

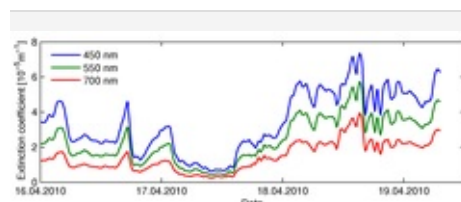
# The mass concentration of volcanic ash from Iceland in European airspace

**Data of the Paul Scherrer Institute from the High-Alpine Research Station Jungfraujoch yield important information.**

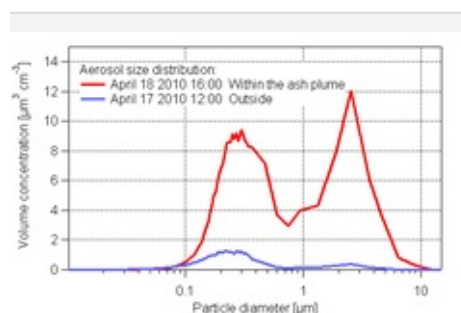
The eruption of the volcano Eyjafjallajökull in Iceland has stalled flight traffic in large regions of Europe. Decision makers had to base their decisions mainly on model calculations for the volcanic plume dispersion. How dangerous is this volcanic ash layer for planes? To estimate the damaging potential, one has to know the mass concentration of the volcanic ash directly in the air. This parameter is, however, difficult to estimate. There are many instruments that measure aerosol mass concentrations continuously, but they are typically designed for ground based use. Thus they cannot be used to track the volcanic ash plume, which is moving some kilometres above ground level. On the other hand there are so-called Lidar instruments (Light detection and ranging). Lidars are operated on the ground but are able to measure vertical profiles of the optical properties of aerosol particles and thus also of volcanic ash. In the best case they deliver extinction coefficients. These coefficients describe the attenuation of a light beam on passing through an atmospheric layer. Most Lidars in Europe have been operated continuously during the last few days and were able to track the altitude of the volcanic ash layer. Mass concentrations can, however, not be directly retrieved from these measurements.

For more than 15 years the Paul Scherrer Institute has conducted continuous aerosol measurements at the Jungfraujoch (3580 meters above sea level) in the Swiss Alps. These measurements are part of the Global Atmosphere Watch (GAW) programme of the World Meteorological Organization (WMO), which has the goal of investigating the effects of aerosol particles on climate. A broad variety of relevant aerosol properties are continuously monitored. These include the extinction coefficient mentioned above, as well as the aerosol size distribution, the total number of particles and the number of particles that are able to form cloud droplets. The mass concentration of fine particles is simultaneously measured by the Swiss Federal Laboratories for Material Testing and Research (Empa) within the National Air Pollution Monitoring Network (NABEL).

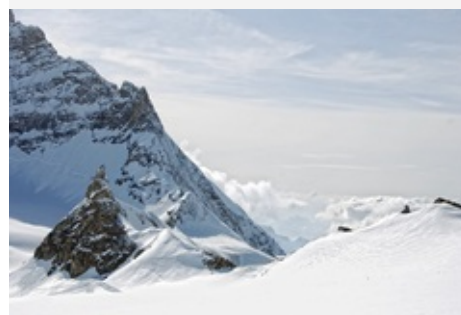
Since the volcanic ash has been shown to form only a thin layer, it is unlikely



Temporal evolution of the extinction coefficient at the Jungfraujoch.

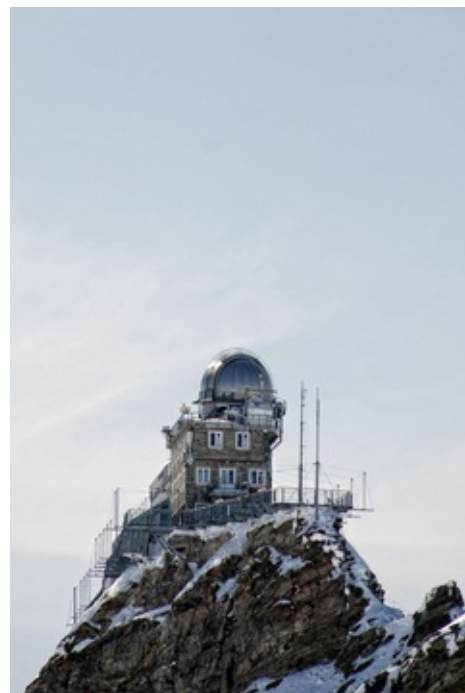


The size distribution of volcanic ash at the Jungfraujoch and for comparison the size distribution of the background aerosol on the previous day.



View at the Jungfraujoch Research Station.

that the measurements at the Jungfraujoch will capture the maximum plume concentration of the ash. However, the combination of the collected data at the Jungfraujoch allows the relationship between the mass concentration of the volcanic ash and its extinction coefficient to be determined. With this information, Lidar data can be converted into vertical profiles for mass concentrations, assuming similar size distributions. In addition, the Swiss company Metair, using a motor glider, has measured the concentration of the larger particle fraction within the plume over Switzerland. These data can be converted into mass concentrations, using the Jungfraujoch measurements, in a similar way. This helps to obtain an overview of the spatial distribution of the mass concentrations caused by the volcanic ash.



View at the Jungfraujoch Research Station.

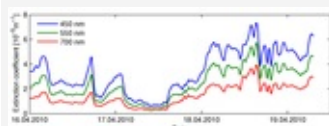
## ABOUT PSI

The Paul Scherrer Institute develops, builds and operates large, complex research facilities, and makes them available to the national and international research community. The Institute's own key research priorities are in the investigation of condensed matter and materials sciences, elementary particle physics, biology and medicine, and energy and the environment. PSI is Switzerland's largest research institution, with 1300 members of staff and an annual budget of approximately 260 million CHF.

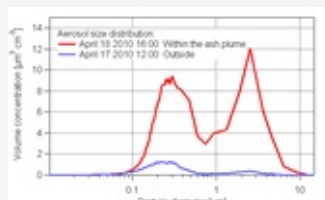
## ADDITIONAL INFORMATION

Prof. Dr. Urs Baltensperger, Laboratory of Atmospheric Chemistry, Paul Scherrer Institut,  
Telephone: +41 (0)56 310 24 08, E-Mail: [urs.baltensperger@psi.ch](mailto:urs.baltensperger@psi.ch) [german, english]

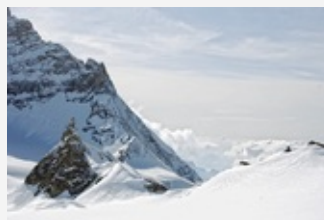
## IMAGES



Temporal evolution of the extinction coefficient at the Jungfraujoch.



The size distribution of volcanic ash at the Jungfraujoch and for comparison the size distribution of the background aerosol on the previous day.



View at the Jungfraujoch Research Station.



View at the Jungfrauoch  
Research Station.

Click on the disc icon to download the high resolution version.

---

<http://www.psi.ch/media/the-mass-concentration-of-volcanic-ash-from-iceland-in-the-european-air-space>