

Stress-Activated Positive Hole Charge Carriers

When Battery Circuit Closes

we can expect to see

Large Currents – Strong EM Signals

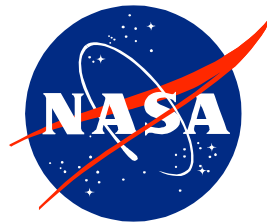
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SETI INSTITUTE

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Physics Department

How do we understand pre-EQ EM signals?

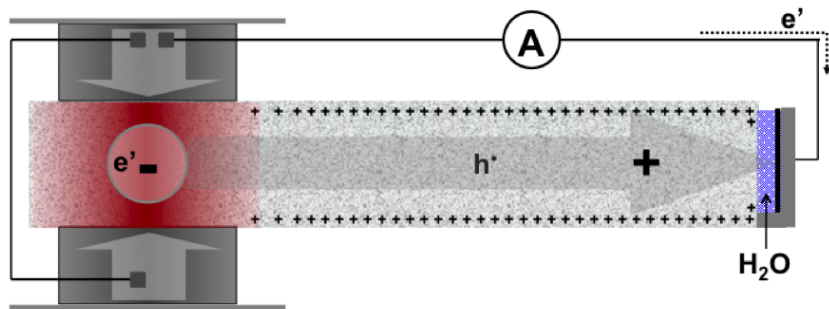


Figure 9a: Basic set-up to demonstrate that stress-activated h^\cdot currents can flow into water and close the battery circuit.

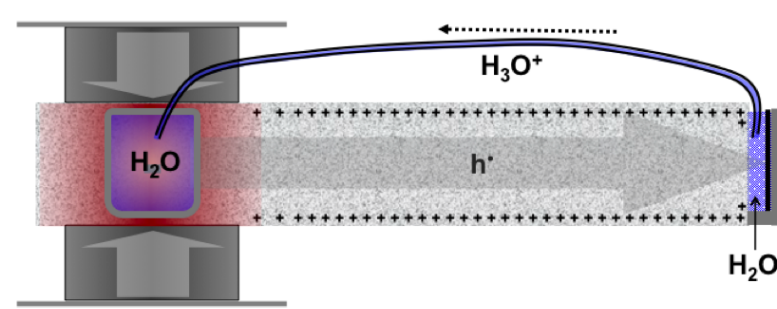
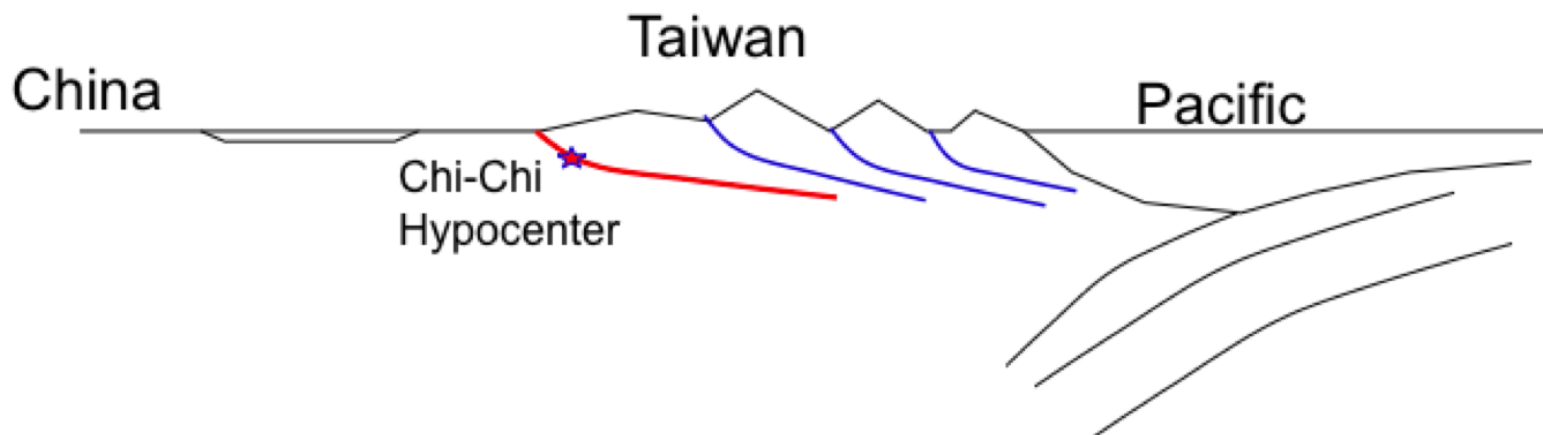
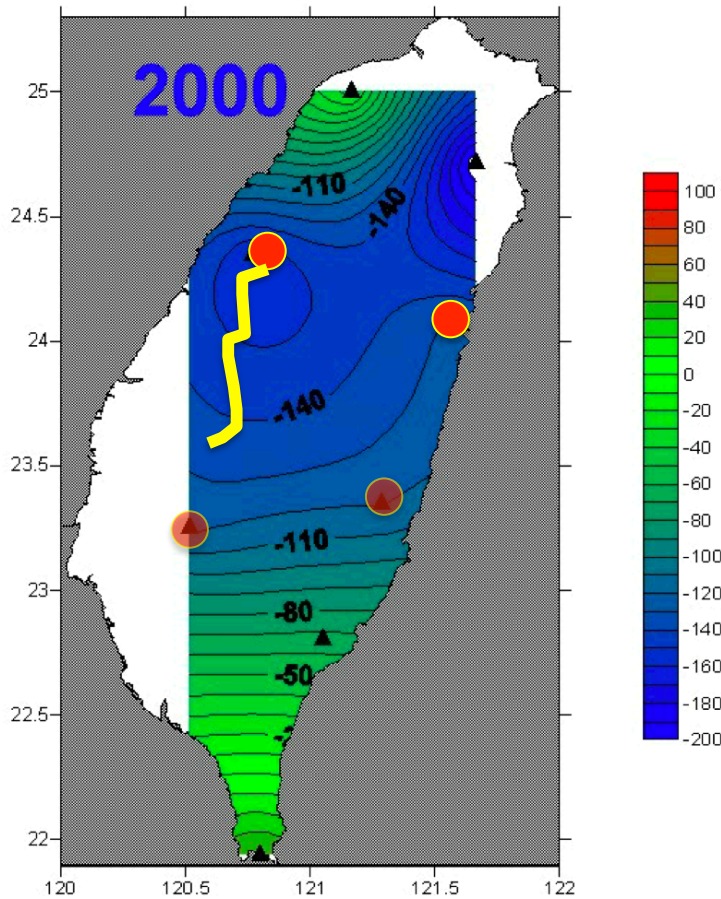


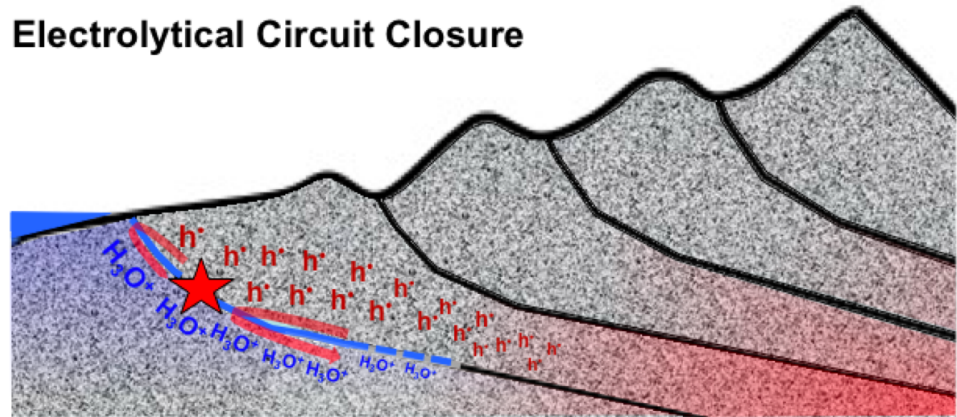
Figure 9b: Demonstration of a rock battery where the circuit closure is achieved through the electrolytical conductivity of water.

Tectonic Setting Chi-Chi Earthquake Taiwan (schematic)





Electrolytical Circuit Closure



*Total magnetic field anomaly
across Taiwan for 2000 relative
to the linear extrapolation of the
long-term trend predicted by the
IGRF model
(after [Chen et al., 2004b; Yen, 2004]).*

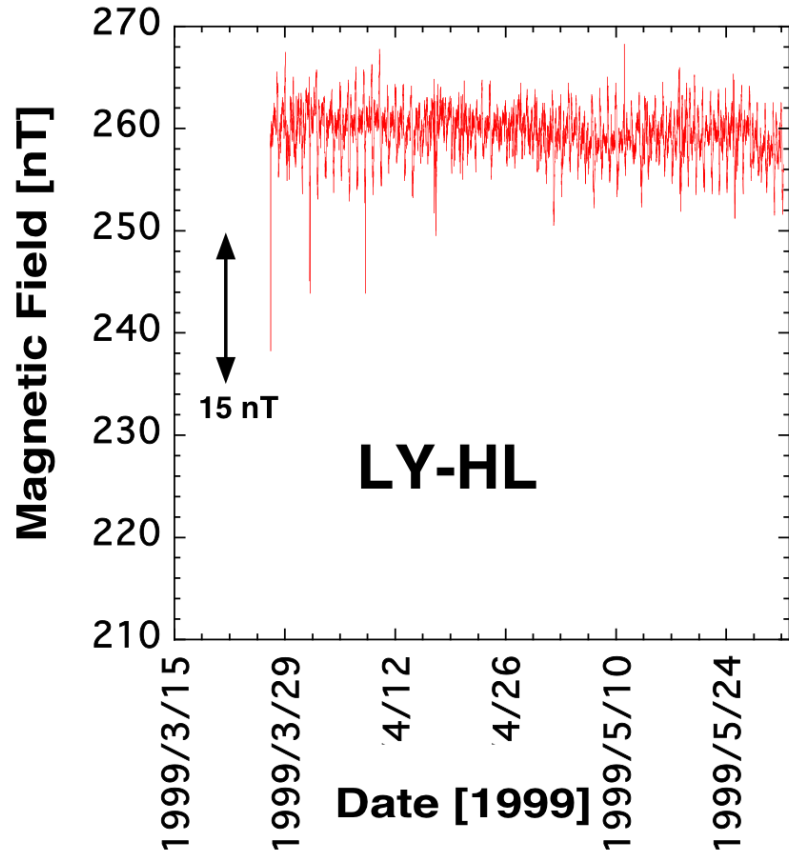


Figure 14a: Small magnetic field residuals obtained from the difference of magnetic data recorded at the LY station minus those of the HL station over 2 months in early 1999.

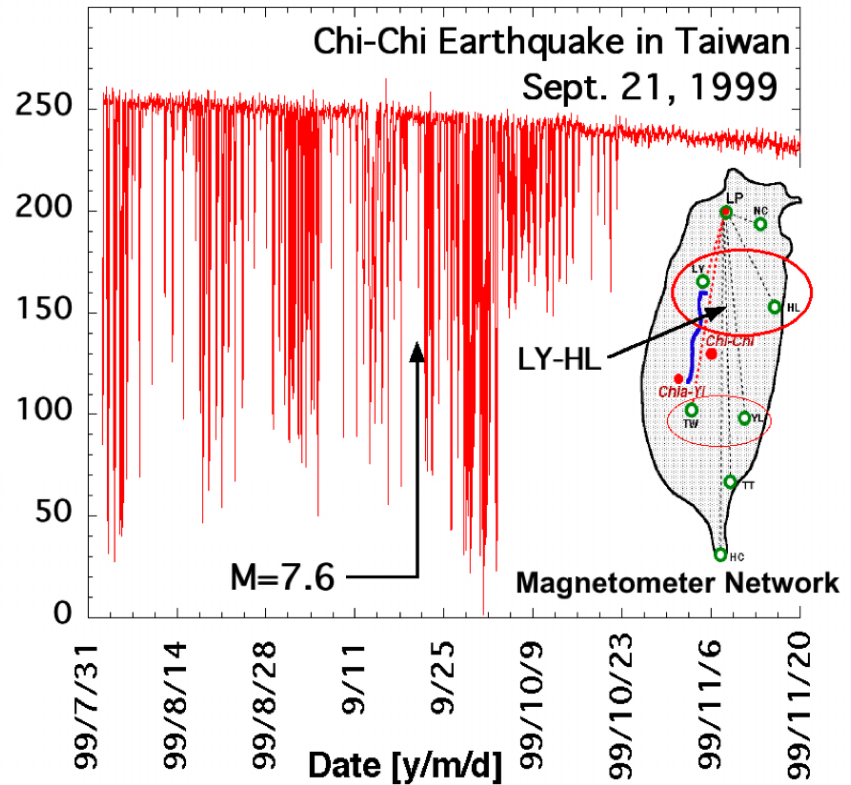


Figure 14b: Large magnetic field residuals seen in the data from the LY minus HL station data for the period from Aug. 01, 1999 to Nov. 20, 1999.

**Magnetic Field Signals: LY-HL, LY-YL, LY-TT
Fourier Transform**

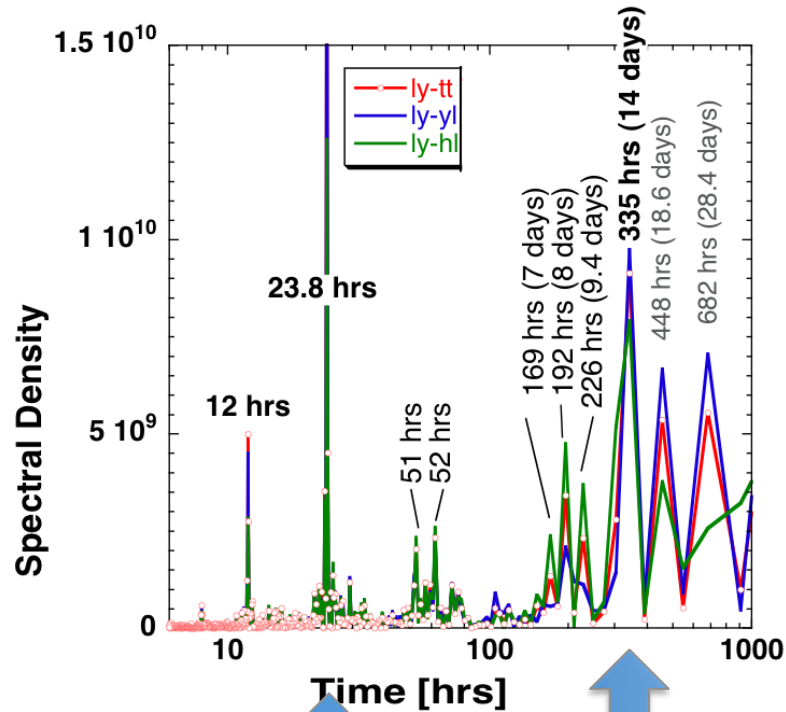
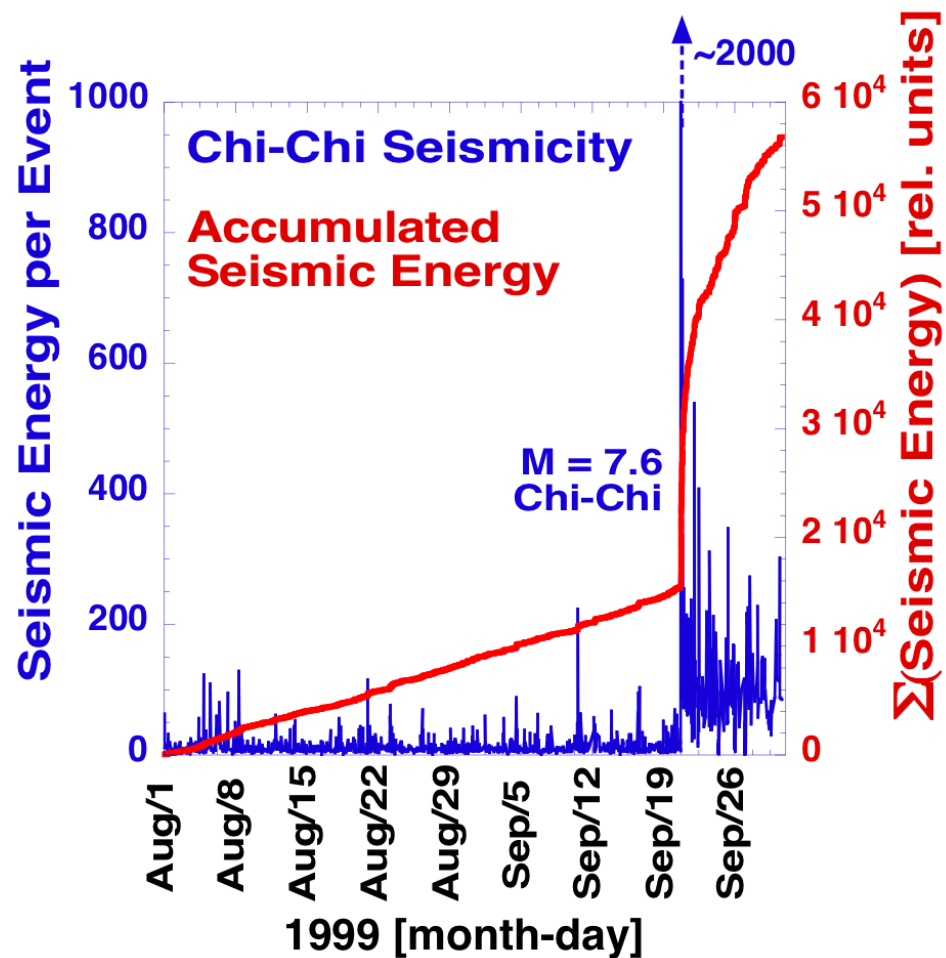
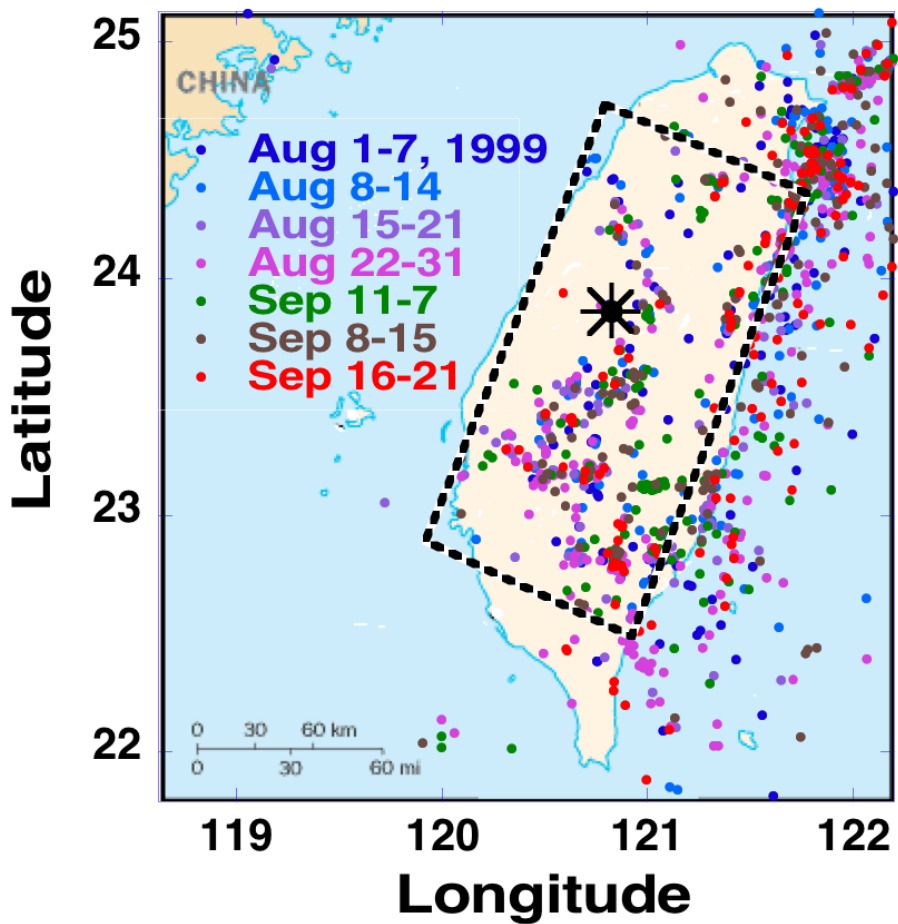


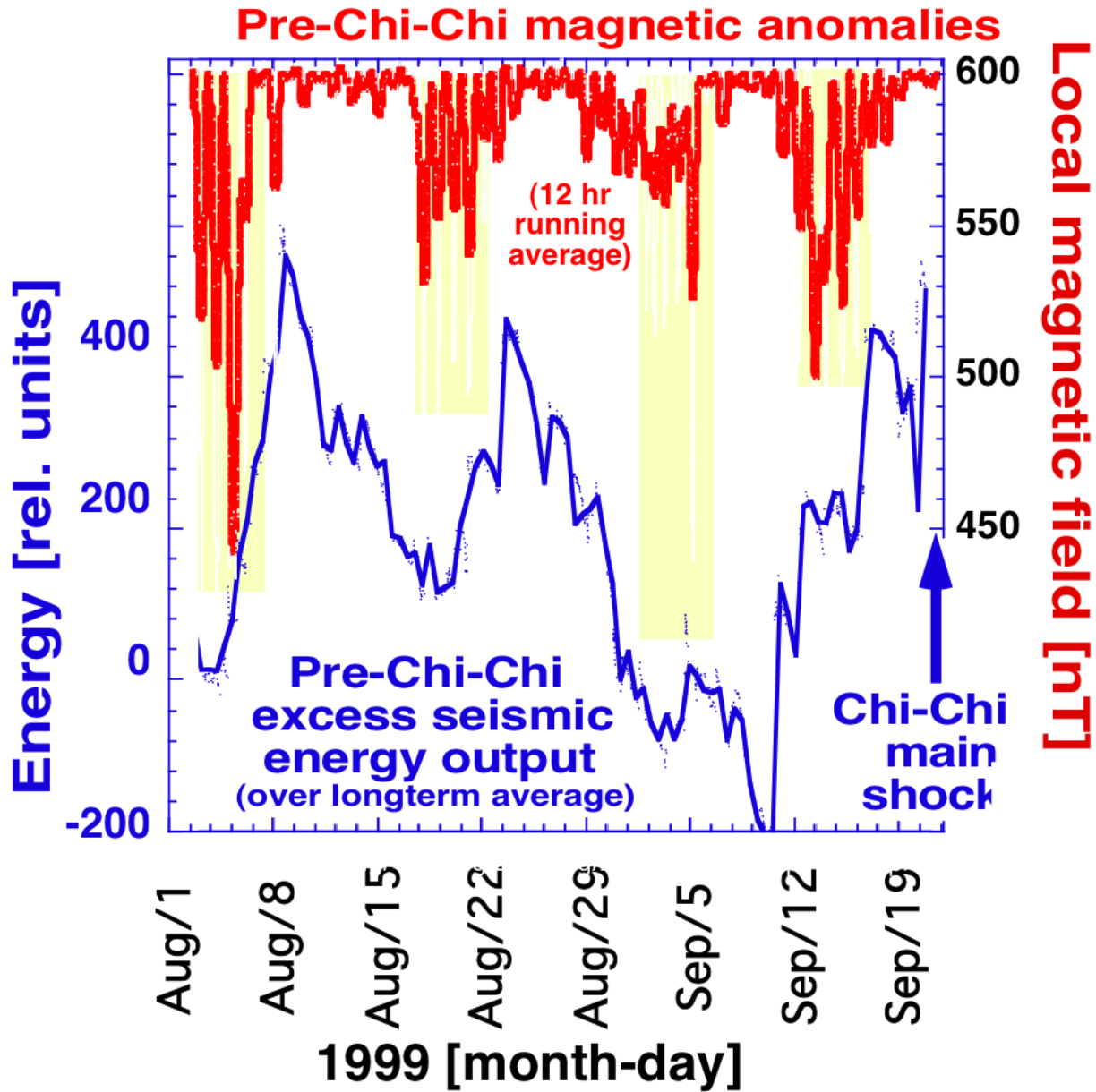
Figure 17: Spectral density of the ULF signals before the Chi-Chi main shock from a Fourier Transform as derived from the LY-HL, LY-YL, and LY-TT station data. The 7-week record is not long enough to provide accurate positions for the FT maxima, but the general pattern observed indicates strong control by the Earth tides.



Tidal Signature

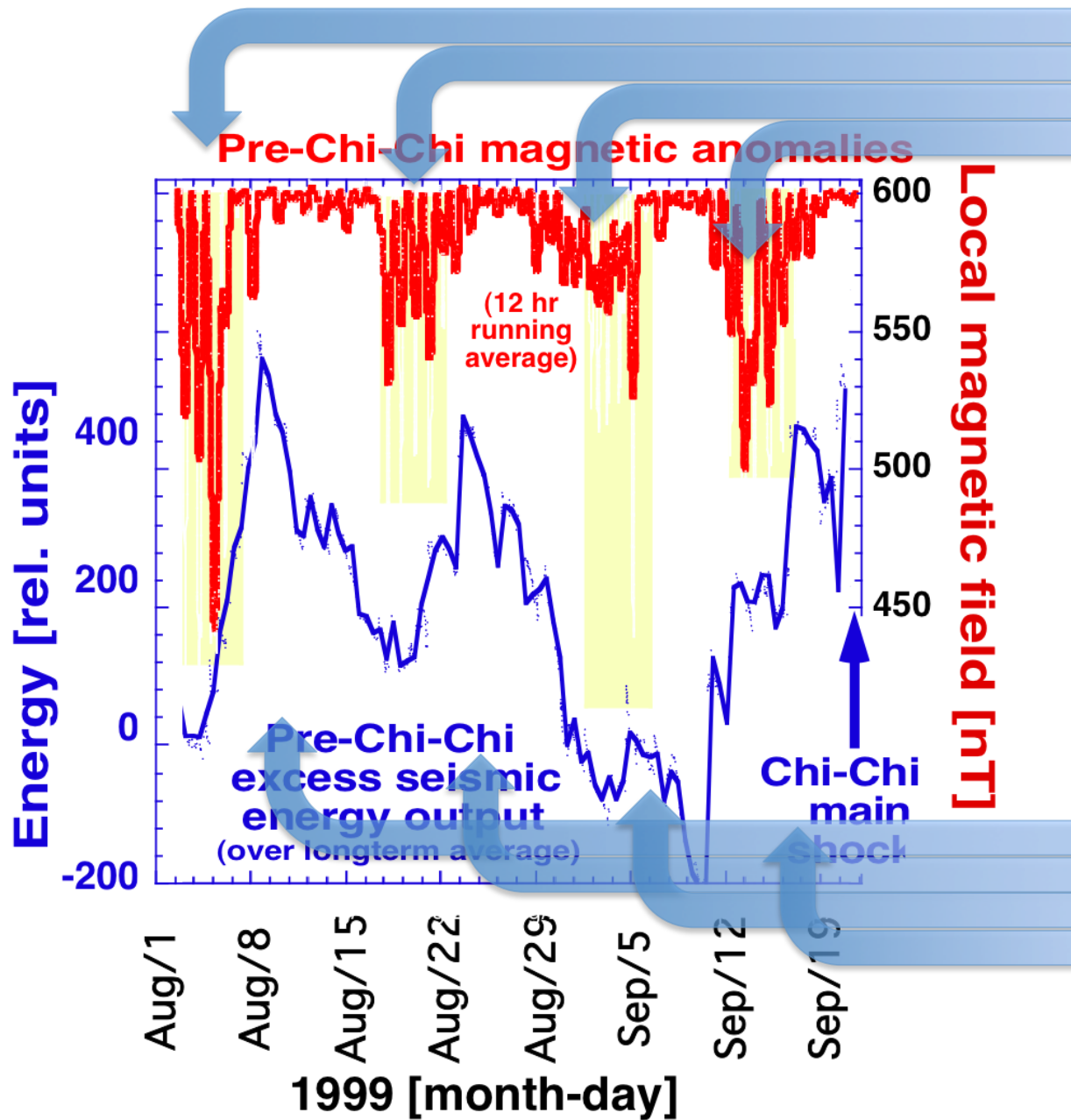
pre-Chi-Chi Seismicity Aug 1-Sep 21, 1999





Excess seismic energy release over the long-term average (blue) and ULF signals recorded at the LY station (red) showing a correlation with the Earth tides.

Yellow bands highlight the ULF maxima.



If and when strong currents flow, strong EM signals will be emitted.

Pre-EQ signals before Chi-Chi are strongest when the regional microseismicity increases, indicating increasing regional stress.