



Analysis of Raspberry Shake Recordings of the April 5, 2024 New Jersey Earthquake:

Global Raspberry Shake Network Promotes Opportunities for Research and Community Engagement

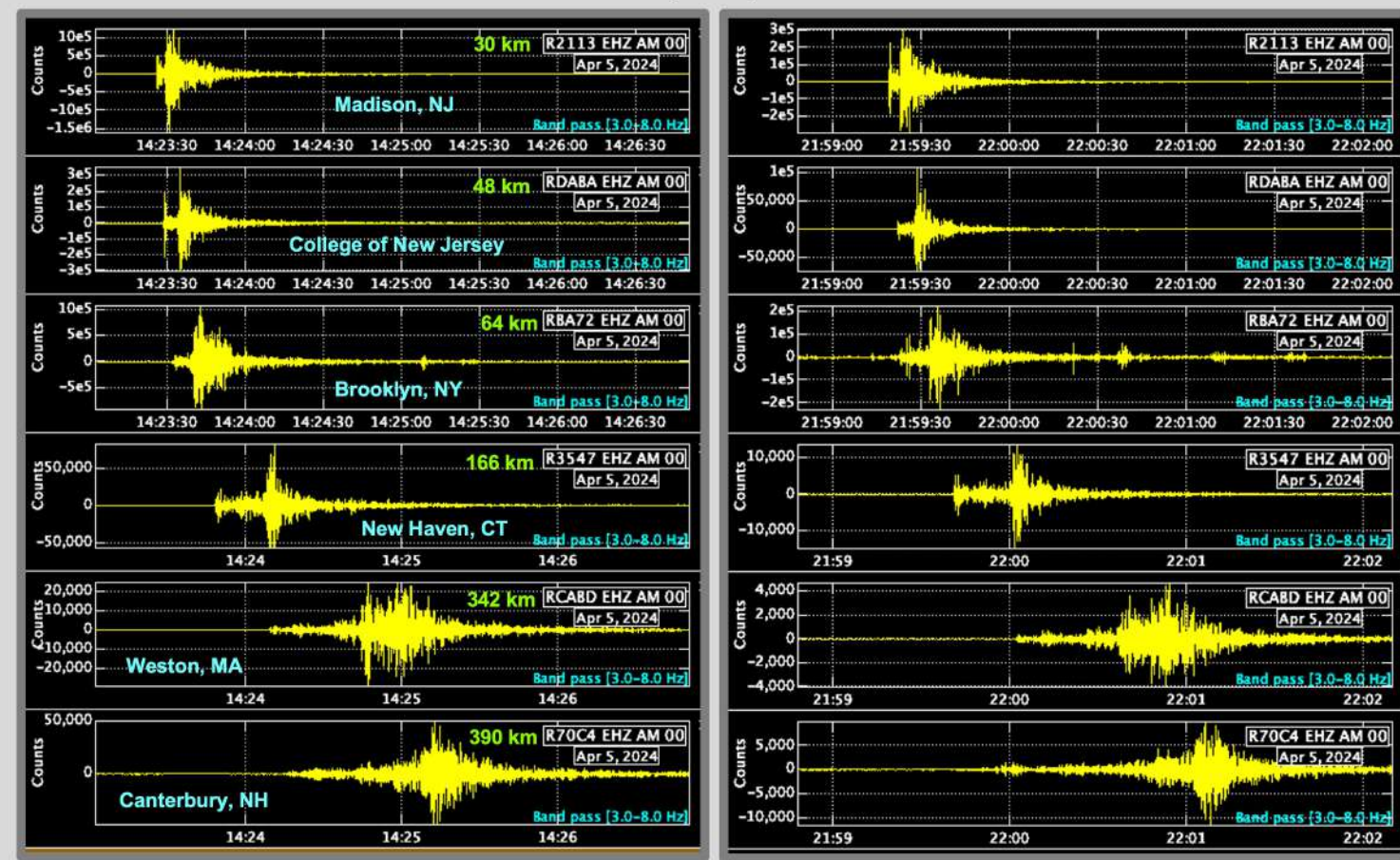
Alan L. Kafka and Jay J. Pulli (Weston Observatory, Boston College), and Keith L. McLaughlin (Leidos Dynetics-LInC)



2024 Annual Meeting

Examples of Raspberry Shake Seismograms of Main Shock and Largest Aftershock

New Jersey - M4.8 (left) and M3.7 Aftershock (right) April 5, 2024

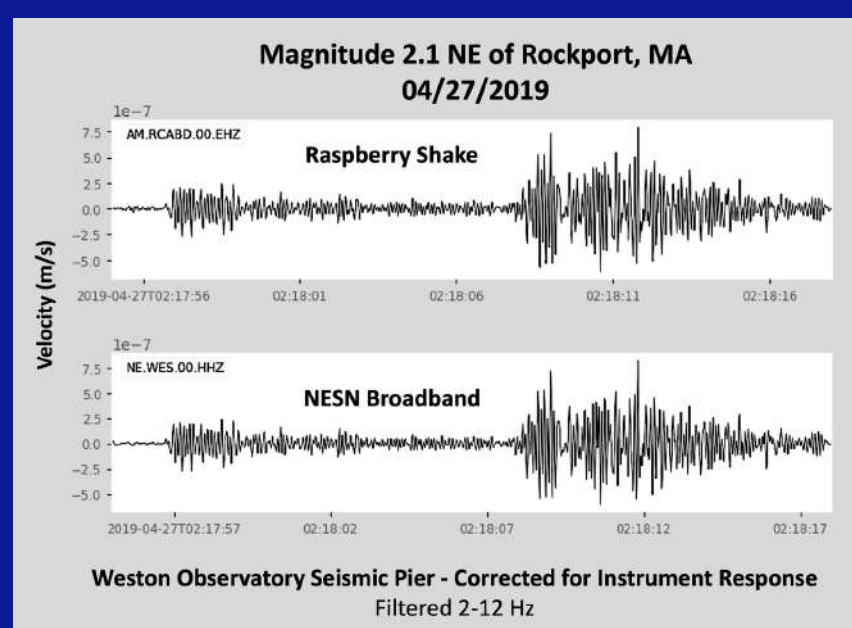


This earthquake was widely recorded and widely felt across the Northeastern US, and was **the largest earthquake in the greater New York City area since a magnitude 5.3 earthquake in 1884.**

The continued growth of the global Raspberry Shake (RS) network attests to just how much those involved in operating a "Shake"—whether they are seismologists, hobbyists, or simply curious science-friendly people—find the process of recording and analyzing the data to be fascinating and engaging, but: **Does this increased engagement translate into meaningful gains in basic research and a worthwhile contribution to the greater good of society?**

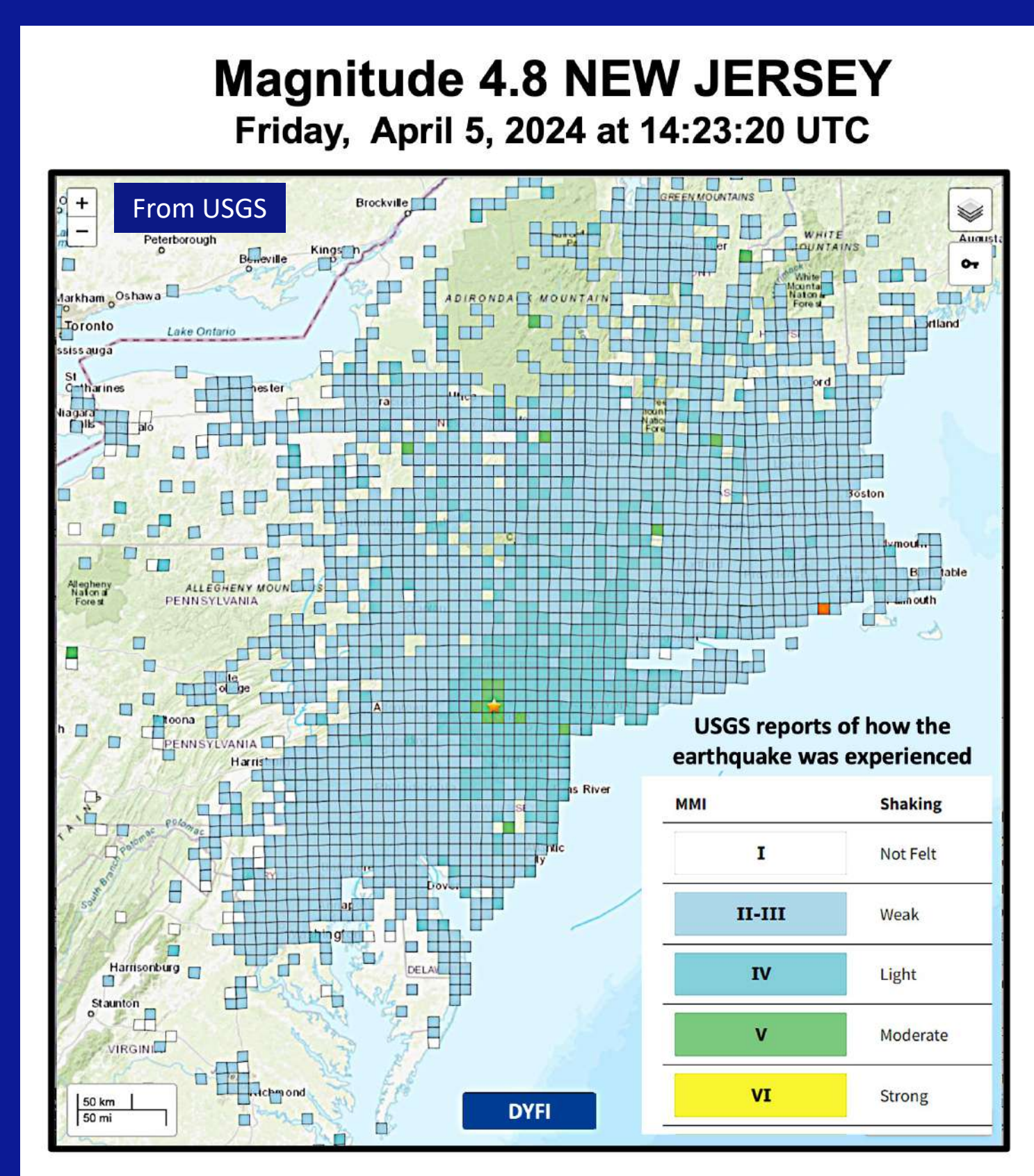


From: raspberrysake.org



Shake

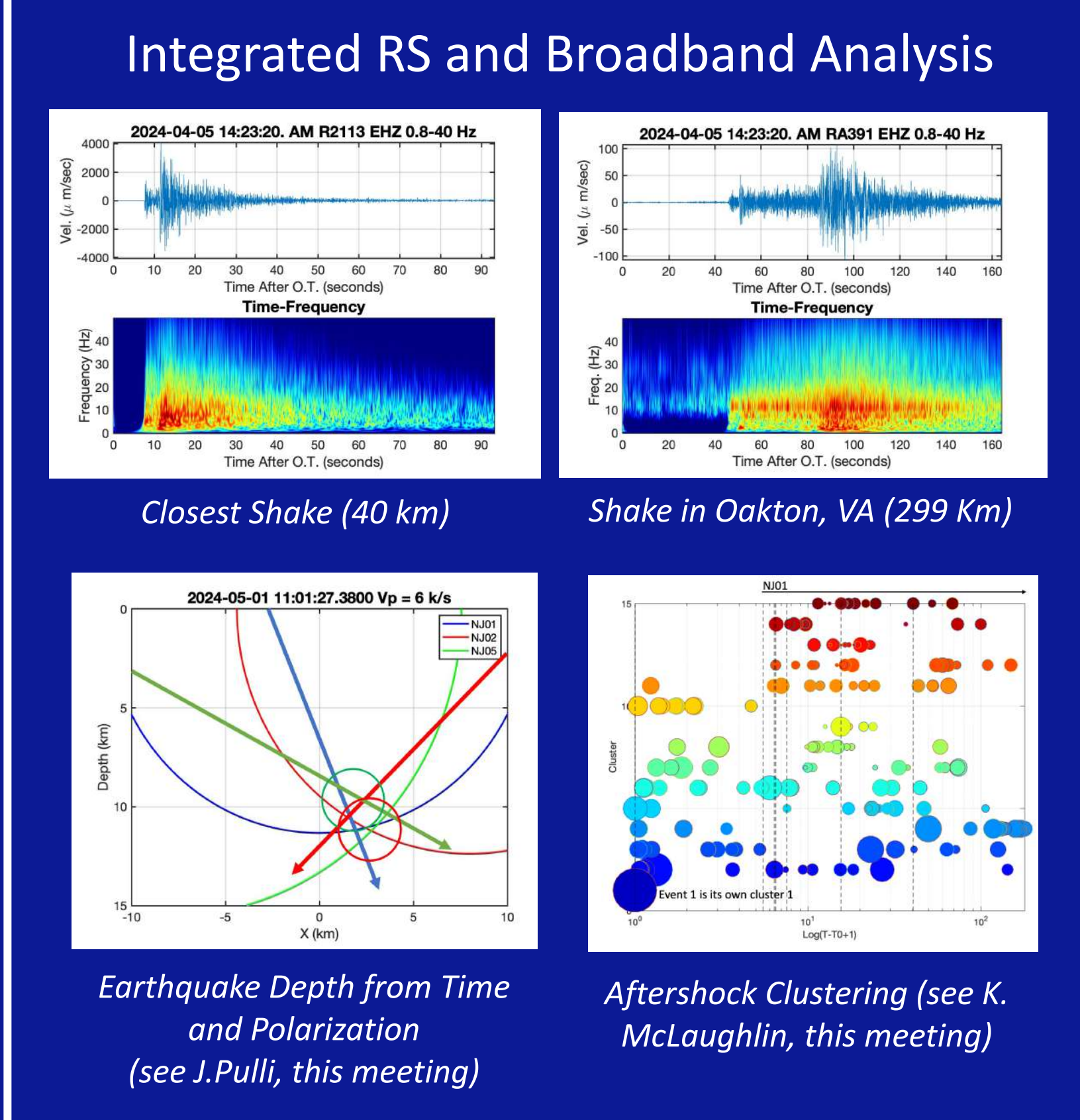
Trillium



Widely felt and in a very highly populated region, this earthquake generated concern and uncertainty among many in the region, and people wanted seismologists to tell them: "What's going on here?!"

These teachable moments present great opportunities for leveraging new developments in seismic monitoring, made possible with RS types of devices integrated with more expensive "research grade" instruments, and offer broad opportunities to further our understanding of earthquake science in new ways.

But, there is often a gap between what seismologists consider of value (and consider to be "cool" 😊) vs what people usually want to know after experiencing an earthquake.

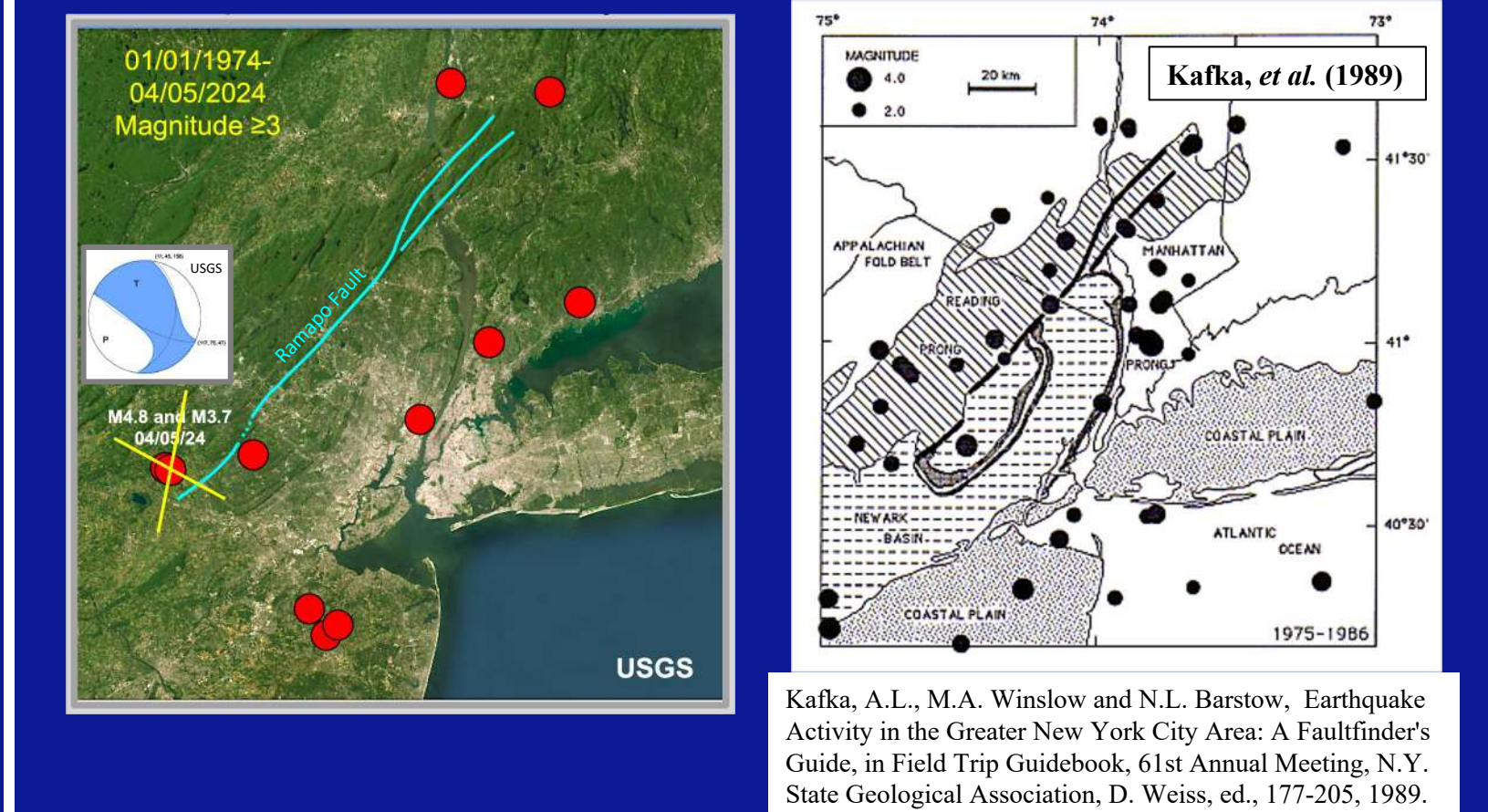


Concern and uncertainty continued in the days and weeks after the mainshock, when about 200 aftershocks were recorded and about a dozen were large enough to be felt.

- People wanted to know:**
- **Is this a sign that "the big one" is coming here?**
 - **Will the aftershocks stop?**
 - **What's with the graphics of seismograms you seismologists are posting?**
 - **And, more...**

Operating their own citizen science RS gives people direct experience with what seismologists are working on regarding monitoring and analyzing seismic data, and helps to fill that gap, **achieving a better balance of science in the service of what matters to society.**

Seismologists partnering with citizen scientists hosting RSs provides **opportunities for developing trusting relationships with communities concerned about earthquakes. But, the challenge remains for seismologists to learn how to effectively convey what we do (and don't) know** about questions of concern to citizens who experience earthquakes.



Many media reports quoted scientists saying that this April 2024 earthquake occurred in the "Ramapo Seismic Zone", but that is probably not the case: the epicenter is not on the mapped fault, the focal mechanism doesn't coincide with the fault trace (yellow lines show possible fault plane orientations), and the seismicity is too scattered to delineate a well-defined seismic zone correlated with the fault.

- Growing networks of low-cost, citizen seismographs integrated with broadband networks provide data to help answer questions people are concerned about:
- Better determination of location, depth, magnitude, and focal mechanisms (*waveform-based analysis methods*).
 - Long-term monitoring of pattern of earthquakes over space and time (*RS densification of seismic networks*).
 - Improved knowledge of relationship between earthquakes and mapped faults (*long-term monitoring augmented by low-cost seismographs*).