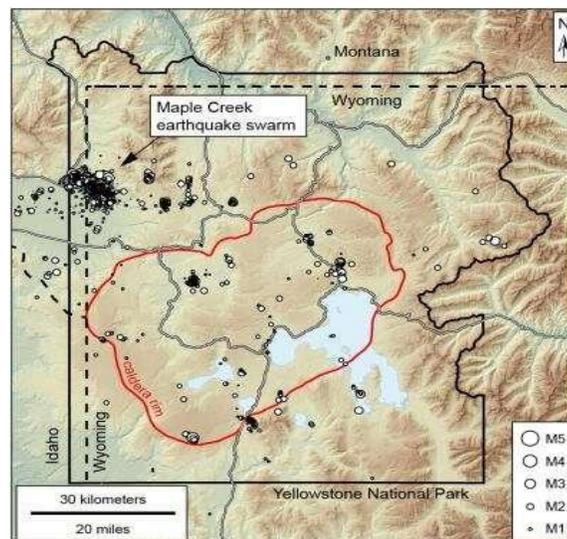


# STANDARD DEVIATIONS: Years Later, Still Yellowstone's Fault

Yeah, a bad pun, I know,

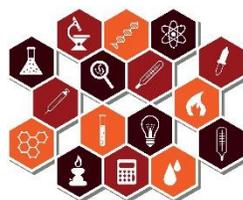
University of Utah seismologists published a study in April of this year that examined the seismicity of some 3,345 earthquakes that occurred near Yellowstone's Maple Creek, in the northwest corner of the park, from June 2017 to March 2018. They determined those quakes to be aftershocks of a magnitude 7.2 event from 1959, The Hebgen Lake Event (28 deaths). They occur in "swarms" and have been going on for sixty years.

Is that unusual? Another, close by earthquake under Borah Peak, Idaho, registered 6.9 in 1987 and has seen aftershocks as recently as 2017. In geological time, these are probably a typical characteristic of earthquakes. Their location, direction, and patterns are so unique and specific that they are like fingerprints to these seismic activity detectives.



Until science, our tools, and our knowledge were able to comprehend the scope of time and its immensity, our brief existence blinded us to this longevity.

The same exact phenomena are seen in disease. The great pandemics of Plague and Influenza are swarms of past infection that have such "fingerprint" qualities that we know their origins to be decades, centuries, who knows how old. Just like an earthquake aftershock, the damage is still in real time. Only now are we beginning to understand their origin, their durability, and their persistence. And death and destruction are hallmarks of both earthquake and disease.



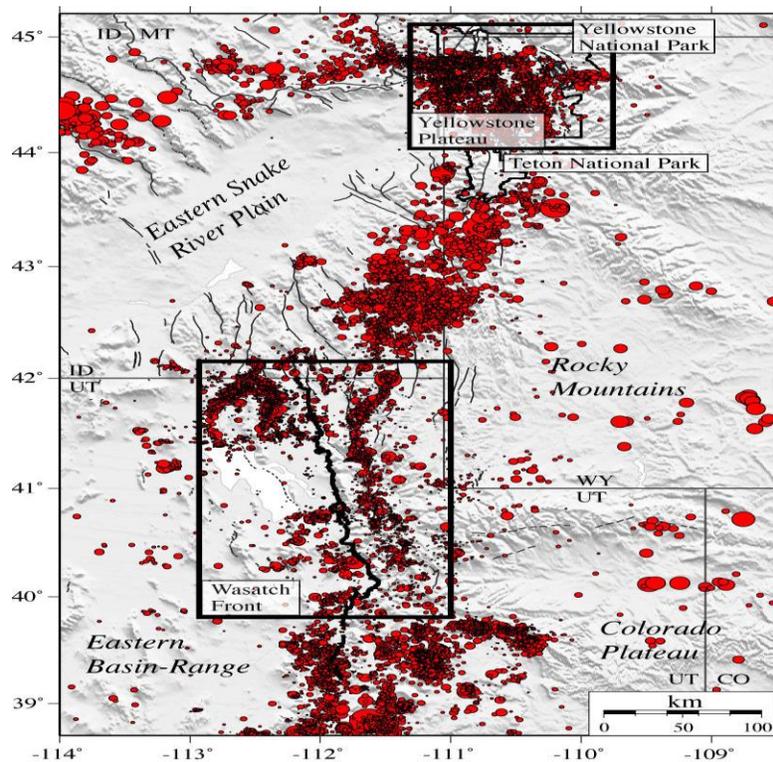
Look at *Yersinia Pestis*. We've endured Plague for centuries. The organism, its effects and symptoms, just an aftershock; just as identifiable as a fingerprint.

Look at Influenza. Is it the same? The virus changes but the disease, in general, remains an aftershock to an original viral event; recurring each time conditions permit (whether our susceptibility or its genetic variance). Sometimes a "mild" aftershock, sometimes devastating. It's been a century since the 1918 "quake", and we anticipate aftershocks every year!

Look at Ebola. We have known about it since 1976 (surely it has been around much longer), and swarms of outbreak have been ongoing for decades; and are still a threat. We are only just beginning to understand the virus.

Look at the similarities in how we mitigate the risks of earthquakes and pandemic. Both can be predicted in limited ways; and we can try to move out of the way or throw up barriers. The strength and unpredictable nature of these things make our efforts seem meager. Our own stubbornness and predictability make us remain vulnerable. Time and again, we can't, or won't, get out of the way.

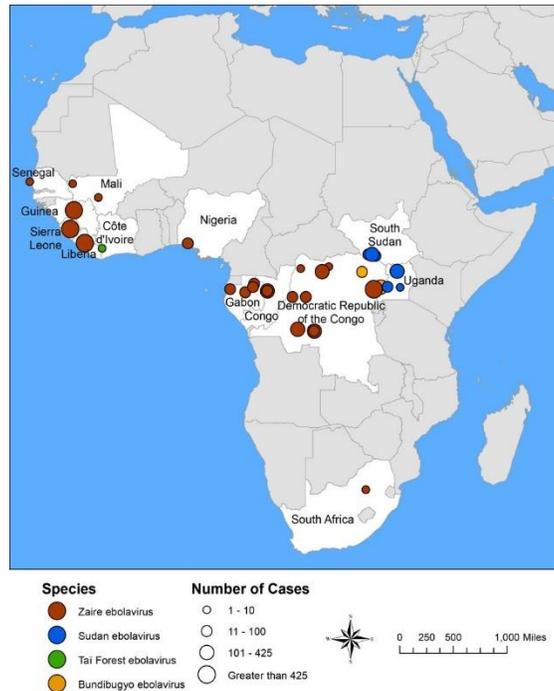
Take a gander at this seismic map of our region:



The Wasatch Faultline is well-studied and foreseen to be overdue for a major cataclysm. There are nearly 3 million people in this predictably unstable area and studies indicate a near doubling in the next 30 years. The consequence of a singular earthquake along this known fault is catastrophic. What about 60 years of aftershock?



Now, observe this map of ebolavirus:



The disease outbreak and its aftershocks have killed thousands and hundreds of millions are still at risk. What will this map look like in ten years if one “aftershock” occurs in Goma (pop. ~1 million), Kampala, Uganda, (1.5 million), or Kinshasa (12 million)? We could talk about flu this way, but we’d need a globe, an abacus, and a strong stomach.

Until our preparedness paradigm changes and we recognize value in the warnings our past imparts on the future, we will be simply, and often feebly, responding to disasters and to their aftershocks. In the here and now, we can and should learn from the past and prepare for the near future. This applies to safety in the laboratory just as easily.

An earthquake occurs, and keeps occurring, in one area, persisting until conditions change enough that it no longer is seen or felt. Likewise, disease will present until it can’t (host, pathway, environment, etc.). But the Earth is a dynamic place and one event is typically followed by another. New earthquakes and other natural disaster are just out of sight. So, too, is the next unknown pandemic. But, our ability to predict and prepare for these unforeseen risks are mitigation tools we can use today.

Have a great week and be safe,

Bryan

p.s. Like many, I am fascinated by Yellowstone Nat’l Park. If the Hebgen quake of ’59 interests you, check out this Forest Service clip: <https://www.youtube.com/watch?v=Wi8r82QpXM8>.

