QUAKEFINDER NEWS

Fourth Quarter 2007

A FEW WORDS FROM THE PRESIDENT

The final months of 2007 were filled with some excitement at QuakeFinder. While most dread a large earthquake, we were energized when one of our best instruments, located 2 km of a M5.6 quake at Alum Rock, Ca. detected pre-quake pulse activity. In December, we ended the year submitting presentations at the Fall Meeting of the American Geophysical Union.

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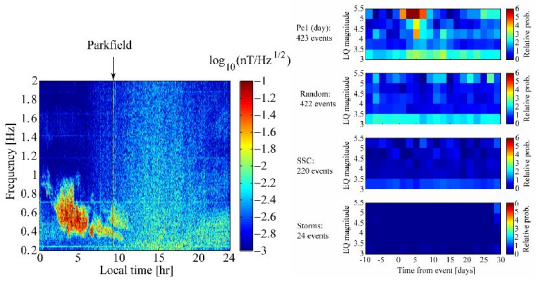
American Geophysical Union (AGU) Mtg.

Dr. Jacob Bortnik presented a paper, "The Possible Statistical Relation of Pc1 pulsations to Earthquake occurrence at low latitudes". This study used 8+ years of ULF data from the Berkeley ULF site at Parkfield, and showed that Pc1 pulsations, although thought to be caused by solar interactions with the magnetosphere and mostly appearing in the nighttime, appeared to show up 4-5 times more frequently, especially in the daytime, 4-14 days prior to the earthquake. For example, there was a huge Pc1 from 2 AM to 11 AM on the day of the quake (M6.0 @ 9:15 AM).



The question exists, "Is there some change to the ionosphere above the quake area that allows Pc1's to penetrate easier, and therefore represent a tool for quake forecasting?"

Clark Dunson presented a poster, "ULF Pc3-4 Pulsations and their Parameters in the California Region as Measured with a Network of Search Coil Magnetometers" in which he showed that solar-generated Pc3-4 pulsations can be observed simultaneously across the entire network, and that this band is especially "clean" in terms of sensing local noise. The significance is that any additional noise in that band, possibly caused by nearby quakes, can be clearly seen by comparison with the other reference stations in CalMagNet. This allows us to compare multiple stations in that band, and to use common mode noise rejection algorithms in the future to eliminate solar noise (Pc3-4's), and to identify site-unique noise (such as earthquakes).

Oct. 30 Alum Rock M5.6 Quake Analysis

We were extremely lucky in having one of our best instruments located about 2 km from the Oct. 30 M5.6 Alum Rock earthquake. The quake size was "medium" as earthquakes go, but we were close to it. Our East Milpitas instrument did not show the expected large ULF (0.01 Hz) signals prior to the quake, but it did indicate a pattern of very large impulses, greater than our calibration signals at 8 nT (huge). We compared the pulses to another site 38 km away in Portola Valley, and the pulses were not present (therefore they were not solar generated and worldwide). Many of the pulses occurred during the 1 AM to 3 AM period when BART trains are off (can't be BART). We checked with the National Ignition Facility (NIF) in Livermore (32 km away) and found that the shot times did not match up with these pulses. We did a systematic measurement of equipment near the site (cars passing by, water pumps, welders, heavy motors, etc) and could not generate any "equipment fingerprints" greater than 10% of the pulses we observed. The signals started about 14 days before the quake, and reduced to normal levels about 7 days after the quake. The "direction of arrival" of the pulses as calculated by using the 3-axis magnetometer was very close to the epicenter (N.E of our instrument). We are really intrigued and cautious, so we will be performing more analyses to see if these signals are really unique to the quake.