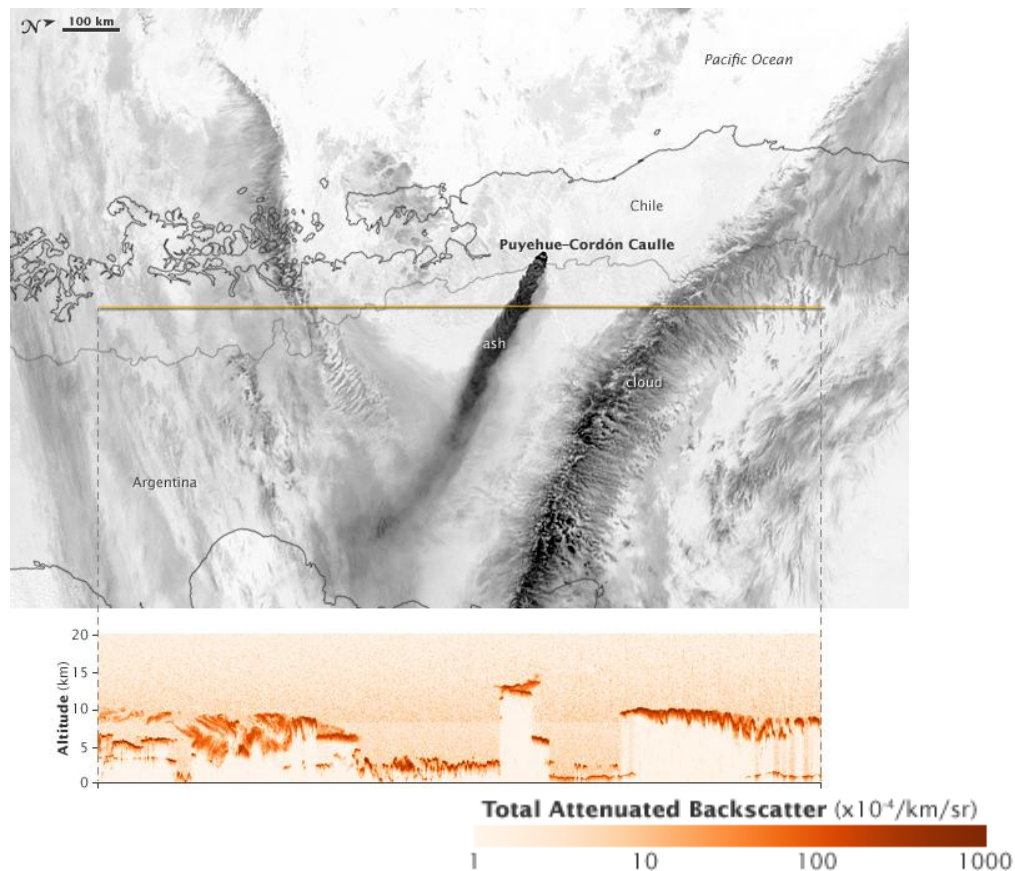


Ash Plume from Puyehue-Cordón Caulle

<http://earthobservatory.nasa.gov/NaturalHazards/view.php?id=50954>



acquired June 5, 2011 [download](#) large image (1 MB, JPEG, 2000x2000)

acquired June 5, 2011 [download](#) GeoTIFF file (4 MB, TIFF, 2000x2000)

On June 4, 2011, Puyehue-Cordón Caulle in Chile experienced its first major eruption in decades. The volcano sent an ash plume eastward, disrupting air traffic, threatening water supplies, and even dropping golf ball-sized pumice on parts of Argentina. From the start, the volcanic plume [towered over local clouds](#).

The top image is a nighttime scene acquired by the Moderate Resolution Imaging Spectroradiometer (MODIS) on NASA's [Aqua](#) satellite. This false-color image is made from observations of [infrared](#) light. The image is rotated and north is at right.

Running across the MODIS image is a yellow line that corresponds to the vertical profile of the atmosphere shown in the graph below. The atmospheric profile was acquired by Cloud-Aerosol Lidar and Infrared Pathfinder Satellite Observations (CALIPSO), a joint mission between NASA and the French Centre National d'Etudes Spatiales (CNES). CALIPSO carries a laser (lidar) that sends quick pulses of light through the atmosphere and a receiver that detects the returning light that bounces off clouds and atmospheric particles. The strength of the returning signal illuminates characteristics of the clouds or particles.

In the lidar profile, the volcanic plume rises well above the clouds to the north—roughly 15 kilometers (9 miles) high. At mid-latitudes, the bottom of the Earth's [stratosphere](#) begins around 10 kilometers (6 miles) above the surface. Stratospheric winds have a strong tendency to carry material eastward, so volcanic ash from this eruption may travel great distances, disrupting air traffic as it goes.

Volcanic ash is very different from ash from ordinary fires, which is soft and fluffy. [Volcanic ash](#) is made of tiny, jagged particles of rock and glass that are very abrasive and slightly corrosive, and can even conduct

electricity when wet. Volcanic ash can irritate respiratory systems, coat vegetation and leave it inedible to wildlife and livestock, and destroy machinery. By working its way into airplane engines, volcanic ash can take down planes in mid-flight.

Because of the hazards volcanic ash poses to airplanes, eruptions frequently cause delays and diversions to air traffic. The Puyehue-Cordón Caulle eruption was no exception. Argentinean air traffic has been hampered, and by June 13, 2011, the ash had spread as far away as Australia and New Zealand, according to news reports.

1. References

2. ABC News Australia. (2011, June 13). [Ash cloud travel chaos set to worsen](#). Accessed June 13, 2011.
3. Civil Aviation Authority of New Zealand. (2011, June 11). [Ash cloud from Chilean volcano entering New Zealand airspace](#). Accessed June 13, 2011.
4. Holmes, H. (2001) *The Secret Life of Dust*. John Wiley and Sons, Inc., Hoboken, New Jersey.
5. Klemetti, E. (2011, June 6). [Spectacular images and video of the Puyehue-Cordón Caulle eruption in Chile](#). Eruptions. Accessed June 13, 2011.
6. Klemetti, E. (2011, June 7). [Puyehue-Cordón Caulle ash makes it to Buenos Aires and Paraguay in Chile](#). Eruptions. Accessed June 13, 2011.
7. Klemetti, E. (2011, June 13). [Quick update on the Nabro \(Eritrea\) and Puyehue-Cordón Caulle eruptions](#). Eruptions. Accessed June 13, 2011.
8. National Earth Science Teachers Association. (2011). [The stratosphere](#). Windows to the Universe. Accessed June 13, 2011.
9. U.S. Geologic Survey. (2000, March 15). [Volcanic ash fall—A “hard rain” of abrasive particles](#). Accessed June 13, 2011.

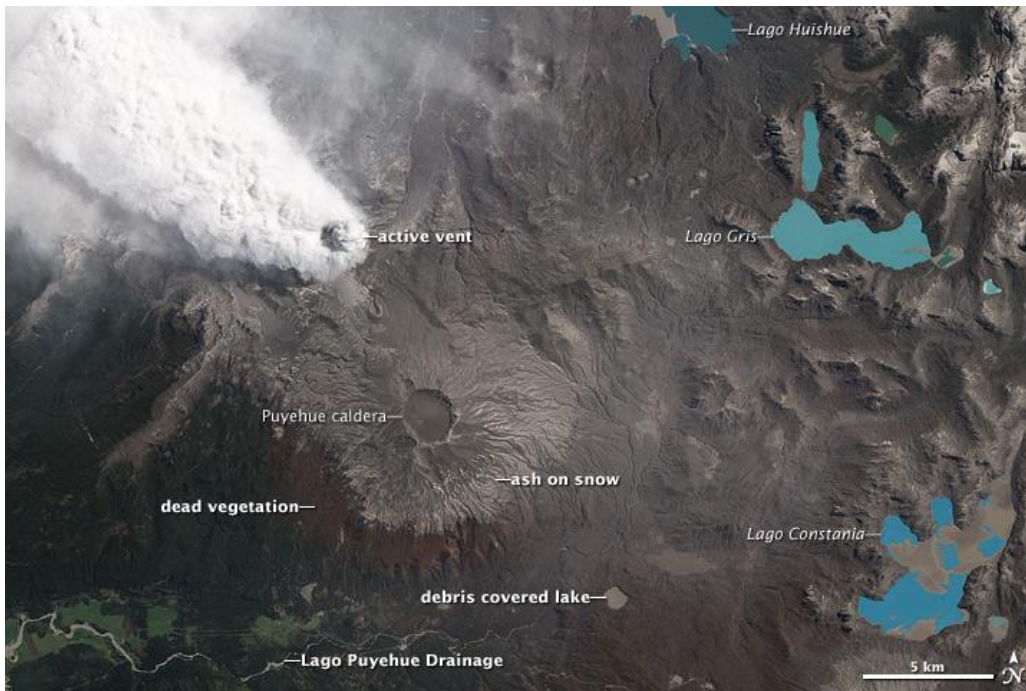
NASA Earth Observatory image created by Jesse Allen, using expediated data provided by the [CALIPSO](#) team. Caption by Michon Scott.

Instrument:

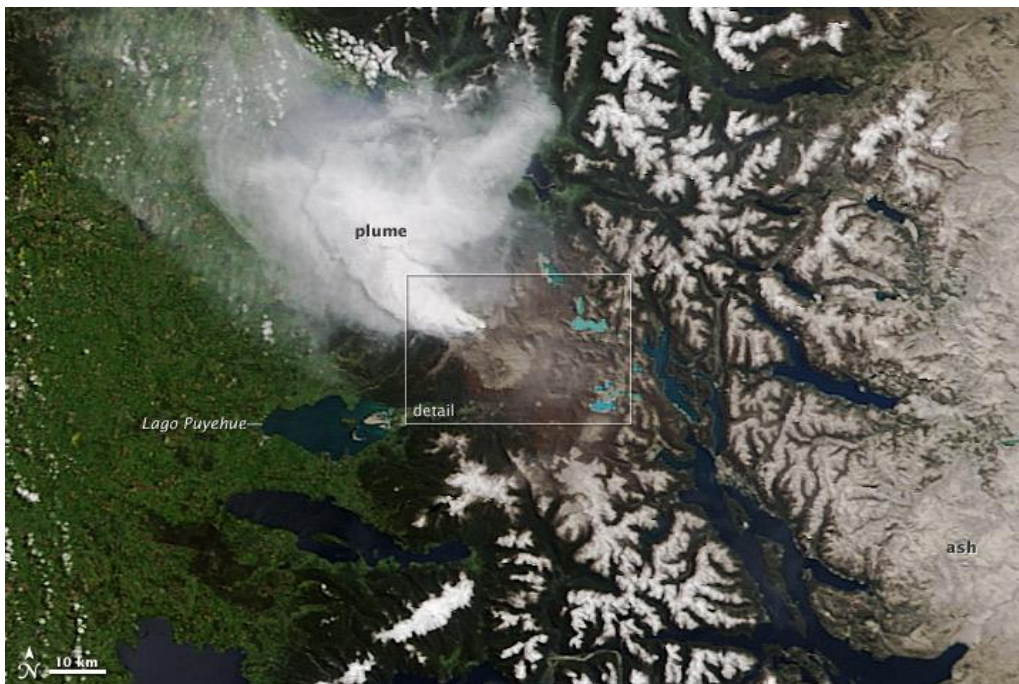
CALIPSO - CALIOP

Puyehue-Cordón Caulle

<http://earthobservatory.nasa.gov/NaturalHazards/view.php?id=76312>



acquired October 22, 2011 [download](#) large image (5 MB, JPEG, 5625x7582)



acquired October 22, 2011 [download](#) large image (1 MB, JPEG, 1800x2400)

The [eruption](#) at Chile's [Puyehue-Cordón Caulle](#) continued in late October 2011. The plume was much smaller than during the opening phases of the eruption (in early June), topping out at about 4.5 kilometers (2.8 miles). However, high atmospheric winds are carrying the ash away and disrupting air travel throughout the region. Depending on the wind, ash from Puyehue-Cordón Caulle is being carried as much as 120–250 kilometers (75–160 miles) from the vent.

This pair of natural-color images were taken on the morning of October 22, 2011. The top picture is a high-resolution view acquired by the Advanced Land Imager (ALI) aboard the Earth Observing-1 (EO-1)

satellite. A wider perspective is shown in the lower picture, acquired by the [Moderate Resolution Imaging Spectroradiometer](#) (MODIS) on [Terra](#).

The hazard from ash and [tephra](#) (solid material ejected by a volcano) doesn't end with the moment of eruption. These images show the accumulation of ash and tephra on the waterways around Puyehue-Cordón Caulle, especially Lago Huishue, Gris, and Constania on the eastern (right) side of the image. Some smaller lakes are completely covered in volcanic debris. Rainfall and snowmelt can easily move the ash deposits into nearby river and stream beds, producing [small mudflows](#) (called [lahars](#)) that carry debris even further away. The stream valley in the lower left of the image is grey with ash and volcanic debris that can be seen entering Lago Puyehue in the lower image. These accumulations of volcanic debris will likely be remobilized for years to decades after the eruption ends.

The wide perspective in the lower image shows Puyehue Cordón-Caulle's ash plume blowing to the northwest; however, prevailing winds usually carry the ash to the east. Nearly five months of activity has covered the high plains of Argentina in gray ash. High winds can [lift this ash back into the air](#), occasionally disrupting air travel in Argentina and Uruguay.

1. References

2. Associated Press. (2011, October 17). [Argentina, Uruguay flights resume after volcanic ash delays](#). Accessed November 2, 2011.
3. SERNAGEOMIN. (2011, October 22). [Reporte Especial de Actividad Volcánica No 176 Complejo Volcánico Puyehue-Cordón Caulle](#). Accessed November 2, 2011.

NASA images by Jesse Allen and Robert Simmon, using ALI data from the EO-1 Team (top), and Jeff Schmaltz [MODIS Rapid Response Team](#), NASA-GSFC (lower). Caption by Erik Klemetti, [Denison University](#) and Wired [Eruptions Blog](#), and Robert Simmon, NASA GSFC.

Instrument:

EO-1 - ALI