

VOLCANOES

Listen Up: Monitoring Volcanoes with Sound



Acoustic Monitoring

One of the ways scientists detect volcanic lahars is through acoustic monitoring: <https://www.dnr.wa.gov/programs-and-services/geology/geologic-hazards/volcanoes-and-lahars#volcanic-hazards.8>. Acoustic monitoring is all about sound and the different types of sound signals and waves. Fundamentally, sounds are produced by little pressure changes tapping on your eardrums—sound waves are *pressure waves*. If you pull on a string on a guitar, the string has a certain thickness and tightness that helps it vibrate in a unique way relative to the other strings.

Lots of things in nature make sound, and volcanoes are no exception. Take a moment to **REFLECT** back to *Section 2: Volcanic Hazards*, and **REVIEW** material on the webpage as needed: <https://www.dnr.wa.gov/programs-and-services/geology/geologic-hazards/volcanoes-and-lahars#volcanic-hazards.7>. Recall the different types of volcanic hazards, and think about the sounds they might produce. **THINK** about how loud the sounds might be (think also about the distance that the hazards can travel), how long they might last, are they sudden and short, or do they go on for minutes or hours? Take some notes in your head or in the space below as you think about this.

Notes

One of the great things about sound is that it can travel really, really fast. Sound typically travels at speeds of 700 miles per hour, which is even faster than an airplane! This technique can provide notice at a distance of a volcanic hazard.

Go to the Pierce County Outdoor Warning System webpage:



<https://www.co.pierce.wa.us/5888/Outdoor-Warning-System>

READ about how Pierce County uses acoustic monitors for lahar warnings.



Then, go to the USGS monitoring map for Mount Rainier at this webpage:

 <https://www.usgs.gov/volcanoes/mount-rainier/monitoring>

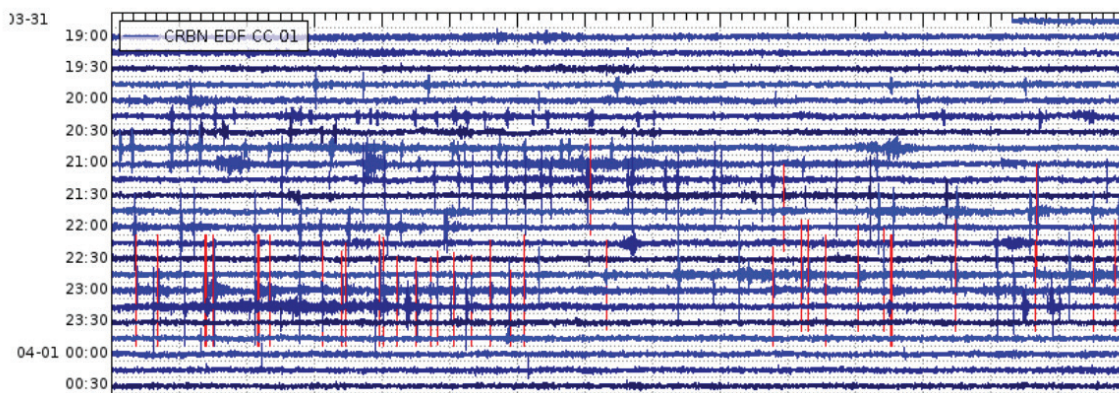
LOCATE Orting, WA on the map by dragging the map, and make sure Mount Rainier is still in view. There are a lot of different things you can see with this map, but let's focus on the acoustic data. **CLICK** on the **Instruments Visible** icon on the right of the map. You should get a popup on the right that says **Filter Instruments**, displaying six types of instruments: GPS, Seismometer, Camera, Infrasound, Tiltmeter, and Temperature. **CLICK** everything except for **Infrasound**¹ to deselect those data types from the map (you'll know they have been de-selected if the boxes are **GRAY** as opposed to **GREEN**). Now look back at the map. The little symbol for the infrasound stations looks like a speaker/megaphone. **LOCATE** the megaphone symbols that are between Mount Rainier and Orting. **THINK** about their placement. What do you notice? How many instruments are there, and why are they placed where they are?

Notes

Click on the speaker symbols and you'll get a popup that has an image under **Infrasound Past 24 hours**. Here, you can click on the words or on the picture to make it bigger, like so:

 Infrasound Monitoring Station CRBN

Infrasound Past 24 hours



¹Infrasound means acoustic signals that are below the threshold of human hearing.



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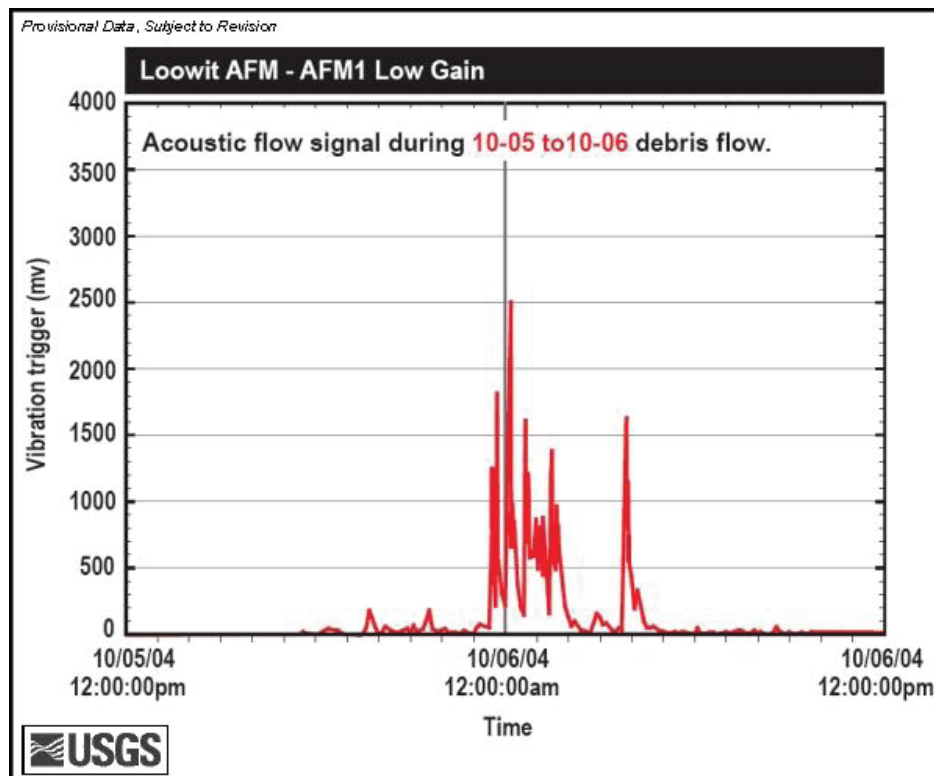
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What you're seeing is live data from the past day that was recorded by the infrasound station. Time is displayed on both the y- and x-axes, and the data runs across and then wraps on the next line below, just the same way that you would read a book. Once you're peeking at the data, **THINK** about what signals you're seeing. Are they all volcanic, or are other types of sounds being 'picked up', so to speak? What types of other sounds might be included here?

Notes

Then **LOOK** at the image below, and some of the other images on the next page that show what some of these infrasound signals might mean.



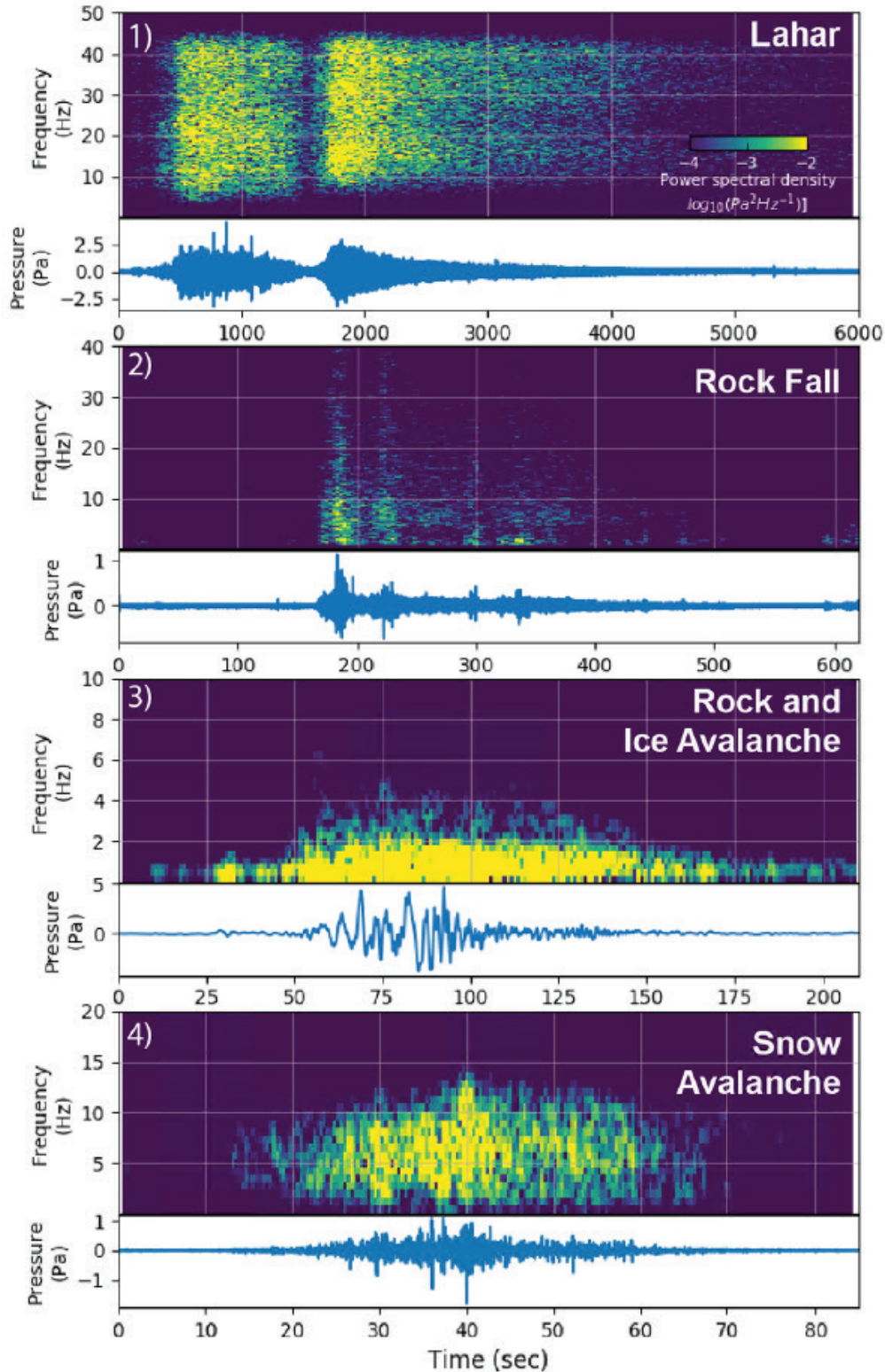
Acoustic signal of a lahar at Mount St. Helens in 2004.

Image credit: [U.S. Geological Survey](#)



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Acoustic signal of a lahar at Mount St. Helens in 2004.

Image credit: [Allstadt and others, 2018](#)



WASHINGTON STATE DEPT OF
**NATURAL
RESOURCES**
WASHINGTON
GEOLOGICAL SURVEY

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Remaining Questions

What did you notice about the data? What questions do you have? What would you like to know more about?

Notes