Comments on Ground Motion Requirements.

Paul Lebrun
Fermilab

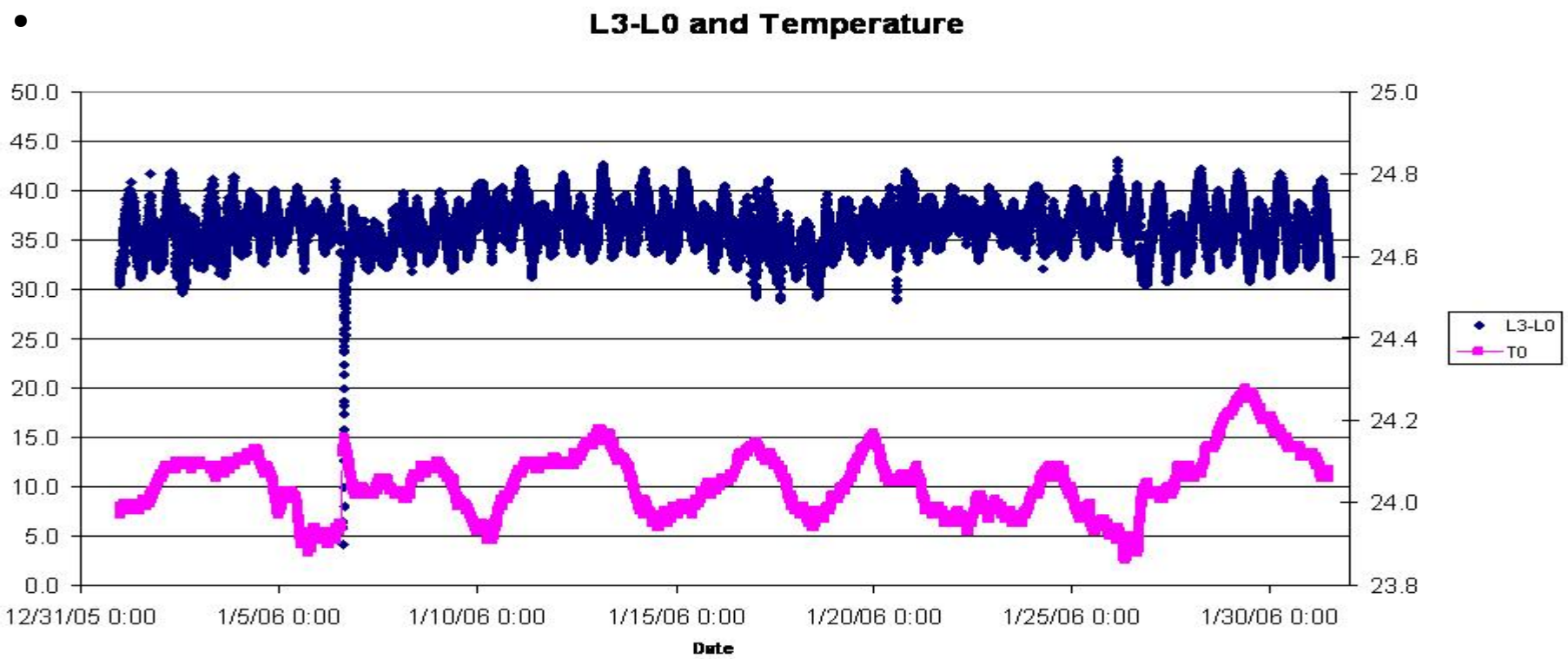
Scope..

- At the Fermilab ALCPG'2007, Kubo-San suggested that, perhaps, the existing Ground Motion models are O.K. Simply adjust parameters, site dependent.
- Here is a crude attempt at quantifying loss of precision..

ATL Model Limitations

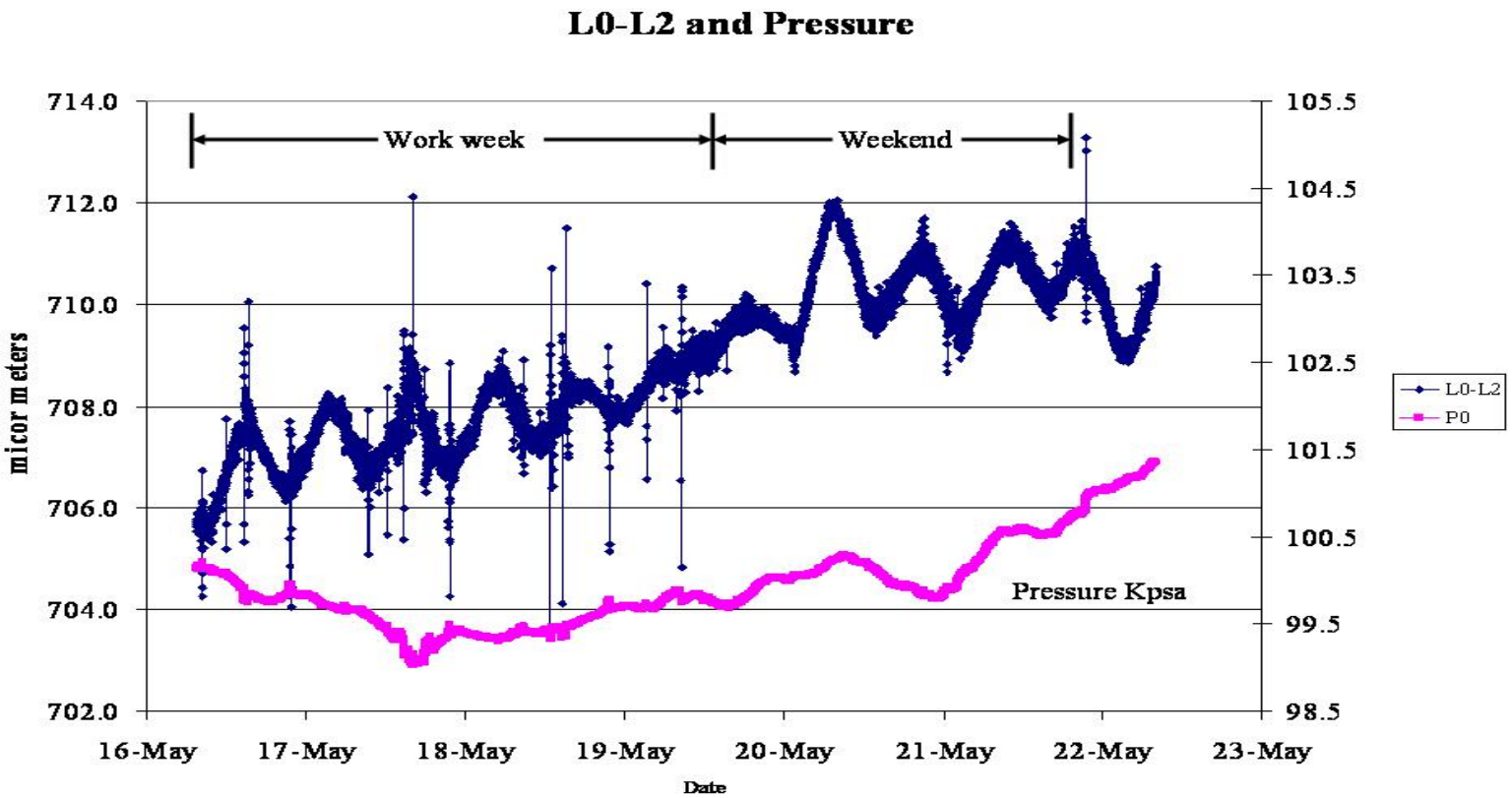
- Difficulty in extracting parameters for motion at time scale of ~ one minute, deltas of fraction of one micron over a distance of ~ 100m. Is this truly a stochastic process, with parameters constant in times? Guess so, but I don't know enough about geology to tell.. But, Critical for us!
- Tides: Obviously non-stochastics! Known to affect accelerators at LEP and SLAC. Really there, see next slide.
- Water table motion **not constant** for Fermilab site.. There will be bad days after heavy rainfall.
- Interference between cultural noise and “natural noise”

Fermilab Data, NuMi + LaFarge Mine

- Water level data: From Jim's Volk *et al,* http://beamdocs.fnal.gov/AD-public/DocDB/ShowDocument?docid=2532
- 

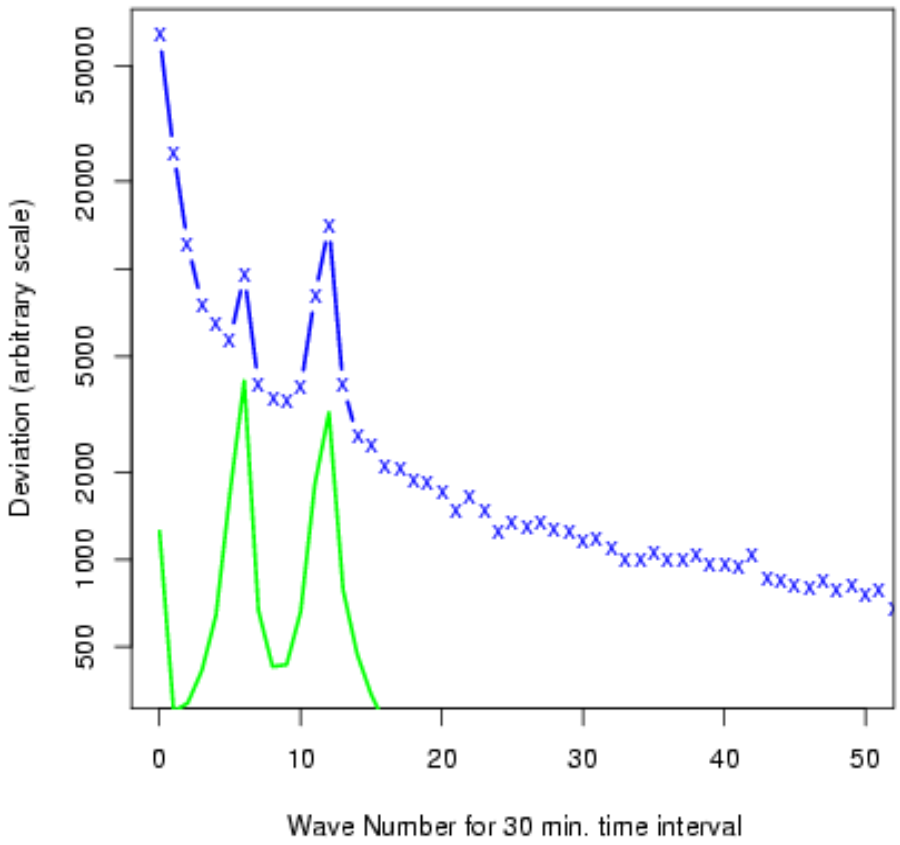
Quiet.. until Sump pump gets turned on... Not clear what the recovery times is..

Other Cultural Noise: Exploitation of Dolomite, LaFarge Mine



Clearly not stochastics.. Good news : explosions not seen at the NuMI site

Tides:



Simple Fourier transform of difference of water levels over ~100 meters. Over many weaks.. This is the only feature in the frequency spectra. Shown in Blue is data, in green a straightforward simulation of tides, abitrary amplitude. (!but not frequency, took an established Tide calculation program).

At ~12 hours period (~ one shift !), dominant amplitude is far from stochastic !

Assuming that the water level reflect correctly the gound motion, of course...

Conclusions

- Interesting Analysis to do...
  - Worth doing ? Only if we have a better idea on the time scale of tuning/re-tuning the LET systems..
- Not sure what the priority for this effort really is..