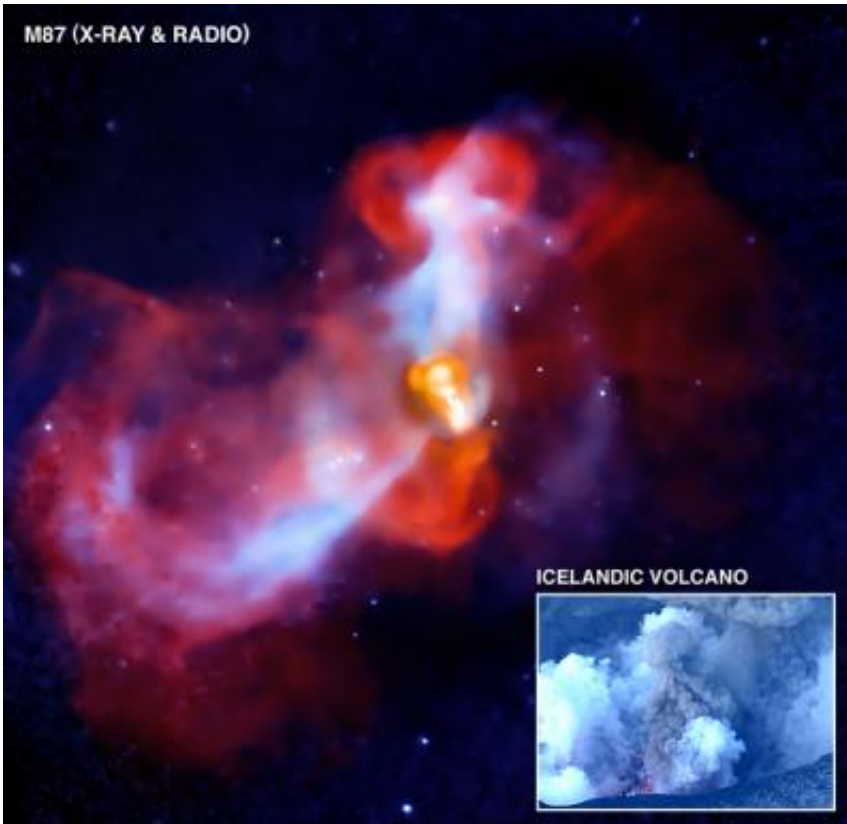


Image: Galactic super-volcano in action

August 19 2010



Credit: X-ray (NASA/CXC/KIPAC/N. Werner et al); Radio (NRAO/AUI/NSF/W. Cotton) Volcano image: Omar Ragnarsson

(PhysOrg.com) -- This image shows the eruption of a galactic "super-volcano" in the massive galaxy M87.

This image shows the eruption of a galactic "super-volcano" in the massive [galaxy M87](#), as witnessed by NASA's [Chandra X-ray](#)

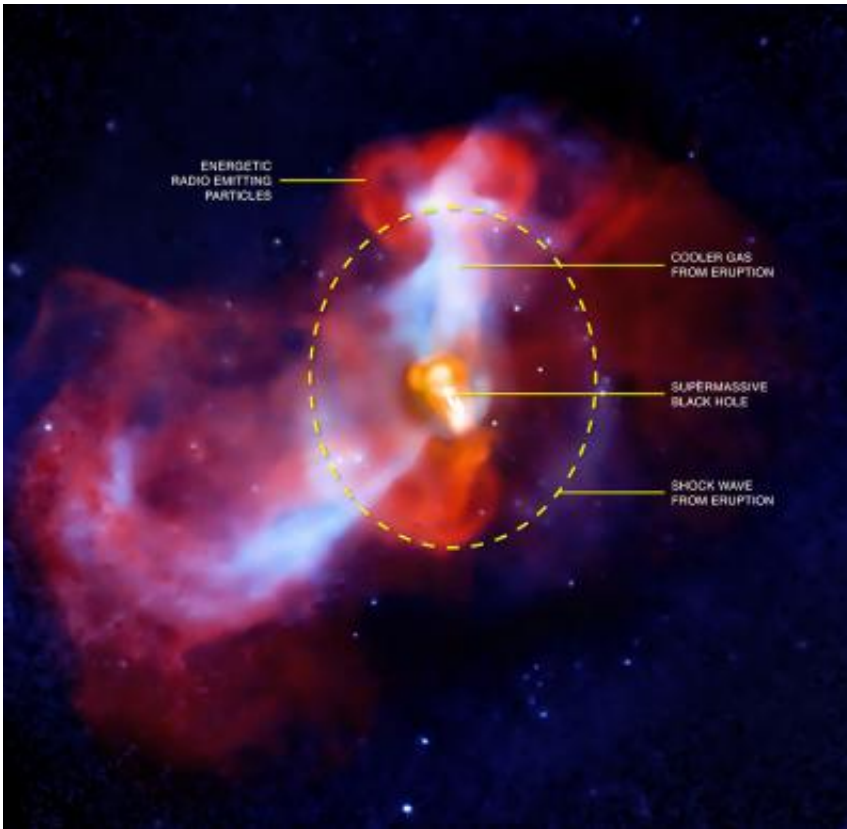
[Observatory](#) and NSF's Very Large Array (VLA). At a distance of about 50 million light years, M87 is relatively close to Earth and lies at the center of the Virgo cluster, which contains thousands of galaxies.

The cluster surrounding M87 is filled with hot gas glowing in X-ray light (shown in blue) that is detected by Chandra. As this gas cools, it can fall toward the galaxy's center where it should continue to cool even faster and form new stars.

However, radio observations with the VLA (red-orange) suggest that in M87 jets of very energetic particles produced by the black hole interrupt this process. These jets lift up the relatively cool gas near the center of the galaxy and produce [shock waves](#) in the galaxy's atmosphere because of their [supersonic speed](#).

The interaction of this cosmic "eruption" with the galaxy's environment is very similar to that of the Eyjafjallajökull volcano in Iceland that occurred in 2010. With Eyjafjallajökull, pockets of hot gas blasted through the surface of the lava, generating shock waves that can be seen passing through the grey smoke of the volcano. This hot gas then rises up in the atmosphere, dragging the dark ash with it. This process can be seen in a movie of the Eyjafjallajökull volcano where the shock waves propagating in the smoke are followed by the rise of dark ash clouds into the atmosphere.

In the analogy with Eyjafjallajökull, the energetic particles produced in the vicinity of the black hole rise through the X-ray emitting atmosphere of the cluster, lifting up the coolest gas near the center of M87 in their wake. This is similar to the hot volcanic gases that drag up the clouds of dark ash. And just like the volcano here on Earth, shock waves can be seen when the black hole pumps energetic particles into the cluster gas. The [energetic particles](#), coolest gas and shock waves are shown in a labeled version.



Provided by Chandra X-ray Center

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