PACE Applications

Disasters

Hazard Assessment & Aviation Safety

Aviation operations can be negatively impacted by **volcanic ash**. Timely and accurate information about a volcanic ash plume's location, altitude, and magnitude can ensure aviation safety after an eruption.

Who Cares and Why?

Iceland's Eyjafjallajökull volcano began erupting on April 14th, 2010. Plumes of volcanic ash were ejected several high into the atmosphere, posing a risk to aviation. According to the International Civil Aviation Organization, more than 100,000 commercial flights were cancelled across western and northern Europe in response to these eruptions. This was the largest shutdown of European air traffic since World War II, resulting in GDP losses in excess of $5 billion. More accurate ash plume prediction, guided by PACE observations, can reduce the impact of events such as this.

Volcanoes inject water, sulfur dioxide (SO_2) and ash into the atmosphere. The latter, primarily composed of silicates, can melt inside a turbine engine, and fuse onto blades and guide vanes. This can lead to engine failure, such as was the case with KLM flight 867 from Amsterdam to Tokyo on December 15th, 1989. An unexpected ash plume from Mount Redoubt in Alaska caused a four engine failure.

The NASA Reponse

HARP-2 & SPEXone

- *Multi-angle polarimeters*
- *440, 550, 670, 870 nm (HARP-2)*
- *386-770 nm (2-4 nm steps; SPEXone)*
- *3 km; 2.5 km at nadir*

PACE's two polarimeters will enable identification of ash particle size and concentration, discrimination between water and ice clouds from volcanic plumes, and separation of volcanic ash from sulfate aerosols.

PACE Ocean Color Instrument (OCI)

- *5 nm hyperspectral resolution*
- *UV (345 nm)- SWIR (2260 nm)*
- *1-2 day overpass*
- *1 km at nadir*

OCI will be able to determine the height of features such as dust storms and volcanic ash clouds, which is key for hazard avoidance and predicting how they will move.


PACE
Plankton, Aerosol, Cloud, ocean Ecosystem