Tempest news

MENU

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TEMPEST NEWS | FEBRUARY 2022

MAN-MADE SNOW AT THE BEIJING OLYMPICS

For the first time in Olympic history, the Winter Olympic Games will rely almost entirely on artificial snow. An Italian snowmaking systems company, TechnoAlpin, was hired to manufacture the snow that is needed to cover the four outdoor event spaces around Beijing and has been working to pull off the feat since 2018. It is estimated that 49 million gallons of water will be needed to produce the 1.2 million cubic meters of snow needed to cover roughly 800,000 square meters of competition space.

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UNDERSTANDING TONGA

Hunga Tonga-Hunga Ha'apai, an underwater volcano in the South Pacific, erupted in January, spewing ash, rock, and other debris into the sky, triggering tsunamis and causing an acoustic gravity wave that wrapped around the globe multiple times. Some scientists like Simon Proud, a satellite data researcher at the University of Oxford, had been monitoring the volcano since late December. Now, experts must come together to look at the data and piece together what exactly caused the unique and angry explosion.

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INCREASE IN "CATASTROPHIC" HURRICANES PREDICTED FOR COASTAL AREAS

According to studies from Princeton University and MIT, hurricanes causing extreme high tides and heavy rains are predicted to occur on a much more frequent basis by the end of the century. Particularly destructive for coastal communities, these types of storms have been rare in the past. But shifting their focus to the future and factoring in climate change painted a different picture for the scientists on the case. Governments, city planners, and resource managers are using the study as a reminder that changes must be made to our preparation and response to climate-driven events.

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MT. EVEREST EXPERIENCING INCREASED ICE LOSS

An international research team led by the University of Maine has analyzed data from the highest ice core and automatic weather stations in the world to find an increased annual loss rate of previously accumulated ice due to human-induced climate change on Mt. Everest. The team explains that this could make expeditions up the famed

mountain more dangerous as climbers are forced to maneuver exposed bedrock and continuously thinning ice.

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TEMPEST INNOVATOR

Through our StartEngine campaign, we met an interesting investor passionate about the weather and startups like ours. We interviewed Vilem Fruhbauer to learn more about the weather's impact on his daily life and business and to get tips for new investors and anyone considering buying shares in WeatherFlow-Tempest.

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The volcanic eruption at Hunga Tonga-Hunga Ha'apai, a volcanic island near the Kingdom of Tonga, captured the world's attention when it erupted on January 15, 2022. Global headlines described the eruption and ensuing tsunami as 'so intense it caused the atmosphere to ring like a bell' — with a sonic boom heard as far away as Alaska. The resulting tsunami cut off all communications from the island when the undersea cable snapped, killed three people, and triggered a devastating oil spill off the coast of Peru

We tracked down volcanologist Mike Poland, a research geophysicist with the Cascades Volcano Observatory and Scientist-in-Charge of the Yellowstone Volcano Observatory to discuss the historic eruption.

Q: WAS THE VOLCANOLOGIST COMMUNITY SHOCKED THAT THIS ERUPTION TOOK PLACE?

A: I wouldn't call it 'shocked' that the eruption happened. More like it was a unique eruption, so people are fascinated by what happened. And there are no immediate

answers. We do know something different happened but there is a lot of curiosity and a lot of research happening around this event.

Q: YOUR WORK FOCUSES ON THE POTENTIAL FOR SATELLITE DATA TO IMPROVE FORECASTS OF FUTURE CHANGES IN VOLCANIC ACTIVITY. I'D LOVE TO UNDERSTAND IF YOU CAN ACTUALLY PREDICT A VOLCANIC ERUPTION.

A: Well, there is no way to *predict* a volcanic eruption. Predict is not a word we like to use. Forecast is a better word, but first, you would have to have monitoring data on that volcano. At a place that is well monitored, we would see the signs before an eruption. You'd see more earthquakes, the ground inflates like a balloon, because magma as it comes up, pushes the ground up. In other places, you'd see the opposite and the ground might be subsiding.

With no monitoring data, you just don't know. Hunga-Tonga is underwater and monitoring underwater is really hard. There were no seismometers and no way to detect small earthquakes in Tonga. It's a small country with 100k people. You have to decide where resources will go. Tonga only has 60 populated islands with about 100k people in the whole kingdom.

Q: HOW DO YOU DECIDE WHICH VOLCANO TO EQUIP WITH MONITORING DATA?

A: A volcano like Mt. St. Helens is equipped with GPS and seismometers that are measuring the gases coming out and how the ground moves. And these are things that can provide some warning before it erupts. There are a few bad actors with a history of eruptions, that are close to people, so you'd pay more attention to a volcano that looms over a city. You would put more monitoring on the one that is more threatening and could do more damage.

Q: DID THE HUNGA TONGA VOLCANO COME OUT OF NOWHERE?

A: No, this was not quite out of the blue. Hunga-Tonga eruptions had been going on for a couple of weeks. It was a known event—what was not anticipated was this massive explosion.

The volcano started erupting in December 2021. You could see ash coming out of the ocean. There were small explosions, then an ash plume on January 14, 2022. It was a good-sized explosion but no one is living on that island or nearby (the main island is 60km away.) This is a remote island in the middle of the Pacific - I'm not sure you could even see it from one of the populated islands.

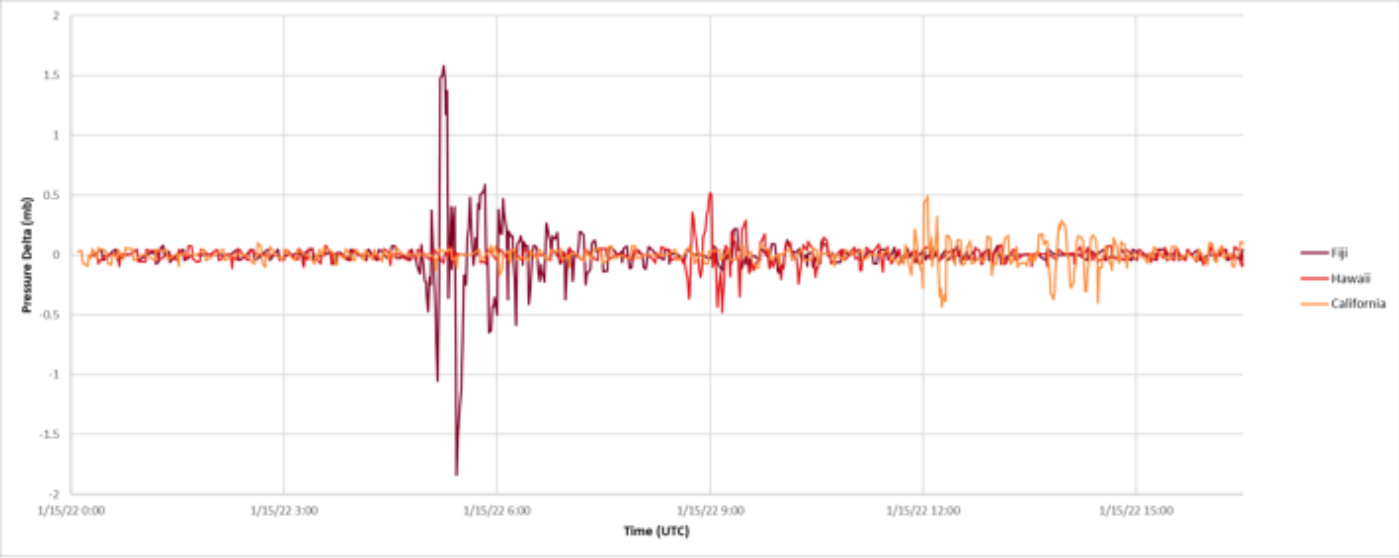
There were definitely photos of the eruptive activity because The Tonga Geological Service was studying it. But the Tonga volcano was mostly underwater. It had erupted in the past, in 2009, then in 2014-2015. That eruption created a new island. But there are 50 volcanoes around the world erupting at any given time. We wouldn't have heard about Hunga-Tonga because it's not located near people. It was not noteworthy.

Q: WHAT OTHER HUGE ERUPTIONS HAVE COME OUT OF SEEMINGLY NOWHERE?

A: In 2018 there was a huge eruption in Vanuatu that evacuated a whole island. That barely made the news in the US. And the monitoring was not as advanced as Kilauea and Mauna Loa volcanoes in Hawaii. Kilauea is the gold standard. It's a place where we've had a volcano observatory for 100 years. The Hawaiian Volcano Observatory was founded in 1912.

It was a place where we could learn about volcanos. The idea was that the more we observe, the more we're going to learn. There are a lot of techniques we've used today that were tested in Hawaii. You want to test in a place that is accessible, has eruptive activity and Kilauea is outstanding for that.

Q: FOLLOWING THE ERUPTION A LOT OF TEMPEST WEATHER STATIONS AROUND THE WORLD RECORDED THE PRESSURE WAVE. THE GRAPH BELOW SHOWS THREE TEMPEST STATIONS (FIJI, HAWAII, AND CALIFORNIA) REPORTING THE PRESSURE WAVE GENERATED BY THE ERUPTION. CAN YOU EXPLAIN WHAT CAUSED THAT?



A: When the explosion happened, it created a pressure wave explosion. That sound traveled an incredibly long way, people around the world heard it. They heard it in Alaska, Washington, Oregon. So it makes sense that people with home weather stations would have picked it up as the wave passed by.

It works like this: there is an explosion. You hear the sound. The sound is carried by sound waves, and the sound wave is associated with the pressure wave that went around the world multiple times. It was an extremely loud event and very rare for volcanoes to do. Was probably very exciting for someone in Texas or France to see on their weather station app!

Q: YOU SAID EARLIER THERE WERE NO ANSWERS. IS THERE A HYPOTHESIS FOR WHAT TRIGGERED HUNGA-TONGA?

A: There are competing ideas for why this was such a massive explosion. Either there was an awful lot of gas in the magma (like soda carbonation) -and if you uncork it quickly, it will explode. And it could have been extremely gas-rich magma. Another theory is there could have been a large amount of magma in contact with water and that can cause an explosion. Or some combination of those. This is one of the problems, we don't know because we don't have the data yet.

Q: WHAT ARE YOU WORKING ON NOW?

A: My focus is Yellowstone. In the USGS, we focus on US volcanoes, Before this, I worked in Hawaii and for a time was based at Mt. St. Helens. That was the most interesting volcano around. Volcanoes are like people, they have personalities, each one is different, with its own special characteristics. Mt. St. Helen's is quiet until it's about to erupt, during that buildup, lots of interesting things happen. You always have to be on your toes.

Yellowstone has not erupted in 70,000 years ago but it has thousands of earthquakes every year. The ground goes up and down all the time. There are more active geysers going off than anywhere in the world. If you took the activity at Yellowstone to Mt. St. Helen's, you'd be alarmed. Yellowstone's personality is in your face. Yellowstone being Yellowstone is 2000 earthquakes a year, geysers, the ground going down, going up It's always changing,

Yellowstone is doing things constantly but never erupts. We learn a lot by studying Mt. St. Helen that we can apply to Mt. Rainer, but still have to recognize every volcano has its own personality and we can't treat them all the same.

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