



Geology in the News – Pythia’s Oasis

Main Points

- DOGAMI and Oregon Department of Emergency Management (OEM) are aware of the new research, recently discussed on multiple media outlets, about an underwater seep off the coast of Newport, Oregon named Pythia’s Oasis. See the original news release from the University of Washington [here](#).
- Pythia’s Oasis, discovered by oceanographers from the University of Washington in 2014, is a seep where water and gas originating from deep under the sea floor have migrated to the surface. This seep is one of many identified along the plate margin.
- Pythia’s Oasis is estimated to have been active for approximately 1,500 years, during which multiple Cascadia Subduction Zone earthquakes have occurred.
- DOGAMI scientists are not alarmed by the discovery and do not believe the feature indicates an increased risk of a Cascadia Subduction Zone earthquake or tsunami.
- It’s not possible to predict when an earthquake or tsunami will occur, and the discovery of Pythia’s Oasis does not change that.
- We know that earthquake and tsunami hazards related to the Cascadia Subduction Zone exist. However, there are steps individuals and families can take to prepare.
- Our current understanding of the hazards related to the Cascadia Subduction Zone has not changed due to the discovery of Pythia’s Oasis.

Frequently Asked Questions about Pythia’s Oasis

When was Pythia’s Oasis discovered and what is believed to have caused it?

According to the article published in [Science Advances](#) and [this article from Phys.org](#), the Research Vessel Thomas G. Thompson experienced a weather delay on its research cruise in 2014 about 50 miles west of Newport, Oregon. While in a holding pattern, the ship’s sonar picked up unexpected columns of bubbles rising from the seafloor. Further exploration using a remotely operated submersible robot revealed the seep, and continued exploration resulted in the research included in the publication.

Further investigation revealed that these bubbles originated along a 0.6-mile-long ridge that is located along the transition from the shallower continental shelf to the deeper abyssal plain off Oregon’s coast. Further study indicated this is not a single seep, but rather a series of small seeps where warmer, methane-rich water is escaping out of the seafloor. The size of the largest seep is about 2 inches in diameter.

The fluid seep indicates the rocks and sediment found at a greater depth beneath Pythia’s Oasis and the subduction zone are under a tremendous amount of pressure, and that pressure “squeezes” the water contained within these rocks up into the ocean. The significance of this is that the fluids contained within the earth’s crust and rocks play a fundamental role as a lubricant in allowing rocks under pressure to slide past each other (such as Cascadia).

This discovery will help provide a better understanding of how the Cascadia Subduction Zone system works, and it will inspire future studies of subduction zone systems around the world.



Is Pythia’s Oasis the same as other hot water vents on the ocean floor?

Hydrothermal (hot water) vents near undersea volcanoes and mid-ocean ridges have been observed throughout the world. The discovery of these hydrothermal vents also has a connection to Oregon, since they were first observed in a study led by [Dr. Jack Corliss from Oregon State University in 1977](#). Hydrothermal vents produce super-heated water that escapes thanks to the high temperature that forces the water upwards. The seeps at Pythia’s Oasis are different: They are not super-heated, but instead are being pushed out by the high pressure that exists in the subduction zone where the Juan de Fuca Plate is colliding with the North American Plate and being pushed downward.

What does this leak mean relating to tectonic activity, and is it a sign that there is activity in the Cascadia Subduction Zone that may precede an earthquake?

This study did not address this discovery as a precursor to a Cascadia Subduction Zone earthquake. According to the study, this seep has been active for approximately 1,500 years, during which there have been at least five Cascadia earthquakes ([Goldfinger et al, 2012](#)). This is an interesting study that will help researchers in this area better understand the role of fluids in subduction zone earthquakes, which will in turn help agencies like DOGAMI, USGS, and others to better communicate to the public the risks posed by geologic hazards such as Cascadia.

Scientists have predicted that there will be a significant earthquake generated by the Cascadia Subduction Zone. How would such an event impact Oregonians?

The research surrounding the magnitude of previous Cascadia earthquakes is ongoing, and this study will help inform this discussion. At this point, there is ample evidence from other studies that supports past occurrences of large earthquakes (M7-M9) along the Cascadia Subduction Zone. The studies of Pythia’s Oasis do not change the current forecasts of the magnitude of earthquakes generated by Cascadia.

DOGAMI has conducted multiple studies of earthquake risk related to the Cascadia Subduction Zone and other faults. For example, in 2021, DOGAMI released the Oregon Seismic Hazard Database (OSHD-1) that can be found at <https://www.oregongeology.org/pubs/dds/p-OSHD-1.htm>. Additional information about impacts to the Portland metro region can be found in DOGAMI Open File report O-18-02, Earthquake regional impact analysis for Clackamas, Multnomah, and Washington Counties, accessible at <https://www.oregongeology.org/pubs/ofr/p-O-18-02.htm>.

While there is uncertainty about the magnitude and timing of the next earthquake, there are two facts that every Oregonian should keep in mind: 1. Predicting the date of the next Cascadia earthquake is not possible at this time, but we know this hazard exists. 2. There are steps that individuals and families can take to prepare, and we encourage everyone to visit the [Oregon Department of Emergency Management’s](#) website to learn more about how to prepare for the eventuality of an earthquake and tsunami along the Oregon coast.



Additional information about Pythia's Oasis:

<https://www.washington.edu/news/2023/04/10/warm-liquid-spewing-from-oregon-seafloor-comes-from-cascadia-fault-could-offer-clues-to-earthquake-hazards/>

<https://interactiveoceans.washington.edu/10/2019/pythias-oasis-an-underwater-spring-unlike-any-other/>

<https://phys.org/news/2023-04-liquid-spewing-oregon-seafloor-cascadia.html>

<https://www.science.org/doi/10.1126/sciadv.add6688> (Published journal article)

<https://today.oregonstate.edu/archives/2017/feb/corliss-osu-commemorate-40th-anniversary-hydrothermal-vents-discovery>

Additional information about natural hazards in Oregon:

Information about Tsunamis in Oregon - <https://www.oregontsunami.org>

Information about earthquakes in Oregon - <https://www.oregongeology.org/earthquakes/earthquakehome.htm>

Oregon Emergency Management's Cascadia information page - <https://www.oregon.gov/oem/hazardsprep/Pages/Cascadia-Subduction-Zone.aspx>

DOGAMI's Oregon Seismic Hazard Database publication - <https://www.oregongeology.org/pubs/dds/p-OSHD-1.htm>

DOGAMI's Earthquake regional impact analysis for Clackamas, Multnomah, and Washington Counties - <https://www.oregongeology.org/pubs/ofr/p-O-18-02.htm>