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GI researchers respond to a magnitude 7.1 earthquake

At 1:30 a.m. on Jan. 24, 2016, a magnitude 7.1 earthquake shook Alaskans from Juneau to Two Rivers. The Iniskin earthquake, centered 17 miles north of Augustine Volcano and directly west across Cook Inlet from Anchor Point, broke gas lines and caused fires in four homes near the town of Kenai.

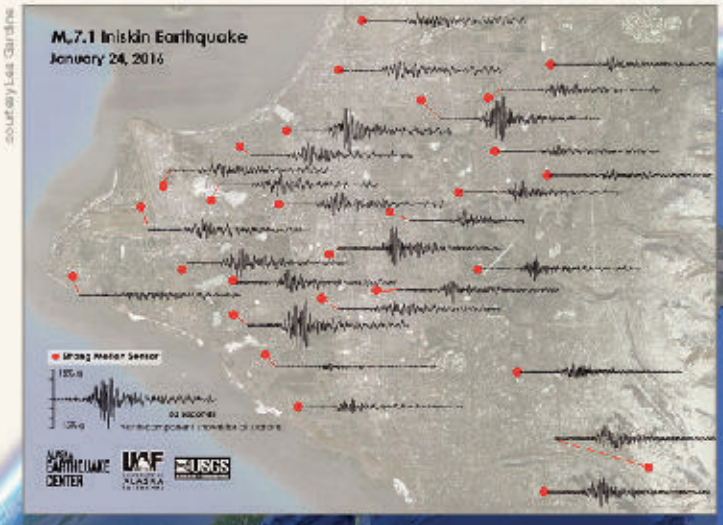
Thousands of people felt the earthquake, leading to a demand for information that often led them to the Alaska Earthquake Center. GI seismologists were the authorities in news stories and generated simulations and other products that helped explain the earthquake to non-scientists.

Reporters who sought out State Seismologist Mike West used his candid, understandable quotes in print, digital, TV and radio stories. Using the high-performance computing cluster at the GI's Research Computing Systems group, seismologist Carl Tape produced computer visualizations to show how the large bathtub of the Cook Inlet basin amplified the shaking. Field technicians including Ian Dickson and Sara Meyer explained Tape's videos and the other related products on the Alaska Earthquake Center's website and social media without using jargon. Hannah Foss and others at the GI's Digital Design Center developed an animation to help people see the Pacific Plate being stretched to the point of failure.

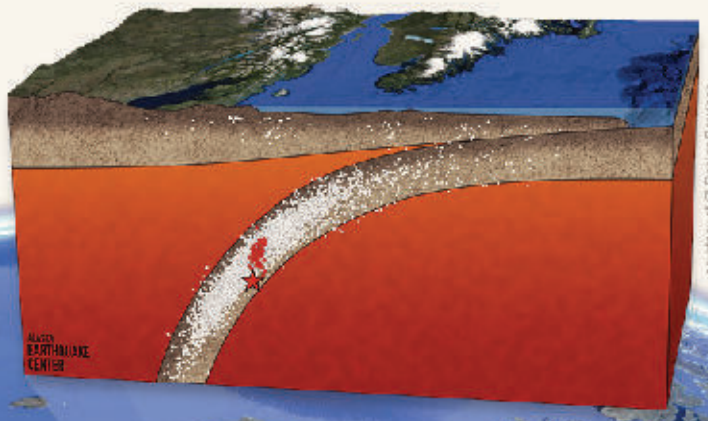
Jeff Freymueller and his group of geodesists at the GI used their instruments installed on the Kenai Peninsula to show how Homer is now 6 millimeters east of where it was before the earthquake. It was an accessible example of plate tectonics in action.

In addition to all the useful products and information they delivered, GI researchers will also soon benefit from a new network of seismometers. In summer 2015, seismologist Doug Christensen led a team in installing seismic stations in a shotgun pattern around the area of the 7.1 earthquake. Christensen and others for years wanted a line of stations directly above the boundary where the Pacific Plate is grinding beneath the North American Plate.

Christensen and others will not be able to read the recent dramatic data from the new network until they service the sites and download information this summer. They are smiling at having placed instruments right on top of one of the largest earthquakes ever to shake Cook Inlet Basin.



courtesy Lea Gardine



courtesy of GI Design Services

Above: Map of Anchorage area showing the variations in shaking across the city. Right: Cross section of Cook Inlet showing the magnitude 7.1 earthquake (red star), aftershocks (red dots) and background seismicity (white dots).

UAF UNIVERSITY OF ALASKA FAIRBANKS

Surprises in Alaska's scientific

All across Alaska and in space above us, highly sensitive networks of equipment measure things like the atmosphere, aurora, earthquakes, volcanoes, and even soil moisture. Geophysical Institute researchers use and maintain these remote sensors, but often signals show up that are beyond the project's focus.

For example, on Wednesday, Feb. 24, 2016, several people near Fairbanks reported seeing a bolide, or very bright meteor, in the sky. Researchers at Poker Flat Research Range, the Alaska Earthquake Center and the GI infrasound group looked to their data to see if they recorded anything. All three groups found evidence of the bolide.

Poker Flat researchers recorded the path of the bolide as it traveled from south to north across the sky on their all-sky camera. The main focus of the all-sky cameras is to record the aurora. Real-time all-sky coverage and archived footage can be found at optics.gi.alaska.edu/optics/, including the recording from Feb. 24.

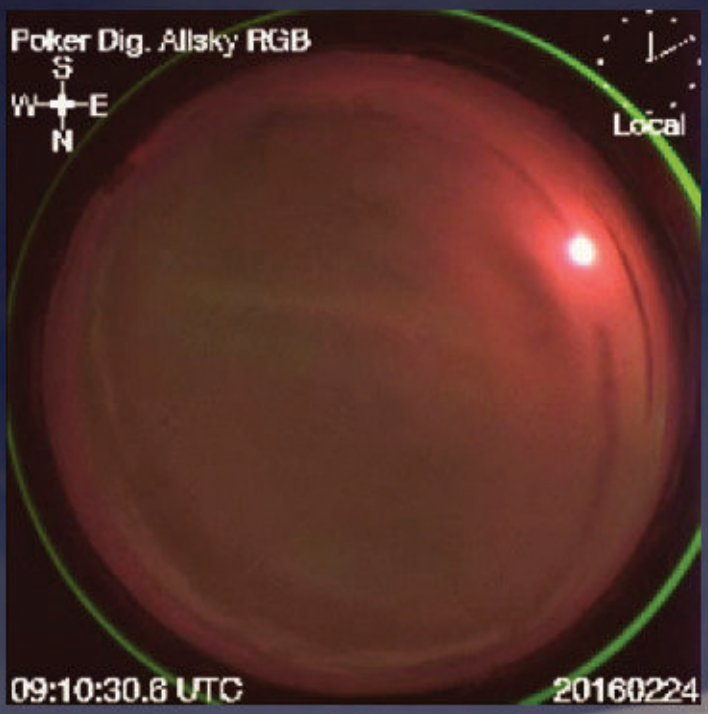
The seismic and infrasound sensors recorded signals likely related to the sonic boom of the bolide entering Earth's atmosphere. The timing of the signal arrivals at the several seismic stations along the bolide's path indicates that the source is a sound wave and not a seismic (earthquake generated) wave. The infrasound signal tells a very similar story: that the bolide entered the atmosphere over southern Alaska and traveled north across the state.

Seismic and infrasound sensors often detect signals outside of their focus. Seismometers record anything that causes vibration in the Earth, including landslides, glacial calving, and man-made signals like mine blasts and nuclear bomb testing. Infrasound sensors detect signals from similar causes but record the perturbation to the atmosphere as opposed to vibration in the Earth.

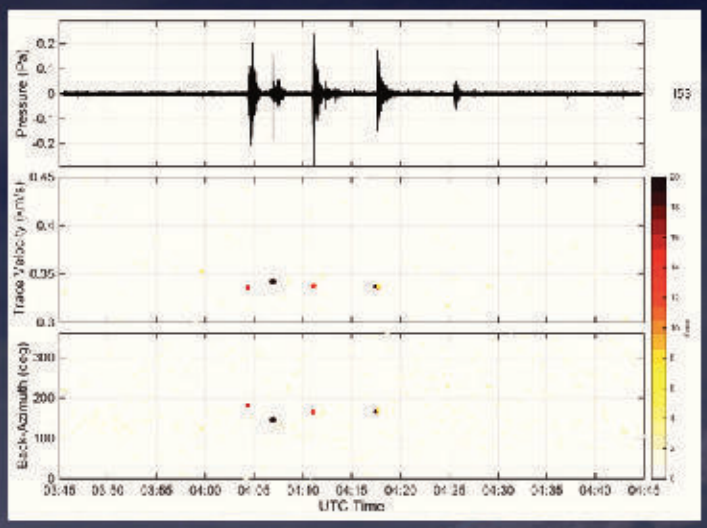
These are not the only networks that routinely record additional signals. The SuperDARN array, a network of continuously operating radars used to study high-latitude structures in the ionosphere, often records signals generated by both man-made and naturally occurring sources. Meteor trails, waves on the ocean and signals produced from the High Frequency Active Auroral Research Program all can show up in SuperDARN data.

This is the nature of collaborative scientific research, and the power of multifaceted research facilities like the GI. Researchers from other disciplines can often find new insights into their project focus from data collected passively by other researchers and monitoring networks.

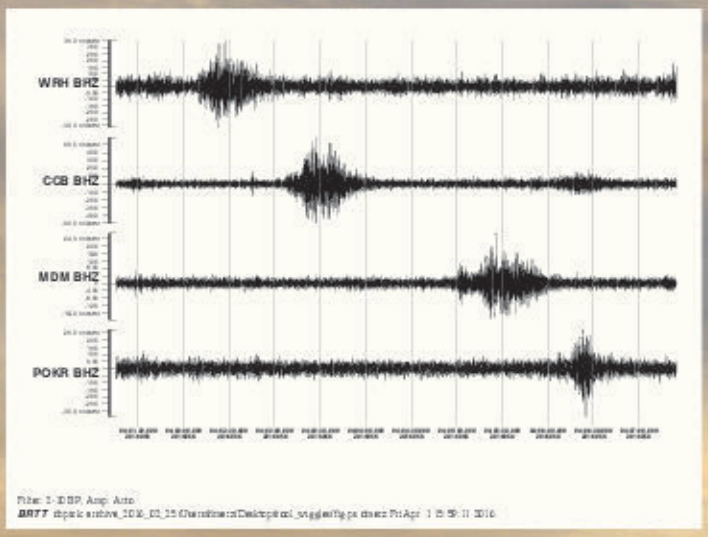
Meteor photo taken Oct. 20, 2012, courtesy Witold Krasowski, Dreamstime.com



ALL-SKY—A bolide appears as a bright spot on the Feb. 24, 2016, recording from an all-sky camera located at Poker Flat.



SIGNALS—Infrasound recordings from the Fairbanks array of the bolide. Courtesy of David Fee.



SHAKING—Bolide recordings on seismic sensors in Interior Alaska. Courtesy of Dana Merz, Alaska Earthquake Center.

SENSORS—Seismic stations that recorded the bolide signal. Courtesy of Dana Merz, Alaska Earthquake Center.

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Ice roads: there's an app for that

Alaska's natural resource managers are using a web application developed at the GI to let oil field companies know when it's safe to build ice roads on the North Slope without damaging the fragile tundra.

Managers at the Alaska Department of Natural Resources' Division of Mining, Land and Water contacted Dayne Broderson and his team at GI's Geographic Information Network of Alaska to ask for help.

GINA staff built a web app that conveys information about the soil temperature, snow depth and snow density data to permittees and the public. DNR managers use the app to post their analysis of the data; the results are displayed immediately in an online map.

"The North Slope contractors can quickly and easily grasp what areas are open and what's closed," said Melissa Head, a DNR natural resources manager.

"Making our services available for practical applications like this is taking advantage of (the university's) ability to serve the state," Broderson said.

"GINA has played a big part in improving our ability to disseminate information to the public and industry," Melissa Head stated.

The Tundra Travel Network website is http://ttn.gina.alaska.edu/.