Written by **Dennis Behreandt** on August 19, 2010

Black Hole Eruption Compared to Volcano in Iceland

Located about 50 million light years away, scientists consider galaxy M87 close enough to make "it an excellent subject for investigations of how a massive black hole impacts its environment," NASA said in press release. The environment around M87 is filled with hot gas that glows in X-ray light which can be detected by Chandra.

Normally, such gas falls to the galaxy center, say researchers, where it cools and forms new stars. Observations using the Very Large Array radio observatory, however, "suggest that in M87, jets of very energetic particles produced by the black hole interrupt this process." Instead, say scientists, the 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."

"Our results show in great detail that supermassive black holes have a surprisingly good control over the evolution of the galaxies in which they live," said Norbert Werner of the Kavli Institute for Particle Astrophysics and Cosmology at Stanford University. "And it doesn't stop there. The black hole's reach extends ever farther into the entire cluster, similar to how one small volcano can affect practically an entire hemisphere on Earth."

The volcanic eruption here on Earth to which the interstellar eruption is being compared is that of the Eyjafjallajokull volcano that earlier this year grounded air traffic across Europe. In that eruption, hot gas "blasted" through the surface of lava, causing shock waves visible in the smoke of the erupting volcano. That hot gas continued to rise into the atmosphere bringing ash with it, a process NASA says was captured on video.

That, say researchers, is very similar to the process taking place in M87 in which energetic particles produced near 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, much like the hot volcanic gases drag up the clouds of dark ash."

According to astrophyscist Aurora Simionescu, also of the Kavli Institute, "This analogy shows that even though astronomical phenomena can occur in exotic settings and over vast scales, the physics can be very similar to events on Earth."

The eruption in M87 means that new star formation has been drastically effected there. "This gas could have formed hundreds of millions of stars if the black hole had not removed it from the center of the galaxy. That seems like a much worse disruption than what the airline companies on Earth had to put up with earlier this year," quipped Evan Million, a graduate student at Stanford and the lead author of a

paper to be published about M87.