

## TRENDS AND OBSERVATIONS

**Doomsday 2012**

BY RAUNO PERTTU



Rauno Perttu

According to some, this year, 2012, is the year the world ends—in December, to be more precise. Of course, we've always been in somebody's end-of-the-world days. Would-be oracles often use recent natural disasters to "prove" these are the real end times. I'll be very impressed if, after 4.6 billion years of spinning, the earth actually decides to end it all this December. I'll bet on another billion years.

It being the start of earth's "final" year, I thought it would be appropriate to join the oracles and make some predictions on events that will make our coming news during the year. I hereby predict we will have a volcanic eruption. I also predict we will have a devastating earthquake. In fact, I predict we will have multiple earthquakes, eruptions, and freakish weather events during the coming year. I will make the same prediction every year. The physical world is an active place, but because geological time pokes along much more slowly than our version of time, we forget until the earth decides to remind us. After we watch the disaster unfold on our television or computer screen, we quickly forget about it until the next disaster—unless we're directly impacted.

Our last impressive reminder of an active earth was the massive earthquake and tsunami on March 11, 2011 in northern Japan. The earthquake and numerous aftershocks happened on a complex fault zone, called a subduction zone, along which the Pacific plate is sliding under Japan. This earthquake did not happen along the part of the zone that has worried scientists for years. The fault segment to the south, near Tokyo, last had a devastating earthquake and tsunami in 1923, and could have another one at any time. This is the disaster that has worried scientists. Because of its proximity to a much larger population center, this quake and tsunami could be significantly more damaging than the one last March.

Very large earthquakes along subduction zones happen somewhere in the world every few years, and are the kind of earthquakes almost always associated with tsunamis. The great Alaska earthquake of 1964 was such a quake, as was the December 2004 earthquake in the Indian Ocean, which triggered tsunamis that drowned more than 230,000 people. The great earthquake in Chile in February 2010 was the most recent such earthquake before the Japanese earthquake last year. Parts of the west coast of North America are also

subject to these earthquakes, although we in the Applegate are very unlikely to be directly impacted. It appears that the risk of a subduction zone earthquake off the northwest coast is mostly limited to a stretch from the central Oregon coast northward to Vancouver Island. Even in that region, it further appears that, because of the unusually warm and thin crustal rocks involved, most of the shaking would be limited to offshore.

Earthquakes on land impact us far more frequently. These non-subduction earthquakes can also be devastating, as demonstrated by the May 2008 earthquake in China, which killed 68,000 people and

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left as many as ten-million homeless. There are places, some of them here in the west, that will have major damaging earthquakes in the coming years—maybe even this year. The only question is when they will occur.

Earthquake records have been kept for centuries in parts of the world with long-term written histories. In Turkey, these records show repeating patterns of earthquakes along certain fault lines. The patterns suggest that Istanbul has a major earthquake scheduled for its vicinity in the next several years, with potentially devastating consequences for this city of more than 13-million people. Although we lack the long-term written history, trenching and scientific detective work have demonstrated that faults in our American West have similar repeating patterns.

I'll use as examples two faults in California that will have damaging earthquakes, possibly within my lifetime as an old geezer, and most probably in your lifetime, if you're young. One of these, the Hayward Fault that passes southward along the eastern margin of the San Francisco Bay Area, has had at least five large earthquakes with approximate intervals of 140 years. The last one was in 1868 (yes, 144 years ago). Because the fault bisects the University of California, Berkeley football stadium, the stadium's ongoing major renovation is designed to protect the players and fans if the next "big one" hits at game time. Perhaps the yardage markers can be used to measure the displacement.

A large earthquake is also scheduled for the segment of the famed San Andreas Fault about 100 miles north of Los Angeles. Studies have shown that very large

earthquakes occur along the segment about every 90 years, and the last large earthquake was in 1857. Fortunately, this segment is far enough from the Los Angeles population centers that the famed "big one" could disappoint true disaster fans. The problem with predicting these large earthquakes is that the average time between earthquakes is only an average, and earthquakes don't run on a reliable timetable.

In and beyond California, numerous active faults, many of them poorly studied or understood, are waiting to surprise us. One that caught my attention years ago, when I was transferred to Salt Lake City, is the Wasatch Fault. This fault is lifting

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the mountains east of Salt Lake Valley, while dropping the valley. Portions of this fault have ruptured and produced large earthquakes approximately every 350 years. One of the segments that is due for a large earthquake runs along the eastern boundary of urban Salt Lake City. Our brick house, which would be very vulnerable to earthquakes, was almost on the fault. Projections of the damage from shaking of the soft sediments that underlie the town were enough to make me think about the family trapped in rubble on a cold winter's night. The Wasatch Fault is a very dangerous fault that was recognized by scientists, but was largely ignored by the public until recently. Similar time-bomb faults are scattered across the west, and along geological zones in the seemingly stable continental interior to the east. Many are unstudied by scientists, and will be recognized and appreciated only when they act up. Very large earthquakes occurred historically along some of the zones in the continental interior, but at a time when the population was isolated and few accurate records were kept. Future large earthquakes will continue to happen along these less-recognized zones but, because of lack of knowledge, they are likely to surprise us, and to be very damaging.

Enough about earthquakes. Volcanoes also work on repeating patterns. Each of the Cascades volcanoes has its own pattern of eruptions with some, like Mount St. Helens and Mount Shasta, erupting frequently. Others, like Mount Hood, erupt less frequently, and still others, like Mount Adams, rarely erupt. Most

volcanoes are also irregular in their eruption patterns, with periods of frequent eruptions followed by long periods of sleep and, like we humans, volcanoes change with time, grow old and die. We older humans had the chance to see Mount St. Helens, a vigorous younger volcano, put on a show, but are unlikely to see another. The young, however, have a very good chance of seeing another Cascades eruption in their lifetime. Our own nearby Mount McLoughlin appears to offer little threat. It has apparently been quiet for 25,000 years, and geologist friends who have studied it believe it will stay quiet.

Other volcanoes can be more dependably active. One example that I expect to cause problems for Europeans, perhaps within this next year, is Katla volcano in southern Iceland. This volcano has a history of significantly larger eruptions than the one that snarled air traffic over Europe last year, and is overdue for an eruption. When it does, air-traffic problems and air quality in Europe could make tourists wish they had chosen a different itinerary.

Again, like those unstudied faults, we will be surprised by an eruption of a volcano that has been quietly sleeping and ignored, if not this year, almost certainly within the next several years.

While we take note of, and quickly forget, the numerous strong earthquakes and run-of-the-mill volcanic eruptions like Mount St. Helens in 1980, we always have the chance for a truly remarkable event, which nature throws at us every few centuries or millennia. I don't hope to be fortunate enough to see one of these events. Examples of these are the eruption of a super volcano like Yellowstone, a major impact of an asteroid or comet, a giant solar flare, a major climate shift, or even a pandemic. These types of natural events have repeatedly happened, and will continue to happen. Our civilization, with its burgeoning population and increasing dependence on technology, isn't designed to easily handle such an event. However, I'm betting such an event doesn't happen in 2012 and, if it does, it won't be the end of the world. Let's have a great new year's party in 2013, knowing another doomsday was averted.

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