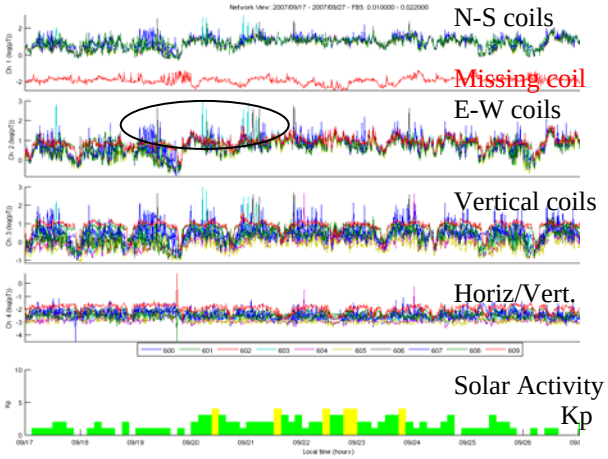
Third Quarter 2007

A FEW WORDS FROM THE PRESIDENT

Data, data, everywhere. How do we interpret them?

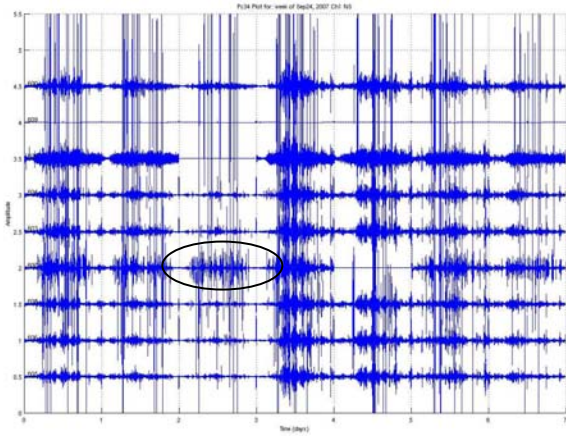
This quarter we have been systematically processing data from our newest sensors (QF-1005's) and devising techniques to extract small signals from a sea of magnetic noise. One of the really cool things about having a network of magnetometers is that you can compare them. For example, we found that we can "remember" how each site behaves relative to time of day, time of year, state of the sun (solar storms), and site locations. We then plotted all these readings, organized by frequency band, on the same weekly axis (see below), and overlaid the historical "limits" of the data (red lines) at 25 and 75% quartiles. Anytime the data exceeds these limits---it means that the site is "excited" by something, and it stands out relative to the other sites (see ellipse below)

7 day ULF magnetic noise, all QF-1005 sites overlaid



We can then separate the sites in the same ultra low frequency band (the band that appeared in the Loma Prieta quake in 1989 near San Francisco), and see what appears. This type of plot is shown in the next column. The blue "active" periods demonstrate pulsations in the ionosphere (Pc3/Pc4's) and can be seen across all the sites, from the most northern sites at the top (Honeydew, Ca.) to the lowest site near the Mexican border (Julian, Ca.) at the bottom. Since the pulsation signals are global, all the sites can see them simultaneously (we disregard them). However, sometimes, there are site-specific "bursts" of energy (see the plot, and ellipse in next column). In this case the burst disappeared within one day, so it is not a concern. Similar signals were observed, but for 14 days, before the Loma Prieta quake.

PC3/Pc4 magnetic noise seen across the State



NEW QF INSTRUMENTS: QF-1007

The Engineering Model's first three circuit boards and ANT4 magnetometers have been fabricated and are undergoing tests now. The custom Linux operating system and 24 bit data acquisition software have been written and are in subsystem test. The 16 bit analog-to-digital converter and communication software will be underway shortly, and then will be integrated. Mechanical parts (enclosures, posts, brackets, and cables are almost complete), as well as computers, communication subsystems, and power subsystems have all been received, and are ready for integration. Statewide site locations for these 5 new units have been tentatively identified, and we are coordinating these locations with other sites being built by a Stanford/USGS team. This new collaboration is exciting because we will have similar equipment, but with different designs, so we can compare future earthquake signals detected using totally different instrument designs. This should enhance the credibility of the earthquake/electromagnetic event.

The team is also preparing for the Fall AGU Conference in San Francisco where the world's latest EM research will be presented in December.

Tom Bleier, President

tbleier@quakefinder.com