircraft. In fact there have been incidents of ash resulting in clogged engines, engine power loss and near crashes.

To aid aviation operations with early warnings of [ash](#) in the atmosphere, a study is being conducted by Florida Institute of Technology and the University of Hawaii, which is funded by the [National Oceanic and Atmospheric Administration](#) (NOAA). Dean of the Florida Tech College of Engineering and Harris Professor of Electrical Engineering Fredric Ham has been working as co-principal investigator with Florida Tech B.S. alumnus and University of Hawaii professor Milton Garces, principal investigator on the NOAA project.

Gaining knowledge of a volcano's eruption intensity can provide an estimate of the height of the ash column in the troposphere above 10 kilometers. To this end, Garces and Ham's research exploits the infrasonic characteristics of volcanoes by using a sophisticated signal processing method to extract the infrasonic signature of the eruption which defines its particular pattern.

"Volcano feature vectors can be used to train and test a neural-classifier that can distinguish the ash-generating eruptive activity among different volcanoes and other natural phenomena that can produce their own infrasonic signatures in the acoustic bandwidth of what is known as the plinian eruption, or sometimes referred to as the Vesuvian eruption," said Ham. This is an [eruption](#) with great quantities of ash-laden gas.

Volcanoes that have been studied to date are Mount St. Helens, U.S.A.; Tungurahua, Ecuador; Lascar, Northern Chile; Manam-Papua, New Guinea; and Kasatochi and Augustine, Alaska, U.S.A.

Ham is an internationally recognized expert in neural networks and has conducted extensive funded research on classifying infrasonic signals associated with natural and man-made events using neural network classifiers; Garces is a world-renowned researcher of the infrasound phenomena associated with man-made and natural events.

Other natural sources of infrasound in the acoustic bandwidth of interest for plinian volcano eruptions are tsunamis, meteors, avalanches and atmospheric turbulence generated by mountain ranges.

Provided by Florida Institute of Technology

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