

Volcano Lightning



Lightning storm around the Surtsey, Iceland volcanic eruption. Public domain image.

This photo was taken by Sigurgeir Jonasson.

The textbook example of lightning from volcanos is the Surtsey volcano in Iceland. Surtsey was an underwater volcano that ultimately created an island, Surtsey, in November 1963. If you are accustomed to seeing photographs of lightning, you will probably observe that this lightning has some very strange features except for the left most flash.

The Surtsey volcano will very likely be replaced in future textbooks by the Eyjafjallajökull volcano (April 2010) for which there are many outstanding photos.



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[Photograph by Marko Fulle.](#)

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[Photograph by Skarphedinn Thrainsson.](#)

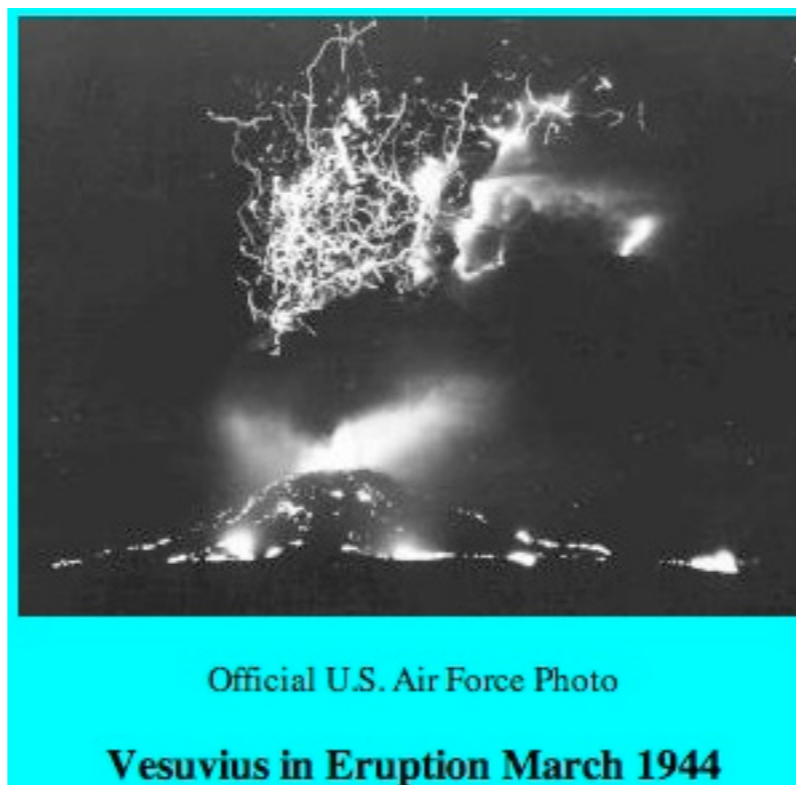


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[Photograph by Lucas Jackson/Reuters.](#)

Icelandic volcanos are not the only volcanos that produce lightning. Perhaps the earliest recorded observation of volcano lightning was by Pliny the Younger during the devastating eruption of Vesuvius in AD 79. He was the nephew of Pliny the Elder, a noted natural scientist, who unfortunately died during the eruption while attempting to rescue family and friends from direct effects of the eruption. There are several English translations of the two letters written by Pliny the Younger to the Roman historian Tacitus. (1) “a dreadful black cloud was torn by gushing flames and great tongues of fire like much-magnified lightning.” <http://quakeinfo.ucsd.edu/~gabi/erth15-06/lecture08/pliny.html> and (2) “In the other direction gaped a horrible black cloud torn by zigzag flashes and masses of flames, like lightning but much larger” and (3) “Behind us were frightening dark clouds, rent by lightning twisted and hurled, opening to reveal huge figures of flame. These were like lightning, but bigger”

But the story continues; assorted photos of volcano lightning from around the world are shown below;
Vesuvius, 1944; Chalten, Chili, 2008; Sakurajima, 1991.



<http://volcaniclightning.tripod.com/volcanic.htm>

[Chalten Volcano, Chili - click](#)



[Chalten Volcano, Chili - click](#)





Credit: Sakurajima Volcanological Observatory
Caption: Sakurajima volcanic lightning, May 18, 1991.
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Perhaps the best documented case of volcano lightning was the eruption of Alaska's Redoubt in March of 2009; see photo below by Bretwood Higman. When the eruption was imminent a team of physicists from the New Mexico Institute of Mining and Technology led by Dr Paul Kreibiel flew to Alaska with a suite of instruments they had developed for studying thunderstorm lightning. They deployed an array of high speed electromagnetic pulse recorders that enabled them to track the progress of electrical discharges in clouds. "Electrical activity is continuous and strong. We see a lot of small electrical discharges as hot gasses come out of the volcano." "After the explosion is over, there is a subsequent phase of plume lightning," Kreibiel said. "Full-fledged lightning occurs in the cloud of ash and water both above and downwind of the volcano." "The lightning activity was as strong as or stronger than we have seen in large Midwestern thunderstorms," Kreibiel said. <<http://www.universetoday.com/2009/04/08/new-array-captures-redoubt-volcano-lightning/>> Research sponsored by the National Science Foundation.



So in short volcanos produce two kinds of discharges: (1) those near the vent that probably result from "frictional" charging among the many different constituents of the tephra, and (2) lightning discharges in the upper cloud that are probably produced by mechanisms similar to thunderstorms.