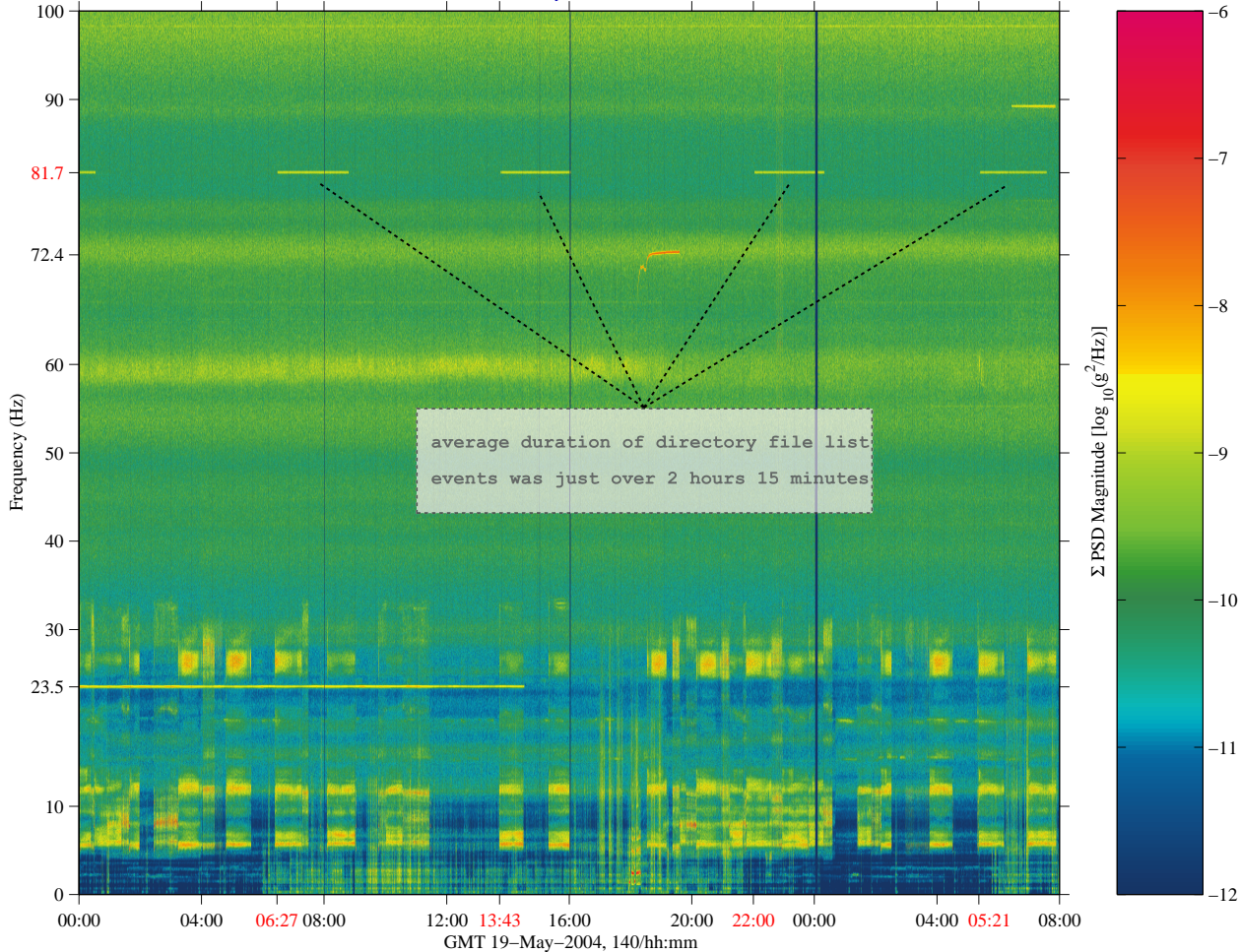


# EXPRESS Memory Unit (EMU) Directory File List Downlink Qualify

mams, hirap at LAB1O2, ER1, Lockers 3,4:[138.68 -16.18 142.35]  
 1000.00 sa/sec (100.00 Hz)  
 $\Delta f = 0.122$  Hz, Nfft = 8192  
 Temp. Res. = 8.192 sec, No = 0

ER1 "EMU Directory List File" Events (E1\_EMU\_FILE\_LIST\_REQ)

Start GMT 19-May-2004, 140/00:00:00



Data Description	
Sensor	HiRAP 1000 sa/sec (100 Hz)
Location	LAB1O2, ER1, Lockers 3,4
Inc/Flight	
Plot Type	Spectrogram

### Notes:

Observation of HiRAP measurements soon after commands were sent by the Payload Rack Officer (PRO) to the EXPRESS Memory Unit (EMU) of EXPRESS rack 1 (ER1) requesting directory file list downlink\* showed strong correlation between start of a narrowband 81.7 Hz disturbance and initiation of this command. Some information gathered by a PRO on the suspected computer hard drive – “The IBM 760XD [laptop] ... specifications from [multiple] vendors on this hard drive ... had 4900 RPM for the speed of the spindle.” – also shows that the rotational rate is precisely 81⅓ Hz. This rate is within the frequency resolution of the candidate 81.7 Hz. Furthermore, no fewer than 9 instances between GMT 18-May-2004 and 20-May-2004, showed this same correlation. The 3 instances noted in the spectrogram show start of the 81.7 Hz signal at these Flight System Verifiers (FSV) GMTs:

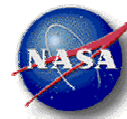
GMT
2004:140:06:27:42
2004:140:13:43:36
2004:140:22:00:40
2004:141:05:21:49

\* This correlation was only observed for ER1 (E1\_EMU\_FILE\_LIST\_REQ) despite checking corresponding commands for other EXPRESS racks (HiRAP is in ER1).

Regime:	Vibratory
Category:	Vehicle
Source:	EXPRESS Memory Unit (EMU) Directory File List Downlink



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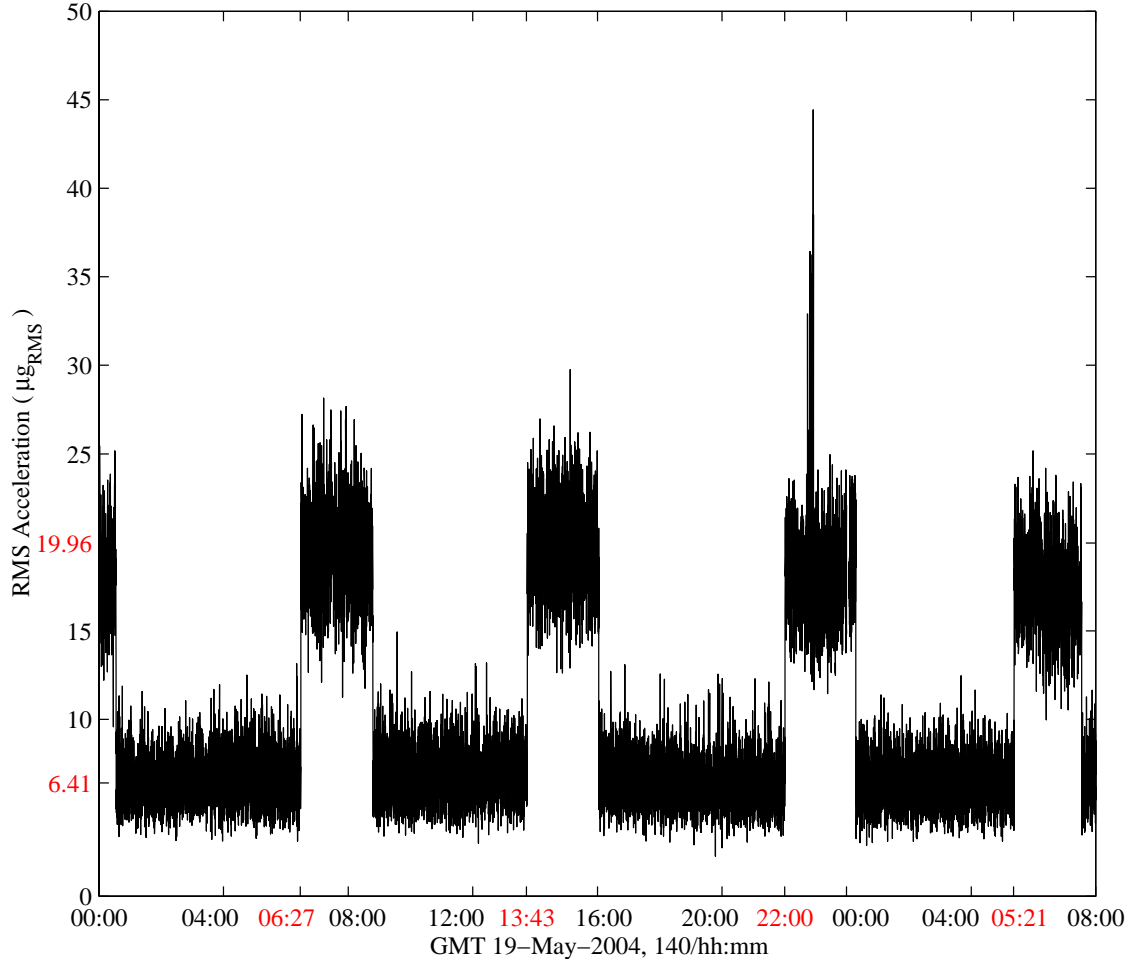
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# EXPRESS Memory Unit (EMU) Directory File List Downlink Quantify

mams, hirap at LAB102, ER1, Lockers 3,4:[138.68 -16.18 142.35]  
1000.00 sa/sec (100.00 Hz)  
 $\Delta f = 0.122$  Hz, Nfft = 8192  
Temp. Res. = 8.192 sec, No = 0

ER1 "EMU Directory List File" Events, 81.4 < f < 81.9 Hz  
Start GMT 19-May-2004, 140/00:00:00

sum  
Hanning, k = 13950  
Span = 32.00 hours



Data Description	
Sensor	HiRAP 1000 sa/sec (100 Hz)
Location	LAB102, ER1, Lockers 3,4
Inc/Flight	
Plot Type	Interval RMS

### Notes:

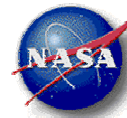
Comparing RMS levels when the 81.7 Hz source (presumably the IBM 760 laptop hard drive in ER1) was operating during downlink to RMS levels when it was not, we see from the table below that the vibratory spectrum from 81.4 to 81.9 Hz was elevated by more than a factor of 3. That is, the "E1\_EMU\_FILE\_LIST\_REQ" command sent by the PRO for directory file list downlink coincides with the narrowband 81.7 Hz (4900 RPM) vibration measured by HiRAP.

During Downlink	Median (µg <sub>RMS</sub> )
NO	6.41
YES	19.96

This correlation has not yet been independently verified, but the preponderance of evidence so far suggests that HiRAP consistently measures start of 81.7 Hz vibration whenever the ER1 directory file list downlink (E1\_EMU\_FILE\_LIST\_REQ) is sent and lasting for about 2 hours and 15 minutes or so.



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Regime:	Vibratory
Category:	Vehicle
Source:	EXPRESS Memory Unit (EMU) Directory File List Downlink