

Appendix C: SAMS Time Histories and Color Spectrograms TSH B

The Principal Investigator Microgravity Services (PIMS) group has further processed SAMS data to produce the plots shown here. This appendix presents power spectral density versus frequency versus time (spectrogram) plots of SAMS TSH A ($f_c=100$ Hz) data.

Color spectrograms are used to show how the microgravity environment varies in intensity with respect to time and frequency. These spectrograms are provided as an overview of the frequency characteristics of the SAMS data. Each spectrogram is a composite of 6 hour's worth of data. The time resolution used to compute the spectrograms seen here is 16.384 seconds. This corresponds to a frequency resolution of 0.0610 Hz.

These data were collected at 500 samples per second, and a 100 Hz lowpass filter was applied to the data by the SAMS unit prior to digitization. Prior to plot production, the raw SAMS data were compensated for gain changes, and then de-meant. De-meaning was accomplished by analyzing individual sections with a nominal length of 30 minutes. Since this de-meaning operation operates on time periods longer than the plot's time resolution, an artificial dc component may be seen in the extreme lower frequency regime of these spectrograms. Since these are data processing artifacts, the low frequency regime ($f < 0.05$ Hz) should be ignored. Users who are interested in further details for either of these operations are encouraged to contact the PIMS group.

Power Spectral Density versus Frequency versus Time Calculations

In order to produce the spectrogram image, Power Spectral Densities were computed for successive time intervals (the length of the interval is equal to the time resolution). For the PSD computation, a Hanning window was applied. In order to combine all three axes into a single plot to show an overall level, a Vector-Magnitude (VM) operation was performed. Stated mathematically:

$$VM_k = \sqrt{PSD_{x_k}^2 + PSD_{y_k}^2 + PSD_{z_k}^2} .$$

By imaging the base 10 logarithm (\log_{10}) magnitude as a color and stacking successive PSDs from left to right, variations of acceleration magnitude and frequency are shown as a function of time. Colors are assigned to discrete magnitude ranges, so that there are 64 colors assigned to the entire range of magnitudes shown.

The colorbar limits are chosen in order to maximize the data value and visibility in a given set of spectrogram plots. Data which fall outside of these limits will be imaged as either the highest or lowest magnitude, depending on which side they have saturated. For this report, less than 1% of the total points lie below the lower limit, and less than 1% of the total points lie above the upper limit. If an area of interest seems to be saturated, care should be taken in that the actual values may lie above or below the color mapping shown on the plot.

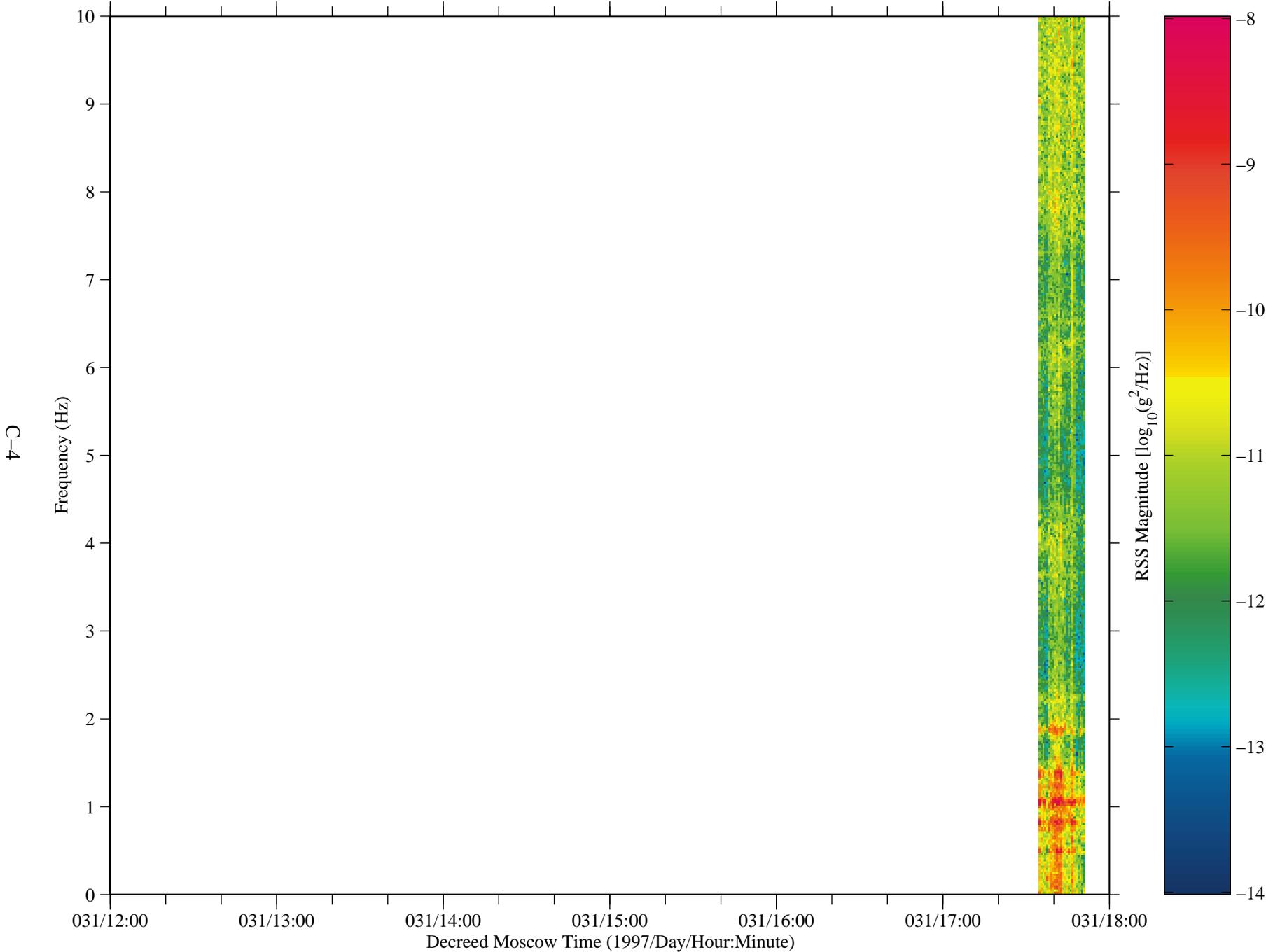
Due to the nature of spectrograms, care should be taken to not merely read a color's numeric value as being the acceleration magnitude that is present at a given frequency. In order to get this type of information, the PSDs must be integrated between two frequencies. These frequencies (lower and upper) form the band of interest. The result of this integration is the g_{RMS} acceleration level in the $[f_{\text{lower}}, f_{\text{upper}}]$ band. The PIMS group is able to provide this type of analysis on a per-request basis.

Plot gaps (if any exist) are shown by either white or dark blue areas on the page. Care should be taken to not mistake a plot gap (represented by a blue vertical band) with a quiet period. If a plot gap exists for an entire plot (or series of successive plots), a comment is placed on the page to let the user know there is a gap in the data. These "No data are available" comments will not show exact times for which the data are not available, but will only indicate missing plots.

Contacting PIMS

To request additional analysis or information, users are encouraged to send an e-mail to pims@lerc.nasa.gov, or FAX a request to (216) 433-8660.

Figure 1: SAMS data from Mir, TSH B (fc=10 Hz)

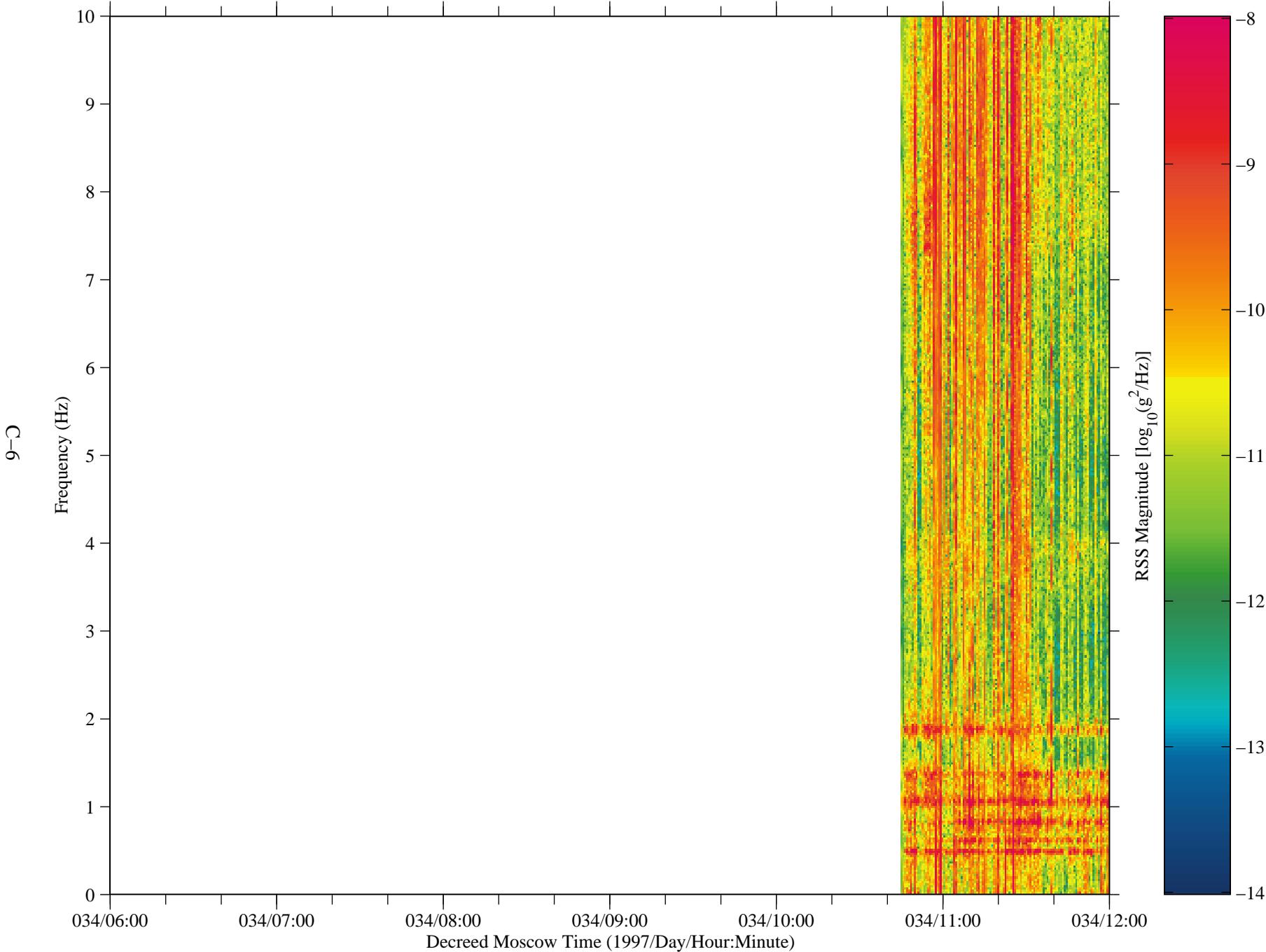


SAMS ACCELERATION MEASUREMENTS ON MIR FROM JANUARY TO MAY 1997

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Figure 2: SAMS data from Mir, TSH B (fc=10 Hz)



SAMS ACCELERATION MEASUREMENTS ON MIR FROM JANUARY TO MAY 1997

Figure 3: SAMS data from Mir, TSH B (fc=10 Hz)

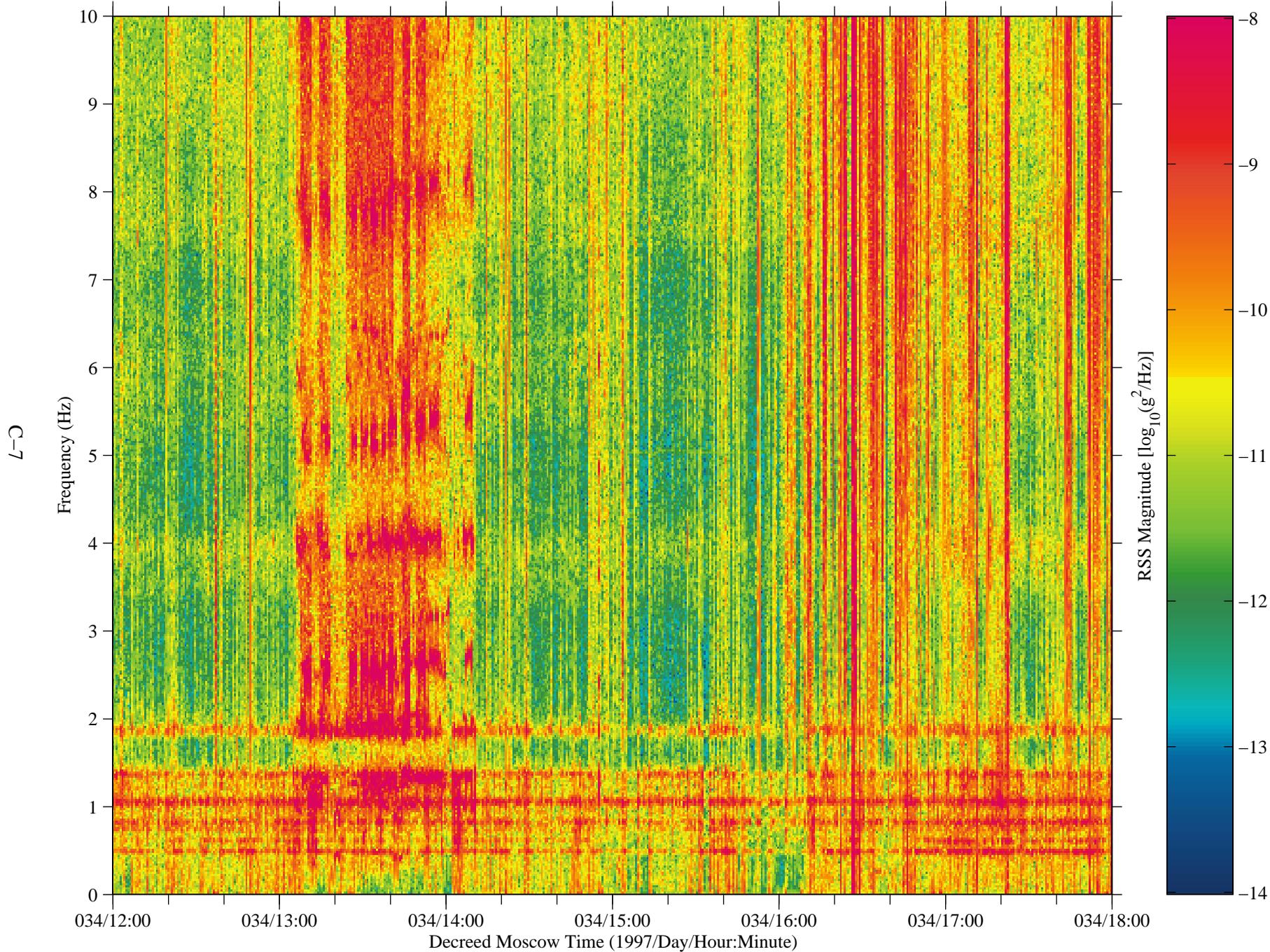
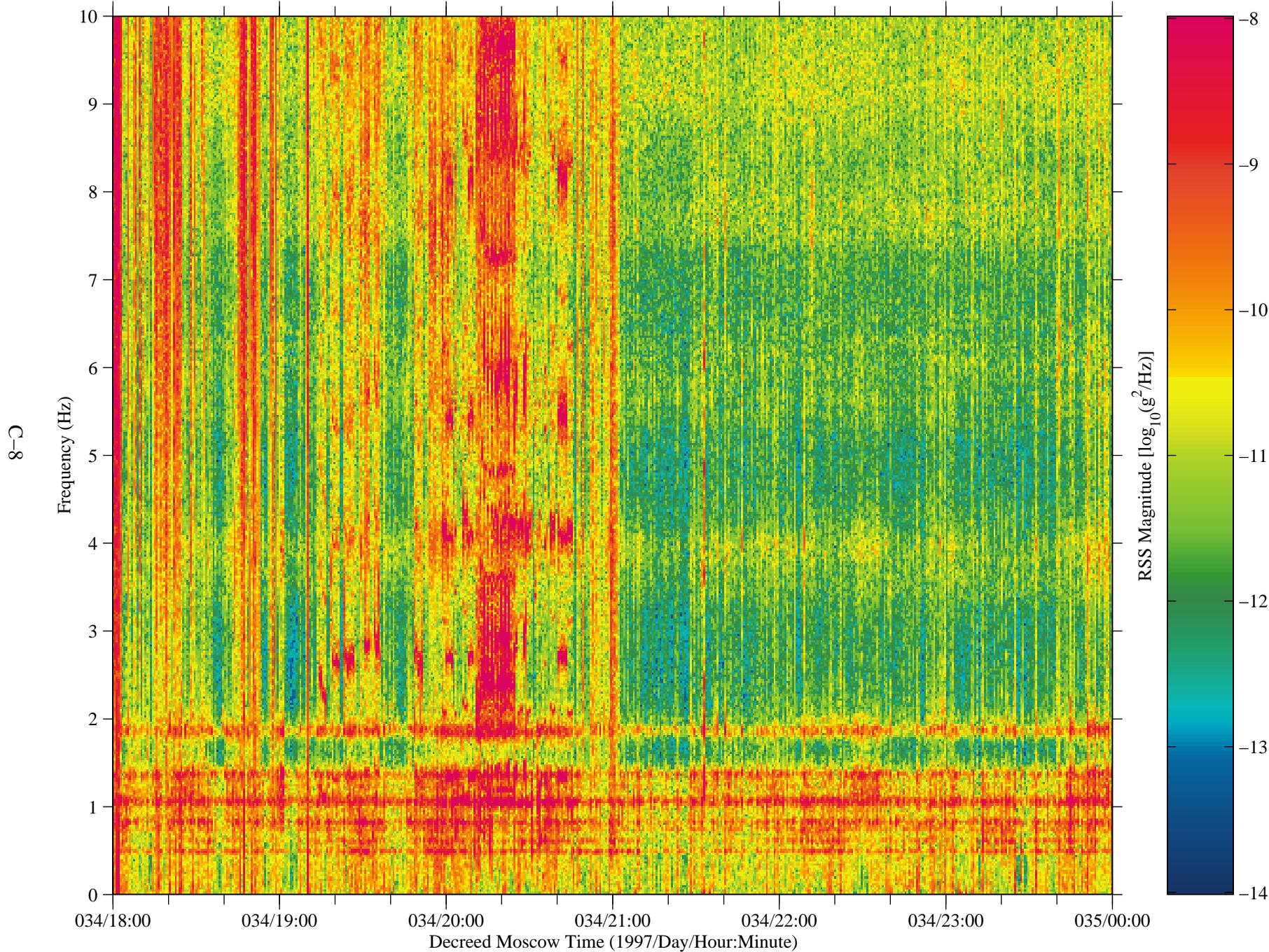
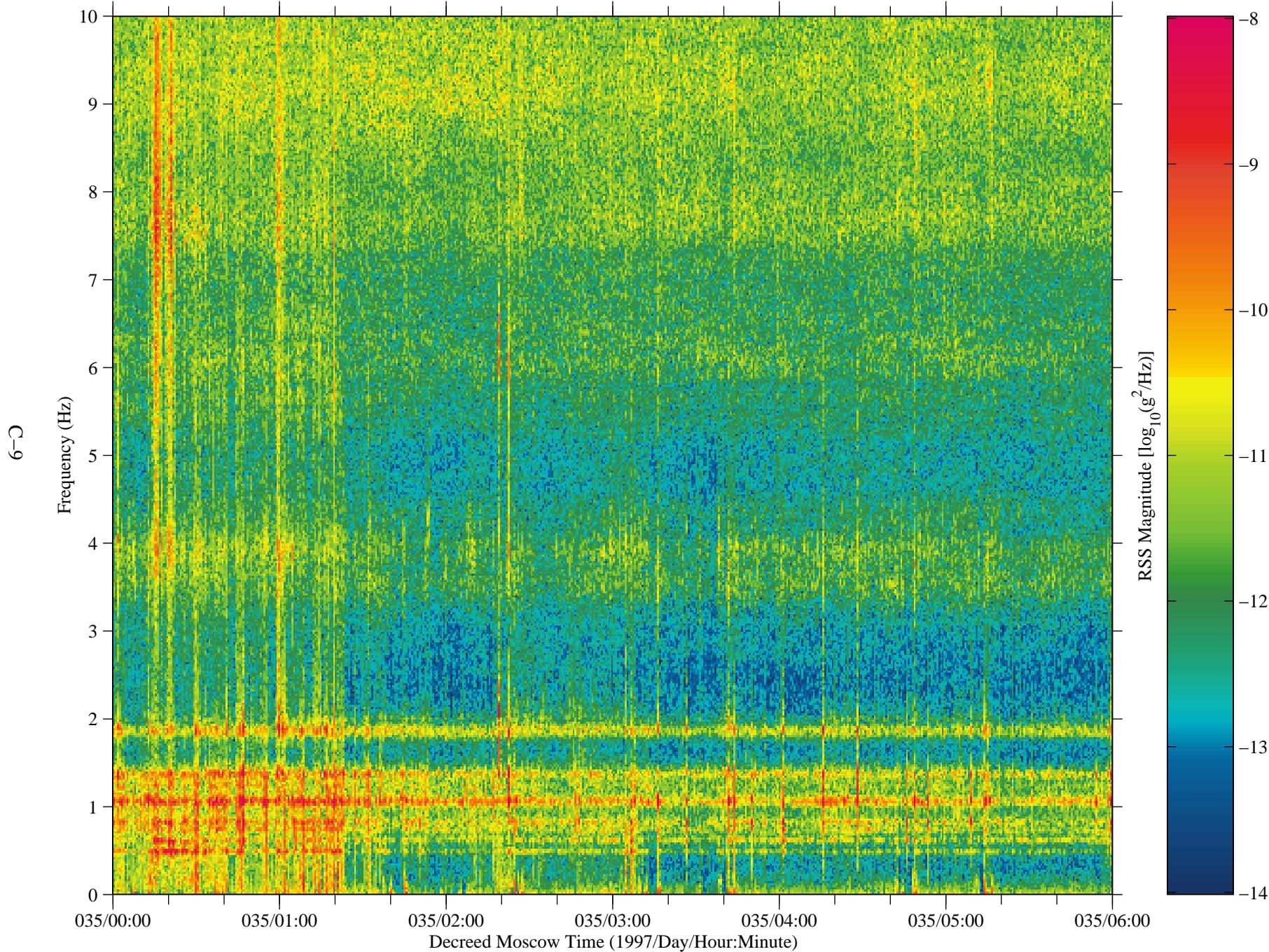


Figure 4: SAMS data from Mir, TSH B (fc=10 Hz)



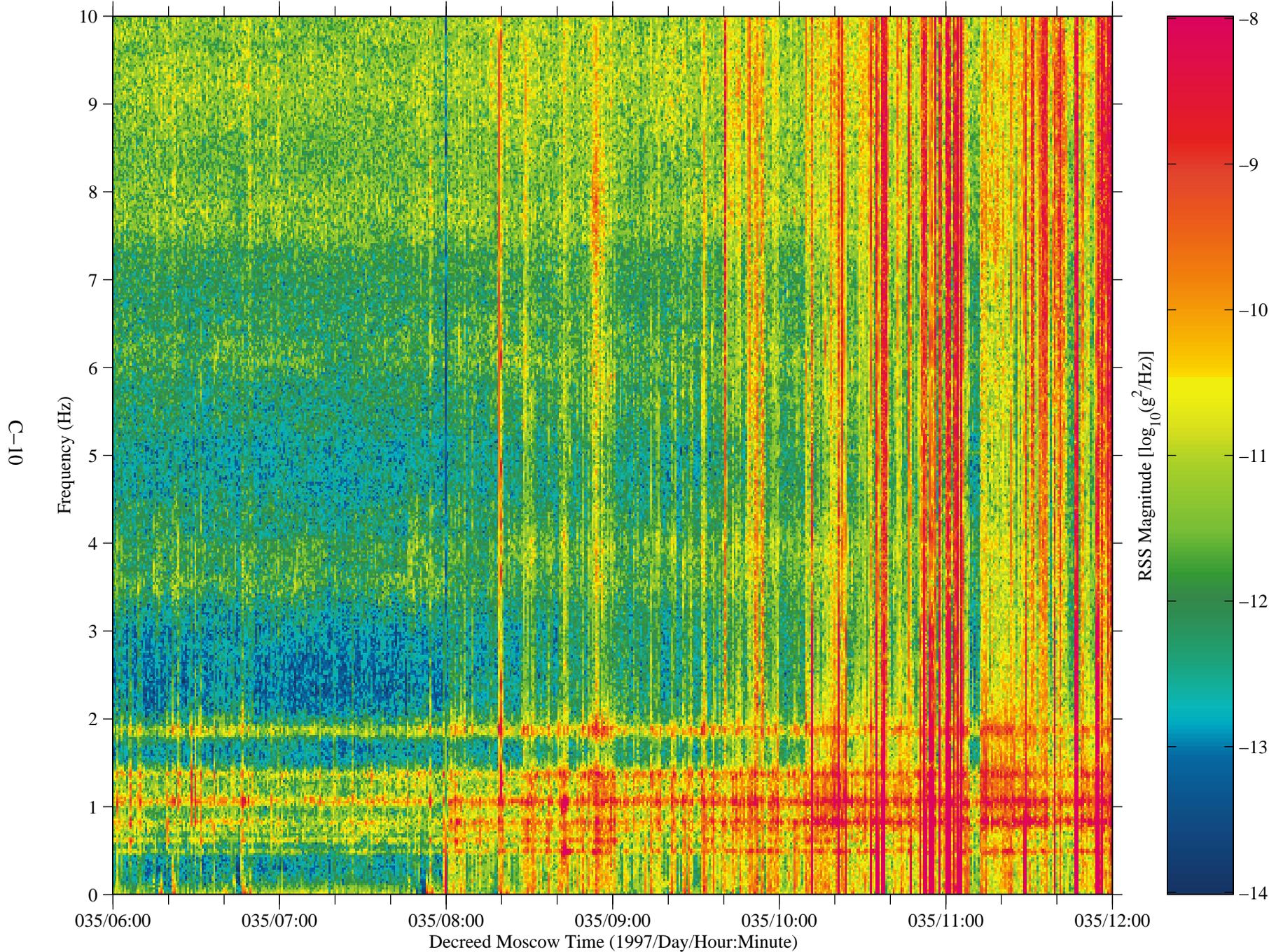
SAMS ACCELERATION MEASUREMENTS ON MIR FROM JANUARY TO MAY 1997

Figure 5: SAMS data from Mir, TSH B (fc=10 Hz)



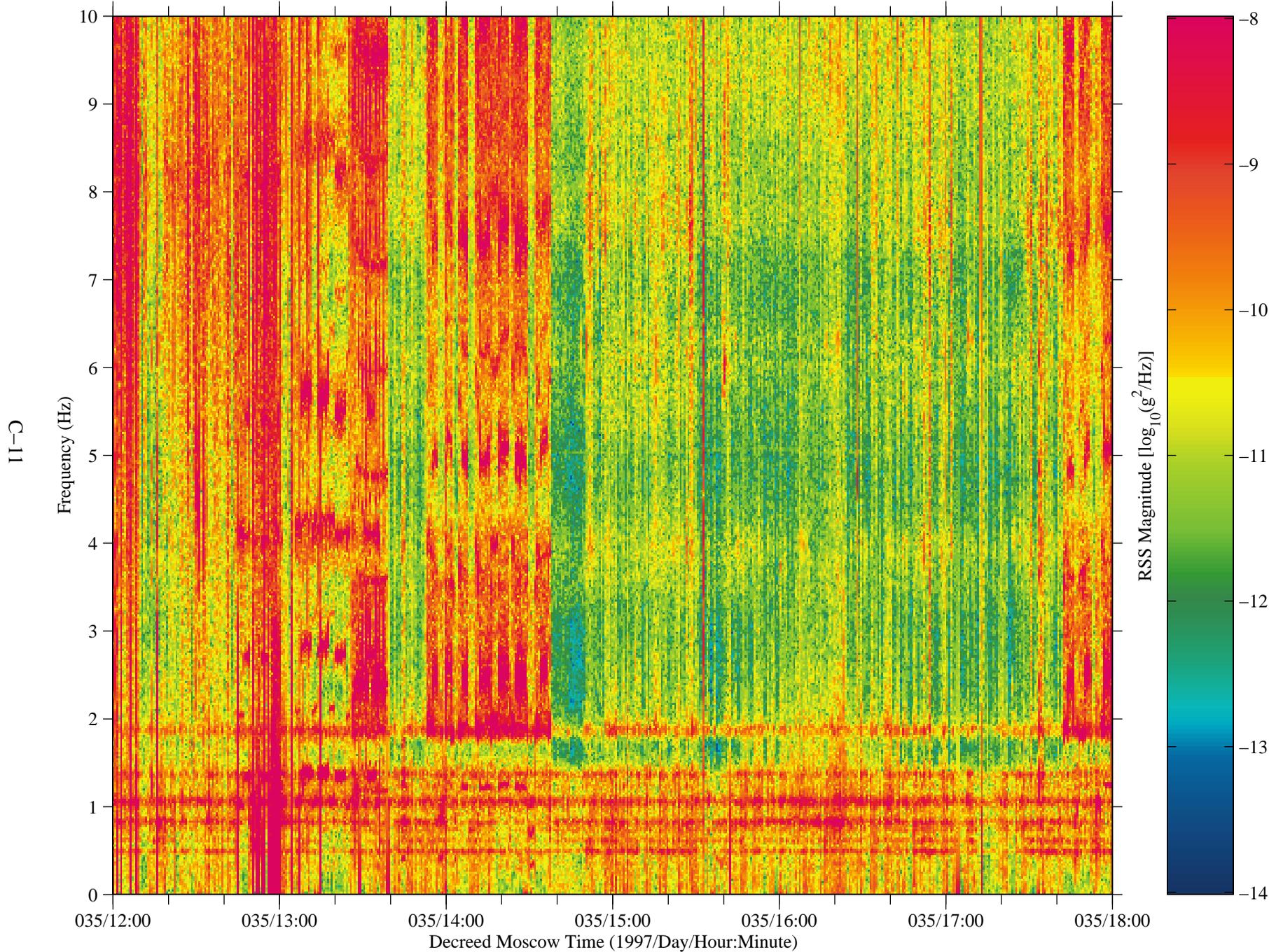
SAMS ACCELERATION MEASUREMENTS ON MIR FROM JANUARY TO MAY 1997

Figure 6: SAMS data from Mir, TSH B (fc=10 Hz)



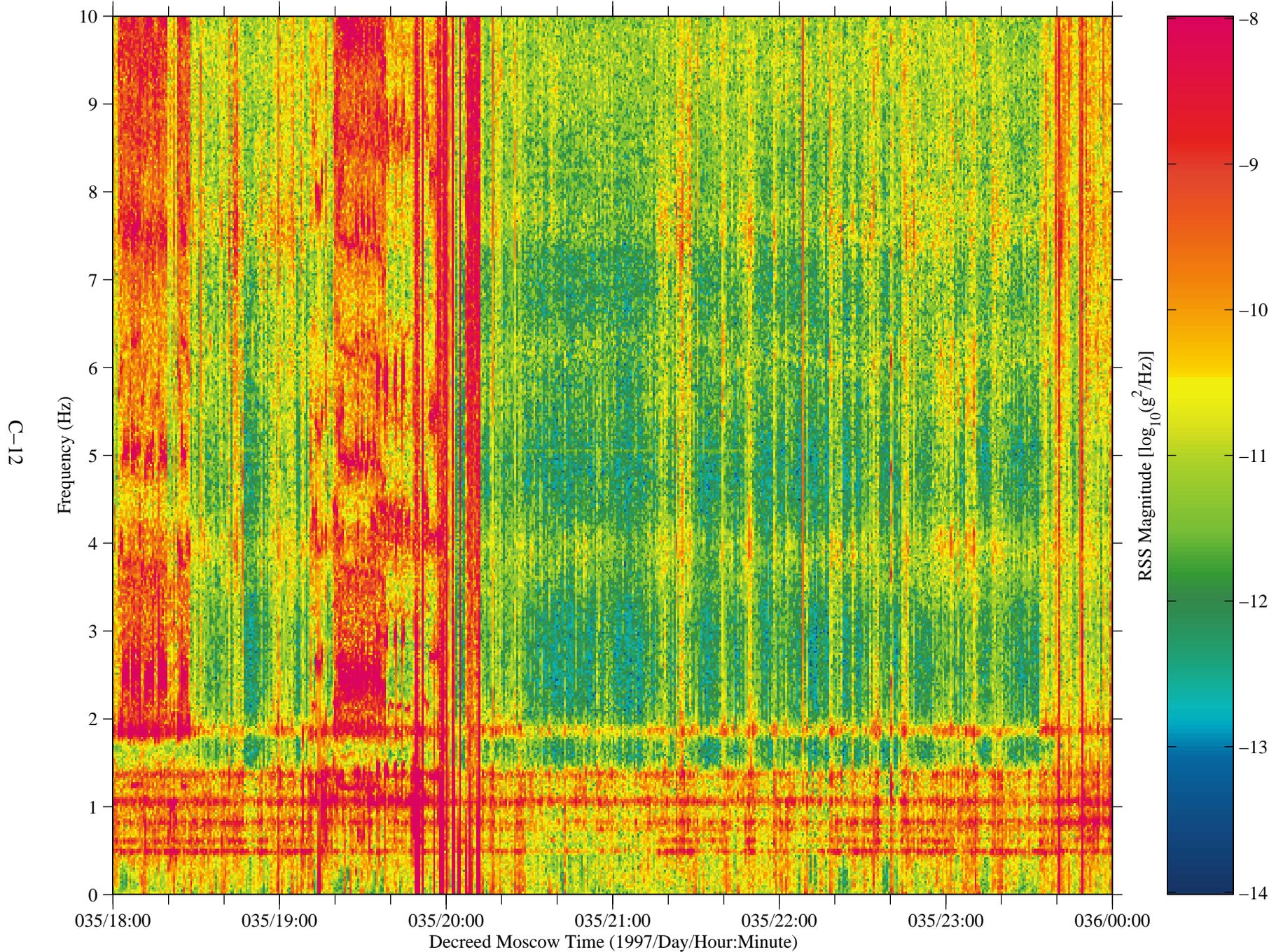
SAMS ACCELERATION MEASUREMENTS ON MIR FROM JANUARY TO MAY 1997

Figure 7: SAMS data from Mir, TSH B (fc=10 Hz)



SAMS ACCELERATION MEASUREMENTS ON MIR FROM JANUARY TO MAY 1997

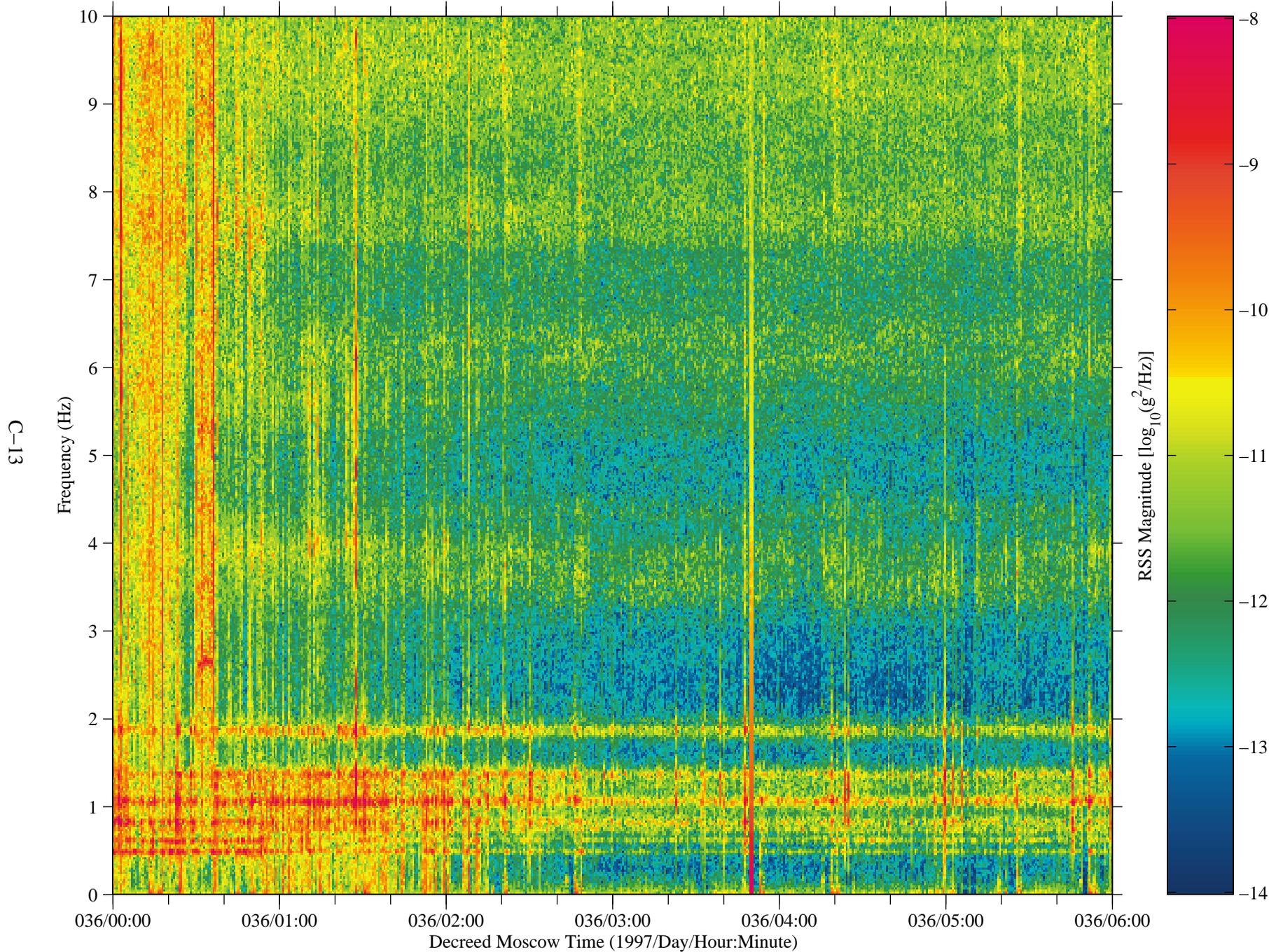
Figure 8: SAMS data from Mir, TSH B (fc=10 Hz)



SAMS ACCELERATION MEASUREMENTS ON MIR FROM JANUARY TO MAY 1997

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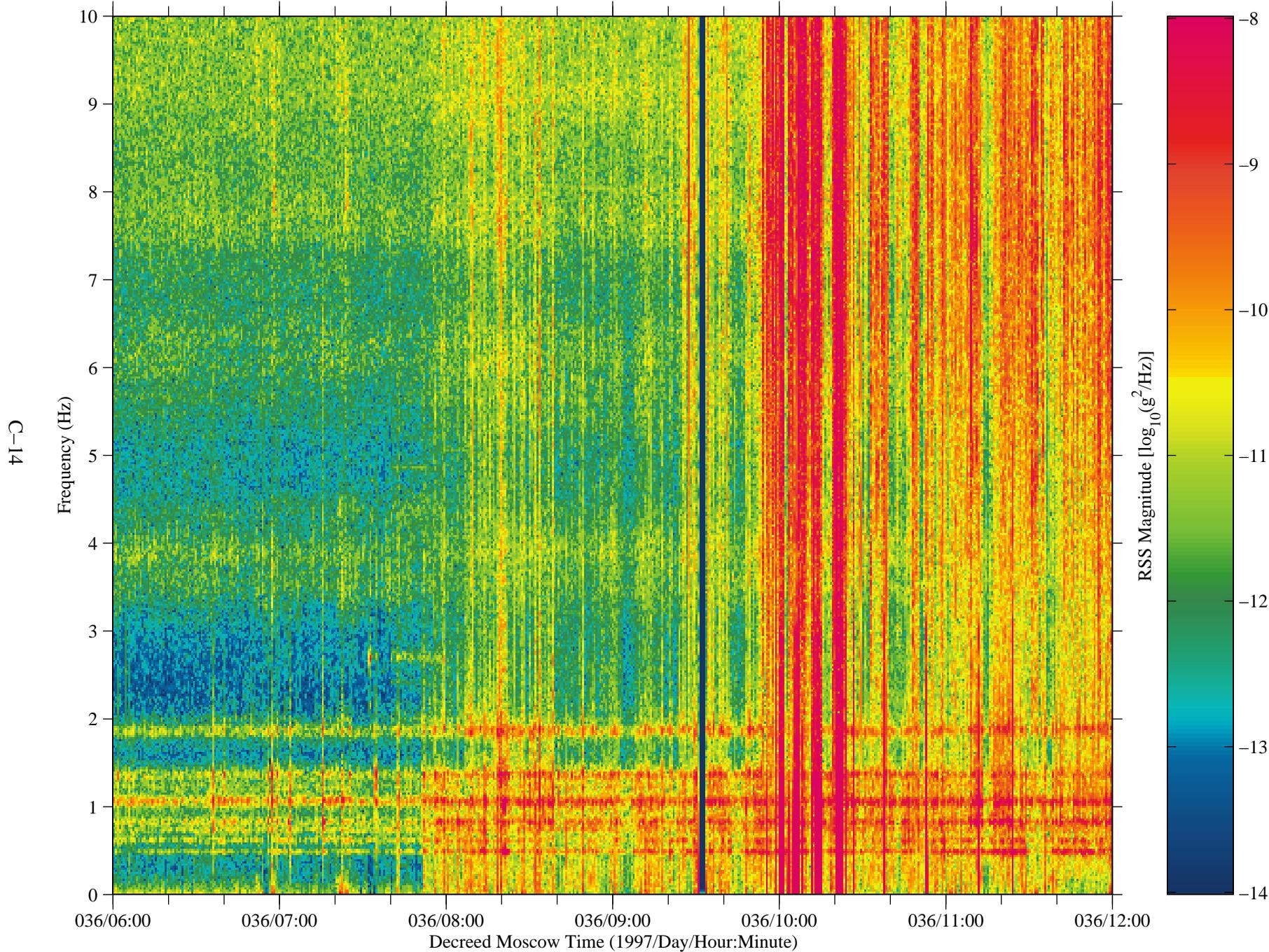
Figure 9: SAMS data from Mir, TSH B (fc=10 Hz)



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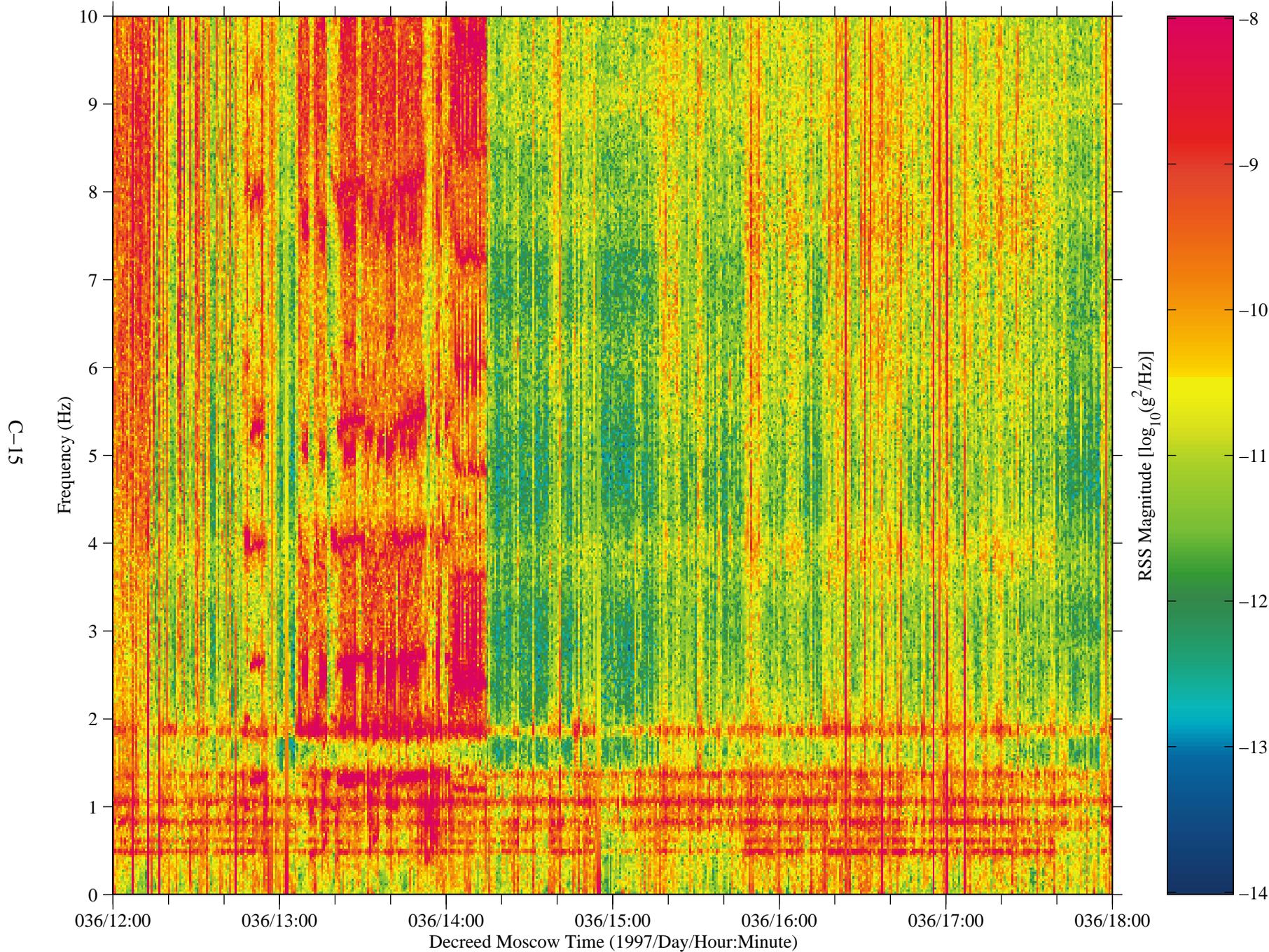
SAMS ACCELERATION MEASUREMENTS ON MIR FROM JANUARY TO MAY 1997

Figure 10: SAMS data from Mir, TSH B (fc=10 Hz)



SAMS ACCELERATION MEASUREMENTS ON MIR FROM JANUARY TO MAY 1997

Figure 11: SAMS data from Mir, TSH B (fc=10 Hz)



SAMS ACCELERATION MEASUREMENTS ON MIR FROM JANUARY TO MAY 1997

Figure 12: SAMS data from Mir, TSH B (fc=10 Hz)

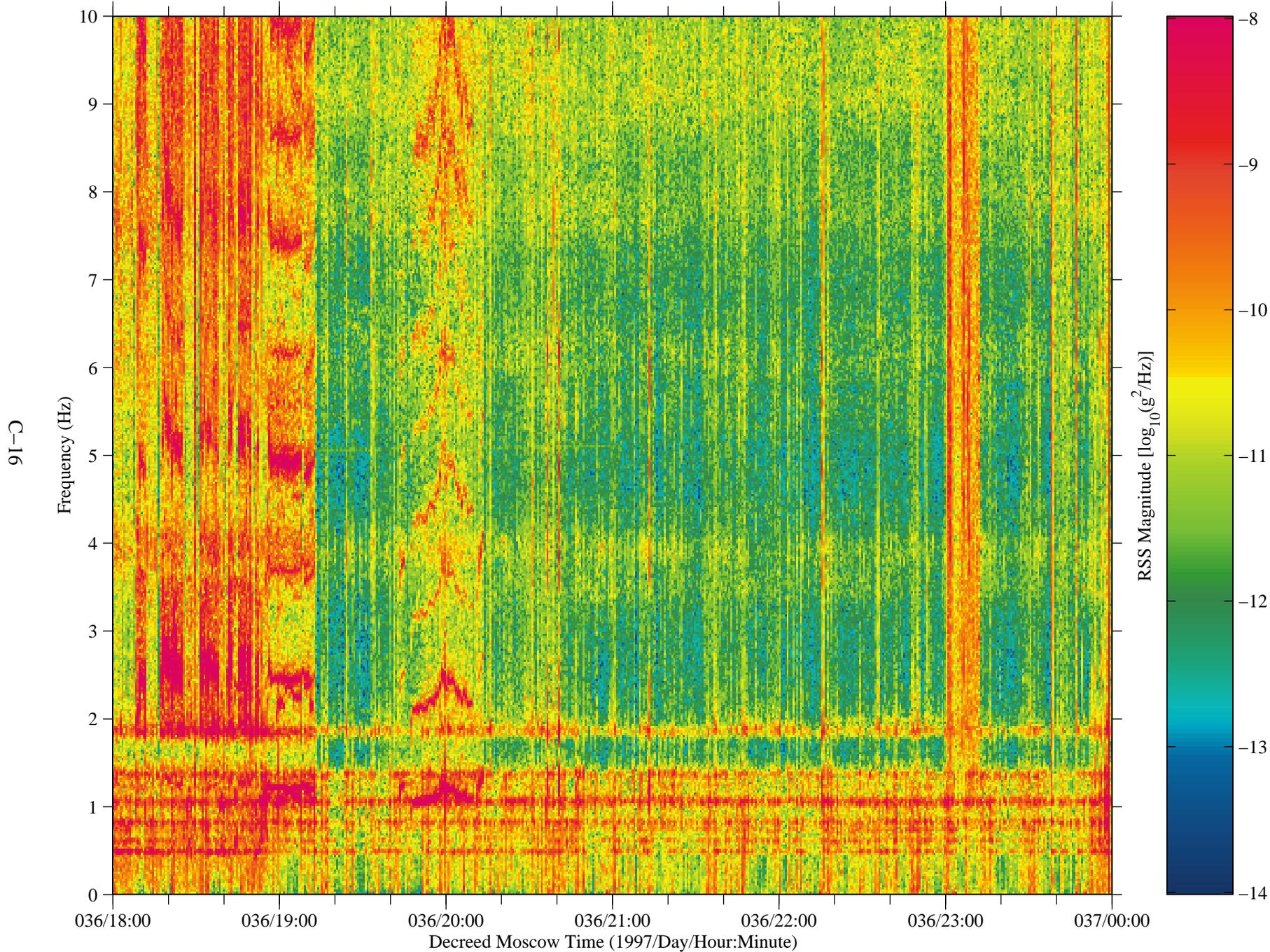
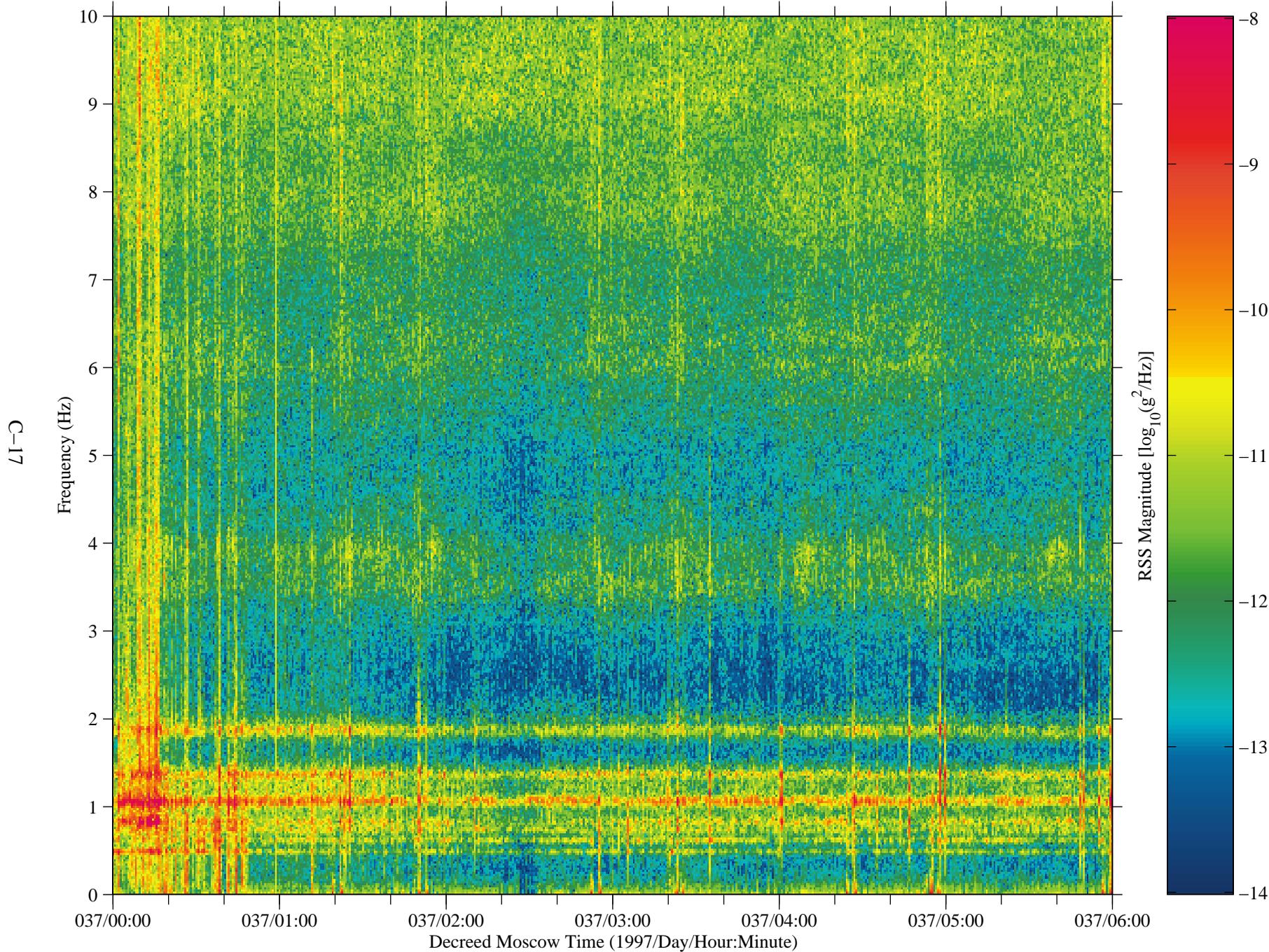


Figure 13: SAMS data from Mir, TSH B (fc=10 Hz)



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SAMS ACCELERATION MEASUREMENTS ON MIR FROM JANUARY TO MAY 1997

Figure 14: SAMS data from Mir, TSH B (fc=10 Hz)

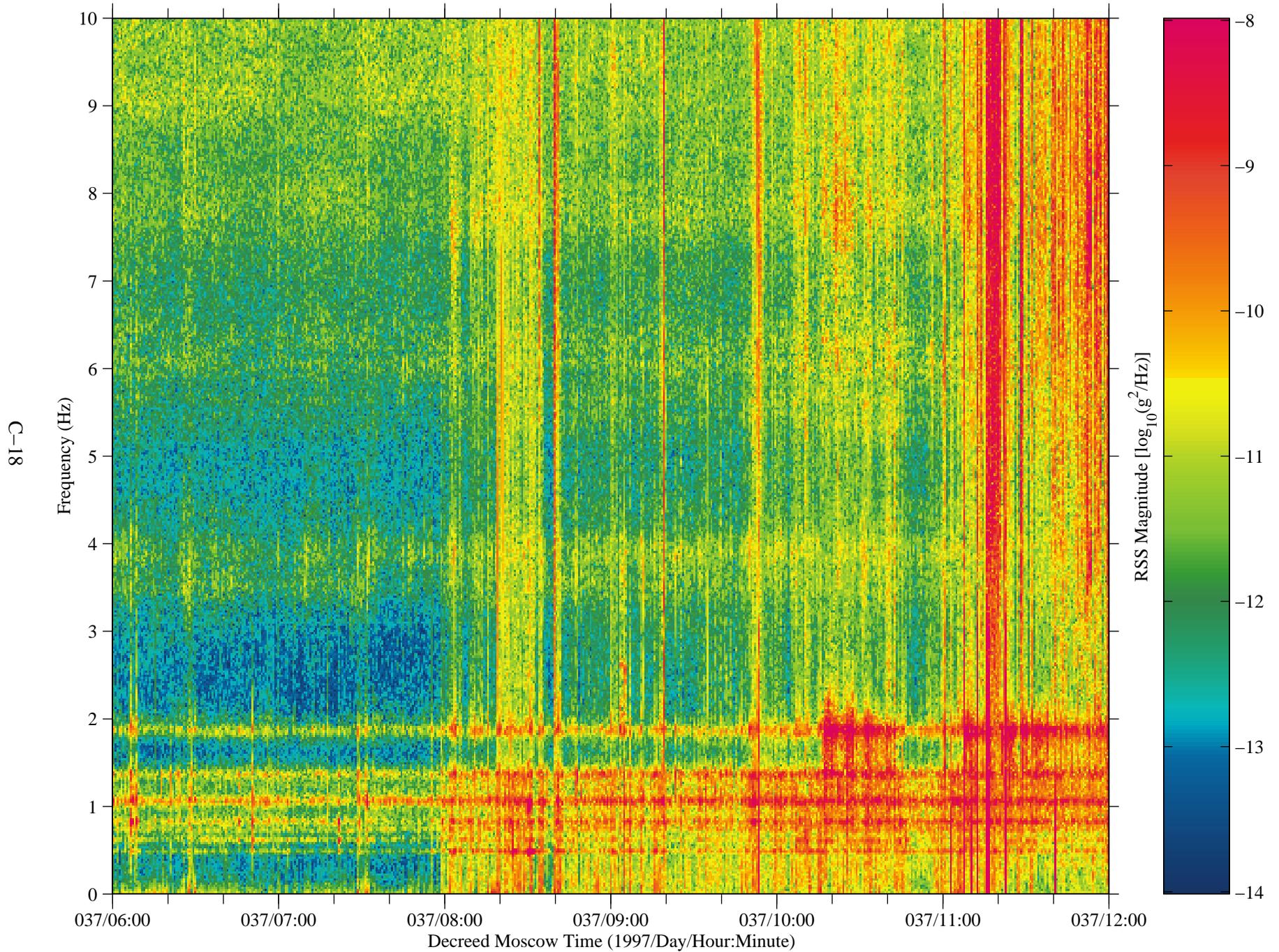


Figure 15: SAMS data from Mir, TSH B (fc=10 Hz)

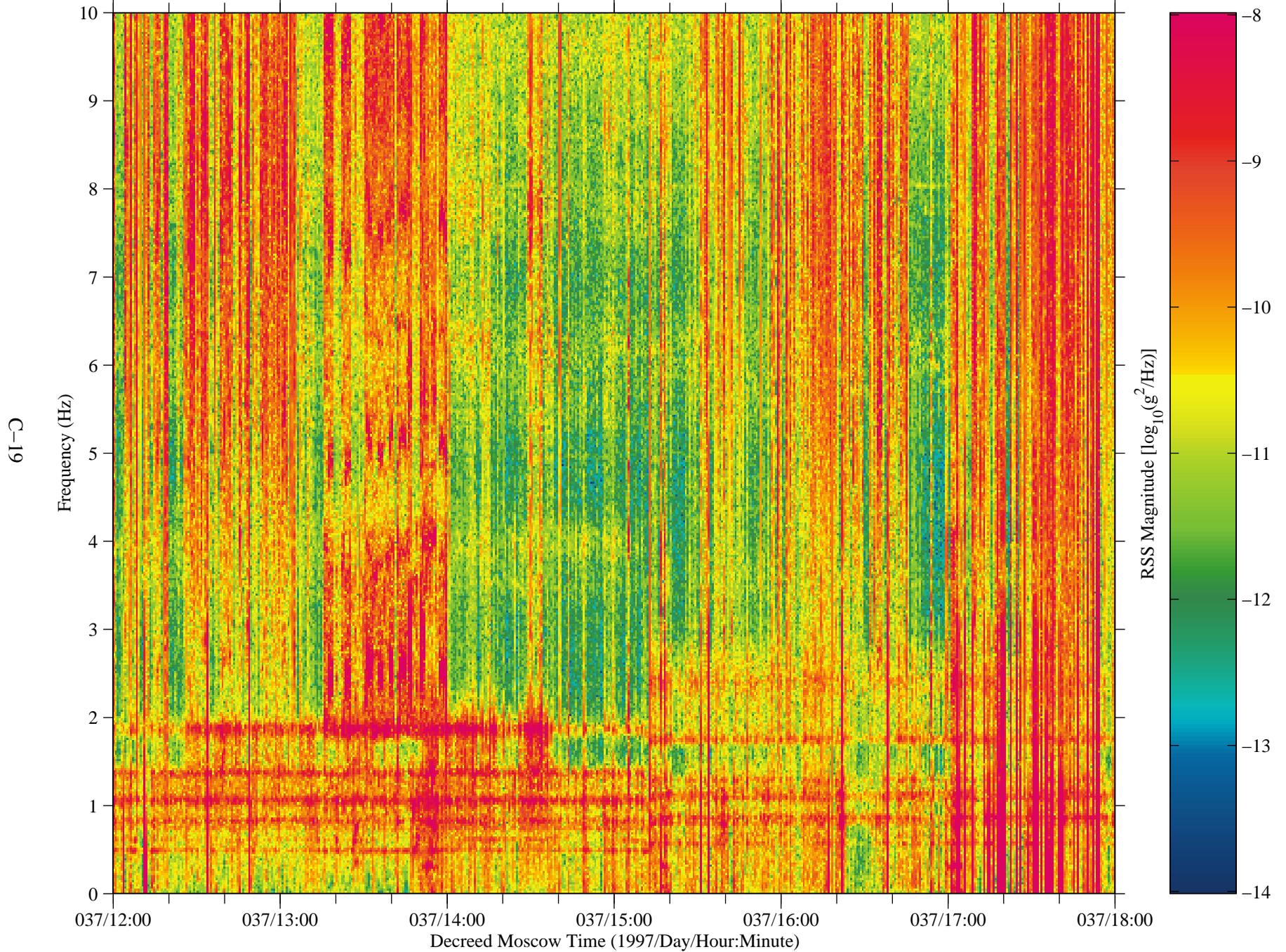


Figure 16: SAMS data from Mir, TSH B (fc=10 Hz)

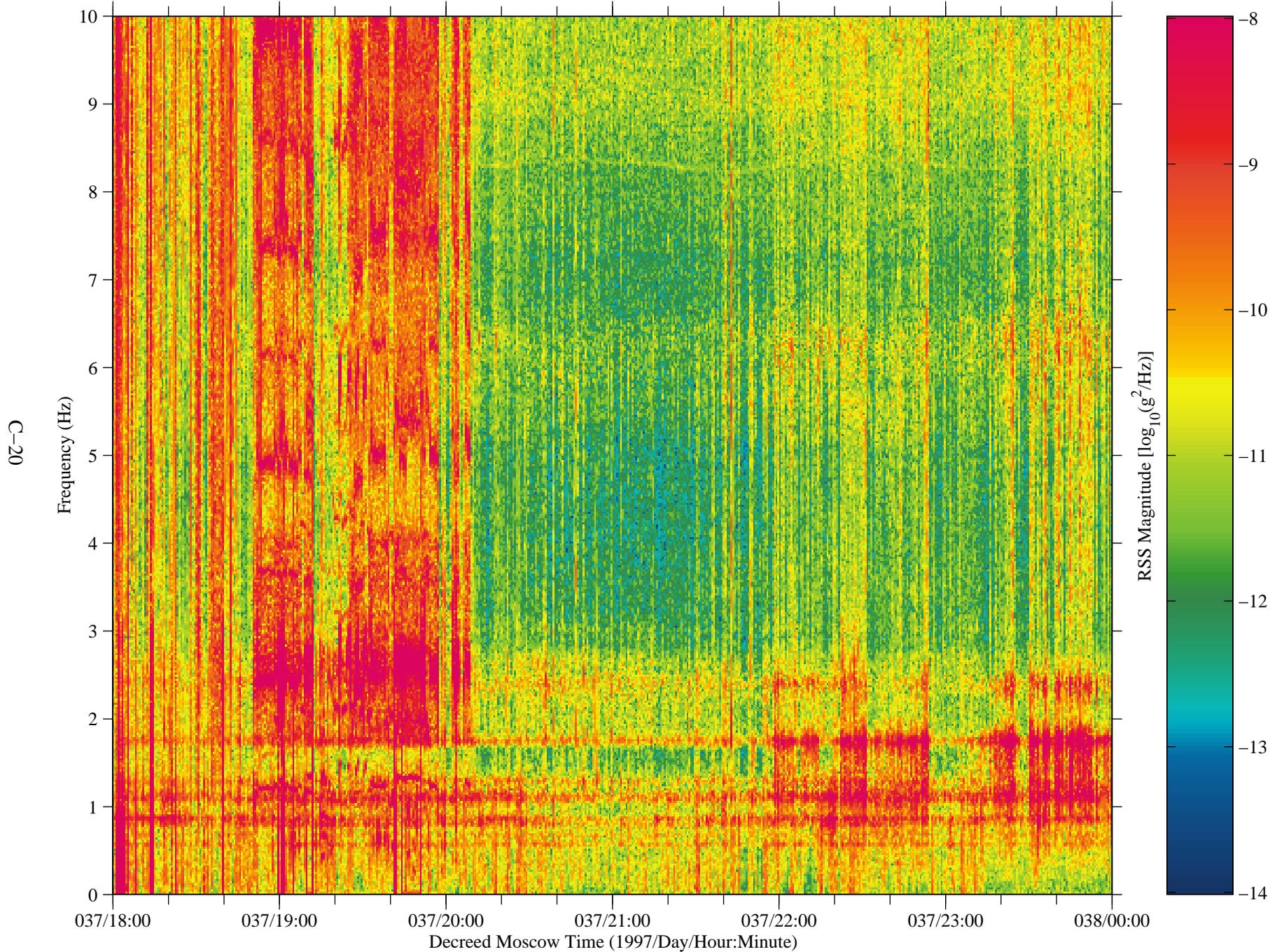


Figure 17: SAMS data from Mir, TSH B (fc=10 Hz)

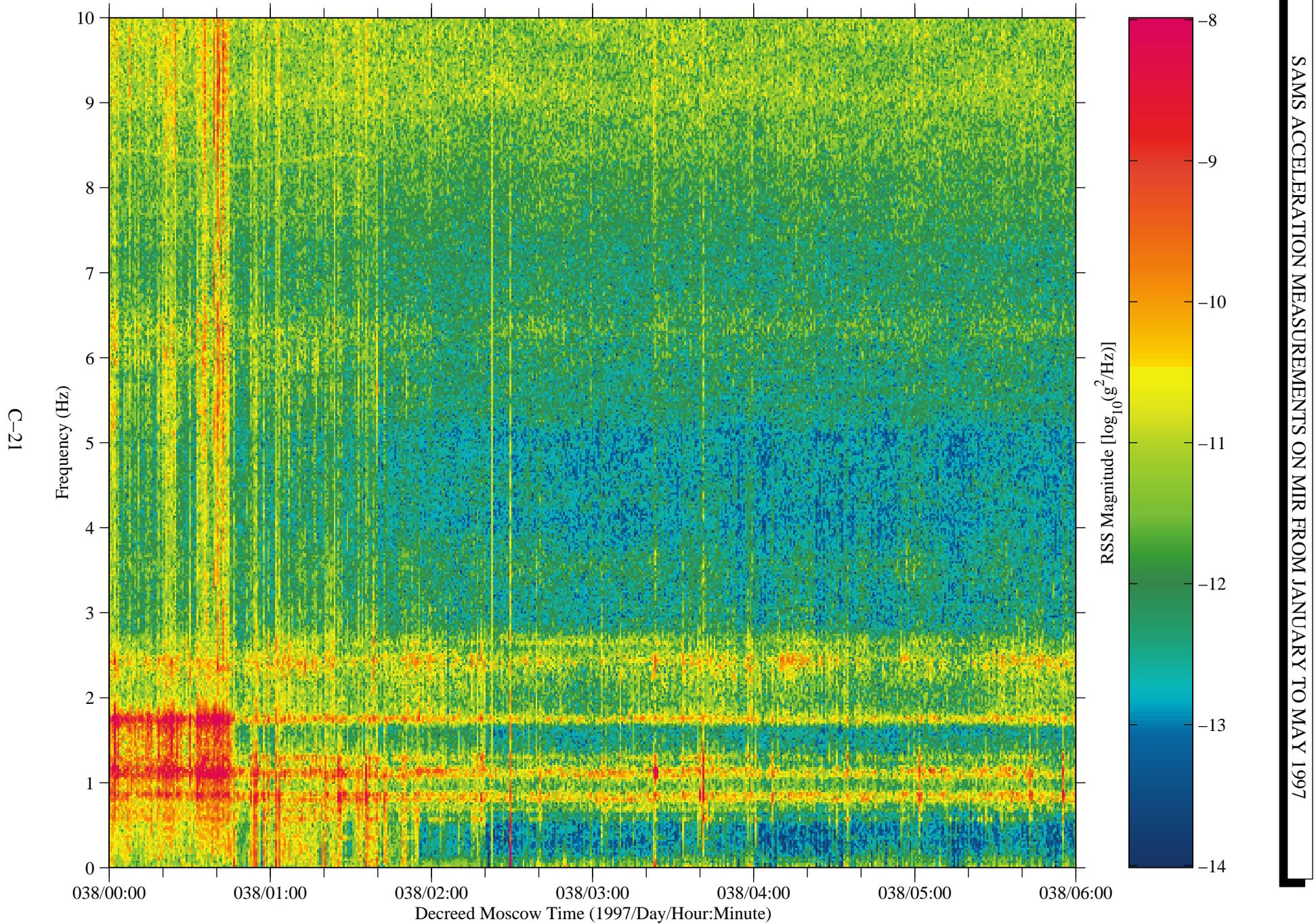
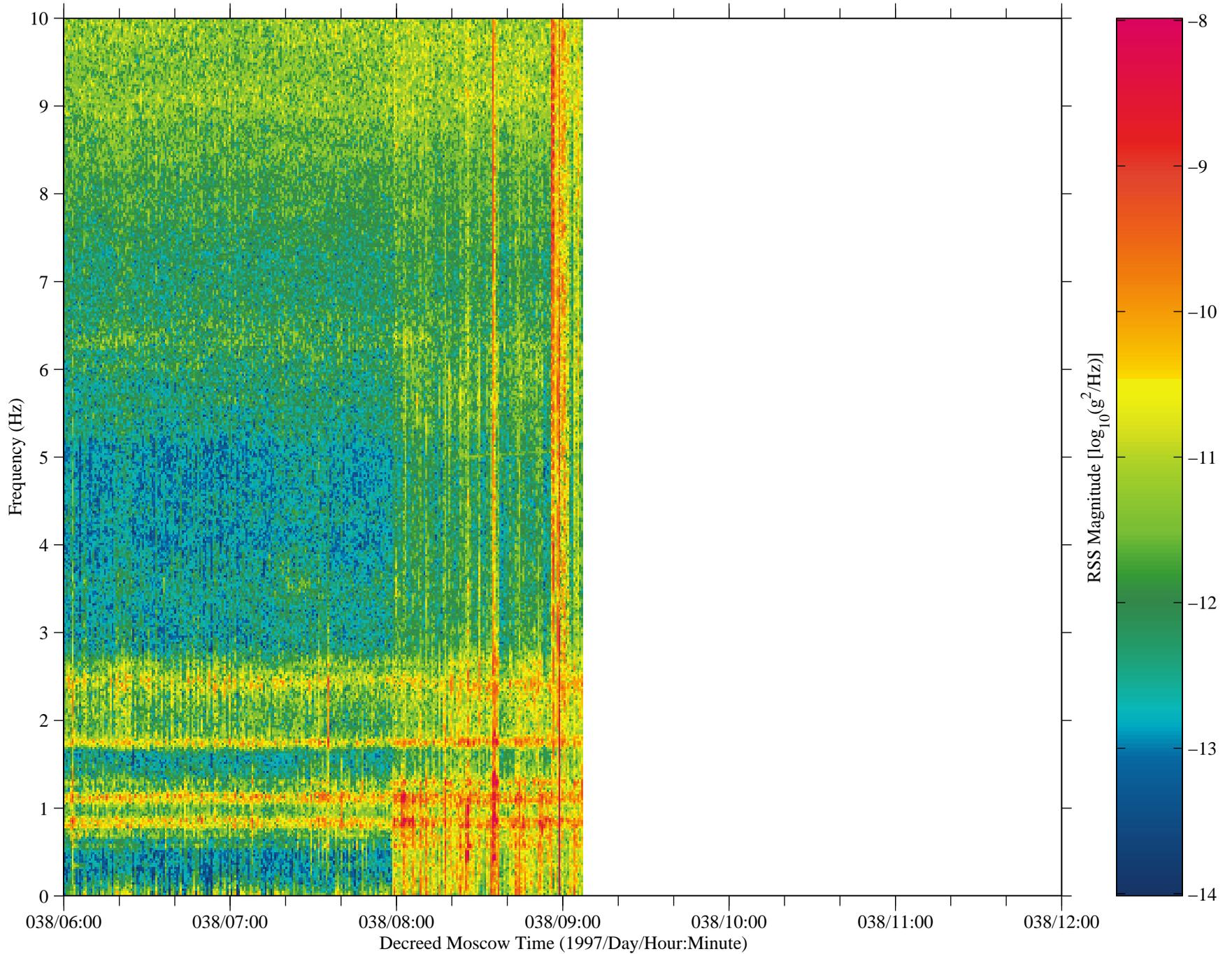


Figure 18: SAMS data from Mir, TSH B (fc=10 Hz)

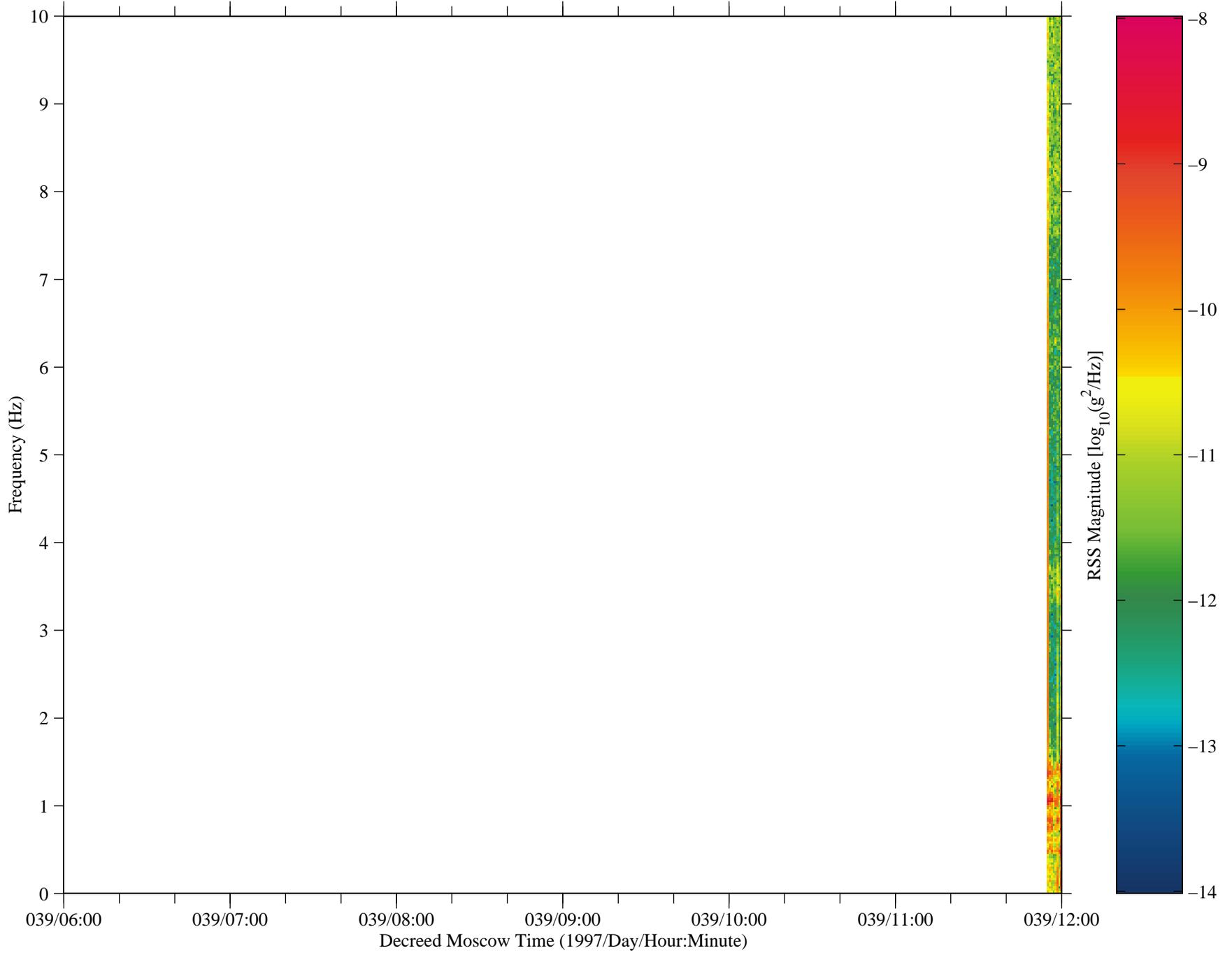


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SAMS ACCELERATION MEASUREMENTS ON MIR FROM JANUARY TO MAY 1997

No data are available
from 038/12:00:00 – 039/06:00:00

Figure 19: SAMS data from Mir, TSH B (fc=10 Hz)



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SAMS ACCELERATION MEASUREMENTS ON MIR FROM JANUARY TO MAY 1997

Figure 20: SAMS data from Mir, TSH B (fc=10 Hz)

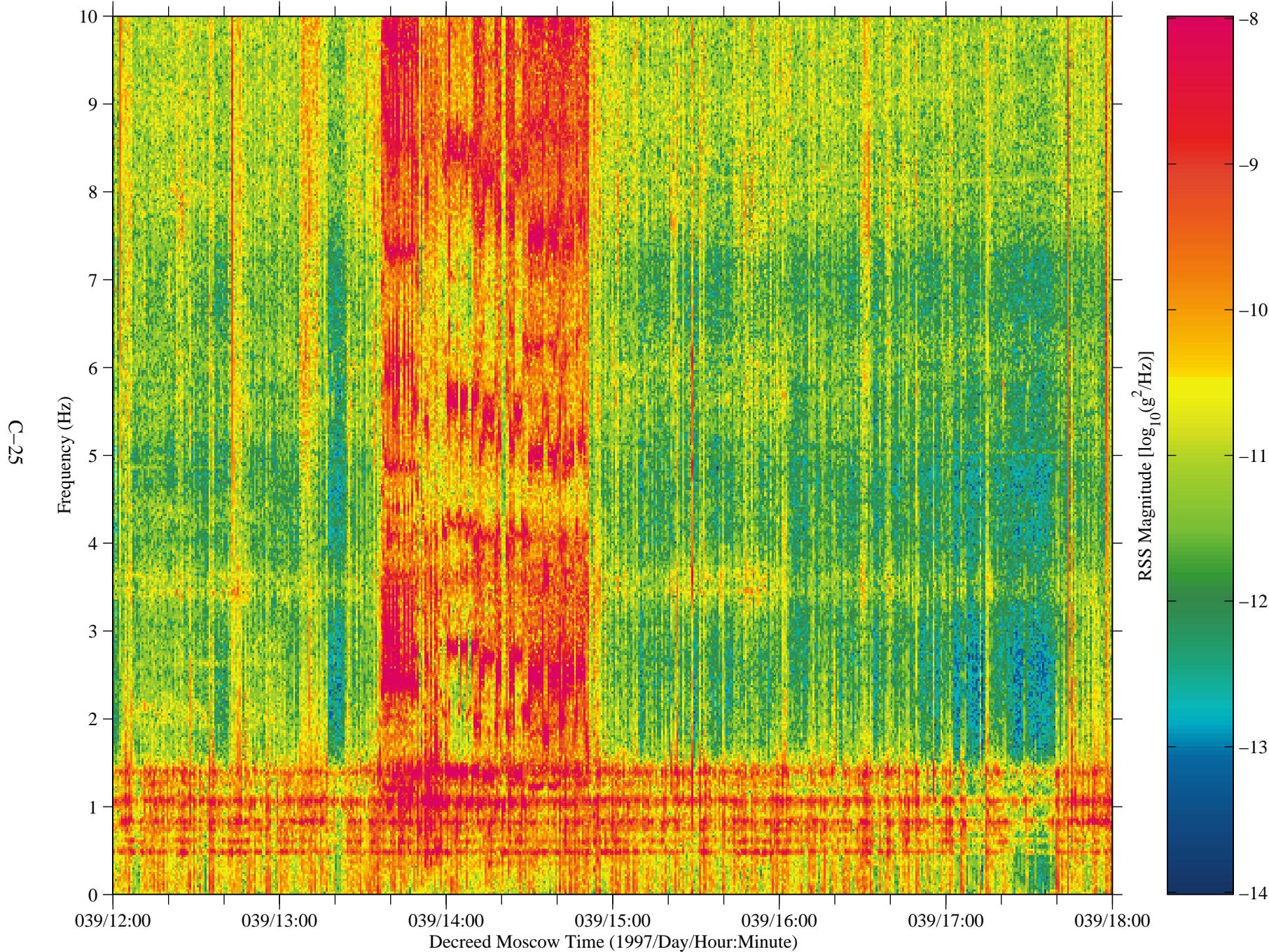
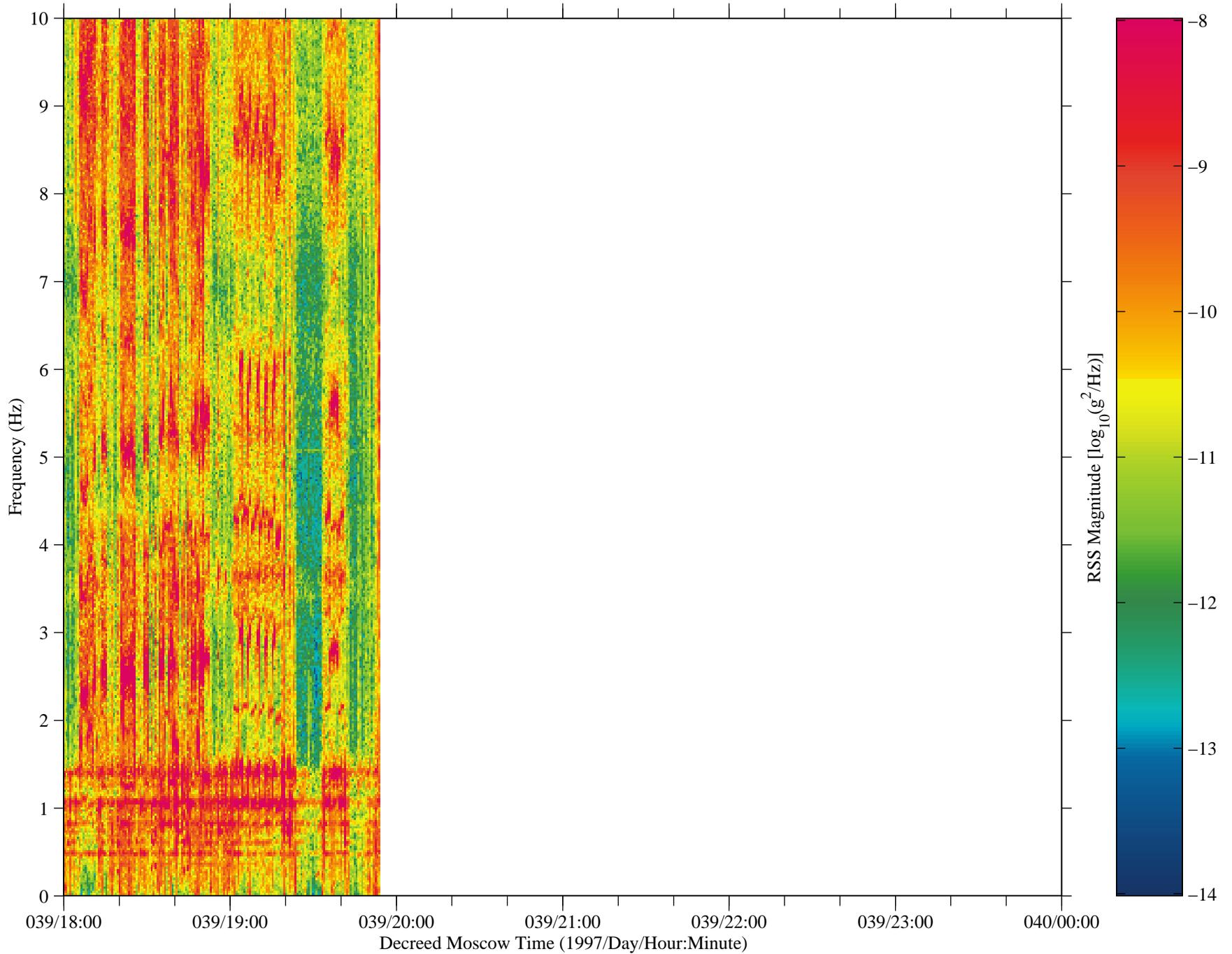


Figure 21: SAMS data from Mir, TSH B (fc=10 Hz)

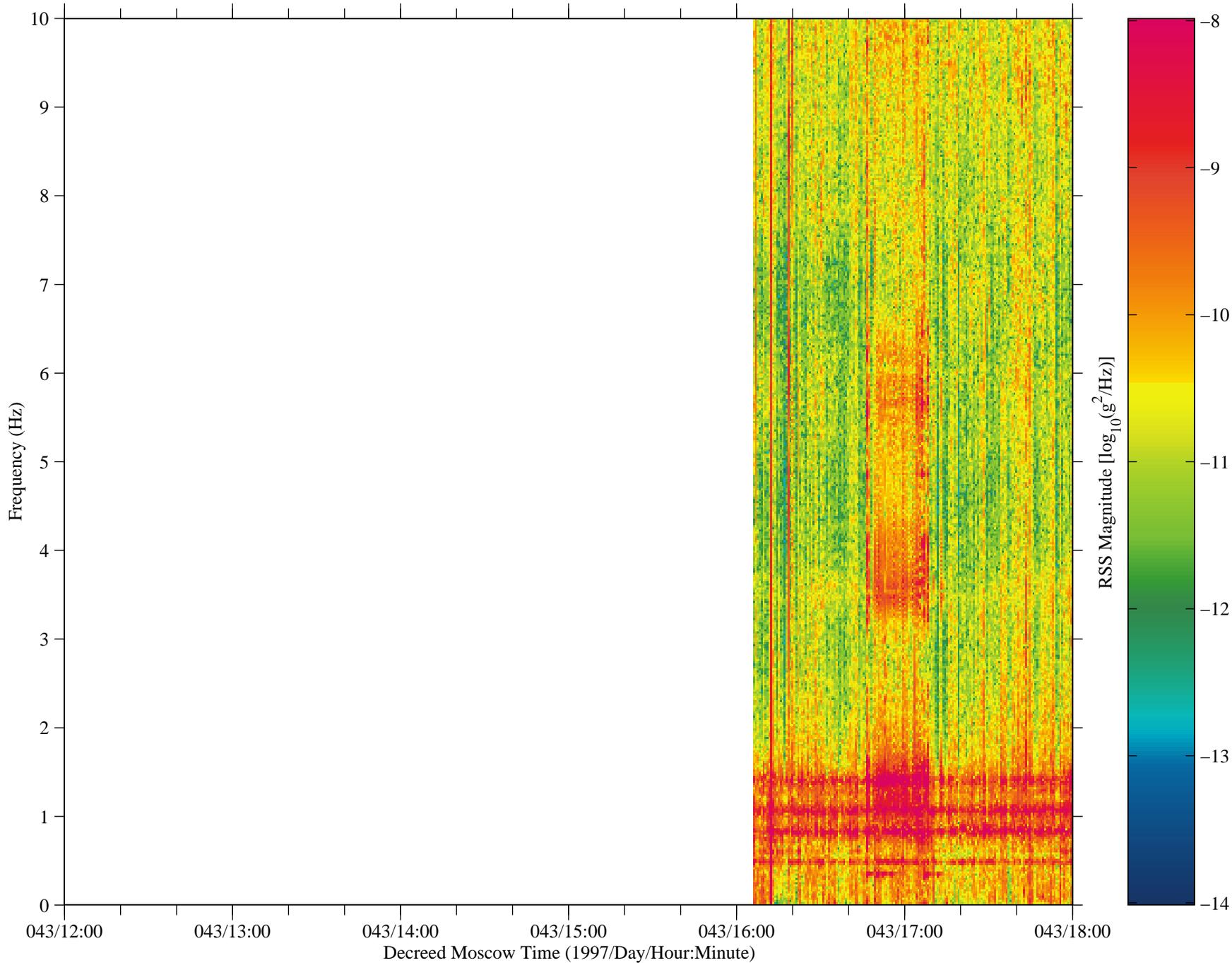


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SAMS ACCELERATION MEASUREMENTS ON MIR FROM JANUARY TO MAY 1997

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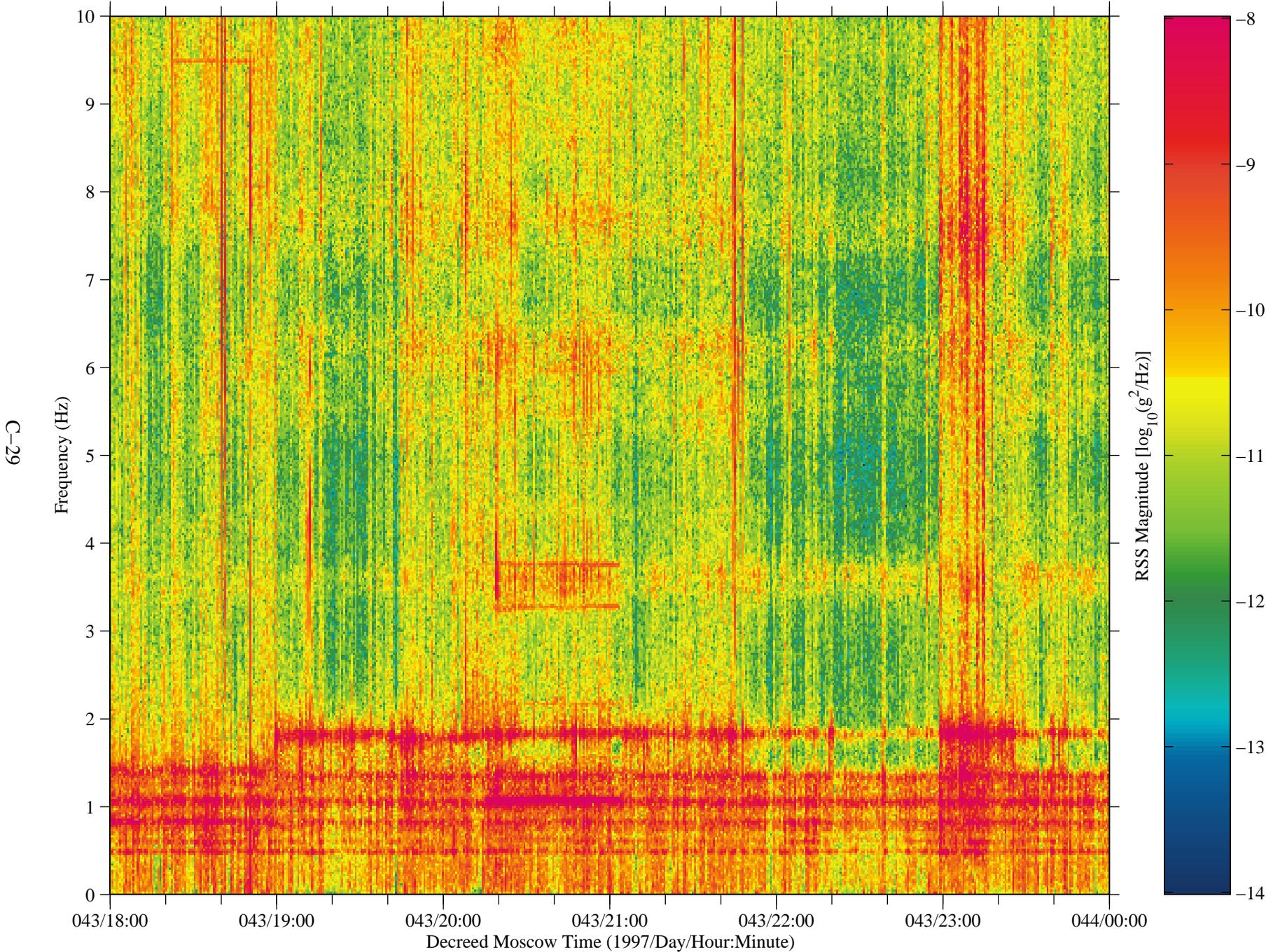
Figure 22: SAMS data from Mir, TSH B (fc=10 Hz)



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SAMS ACCELERATION MEASUREMENTS ON MIR FROM JANUARY TO MAY 1997

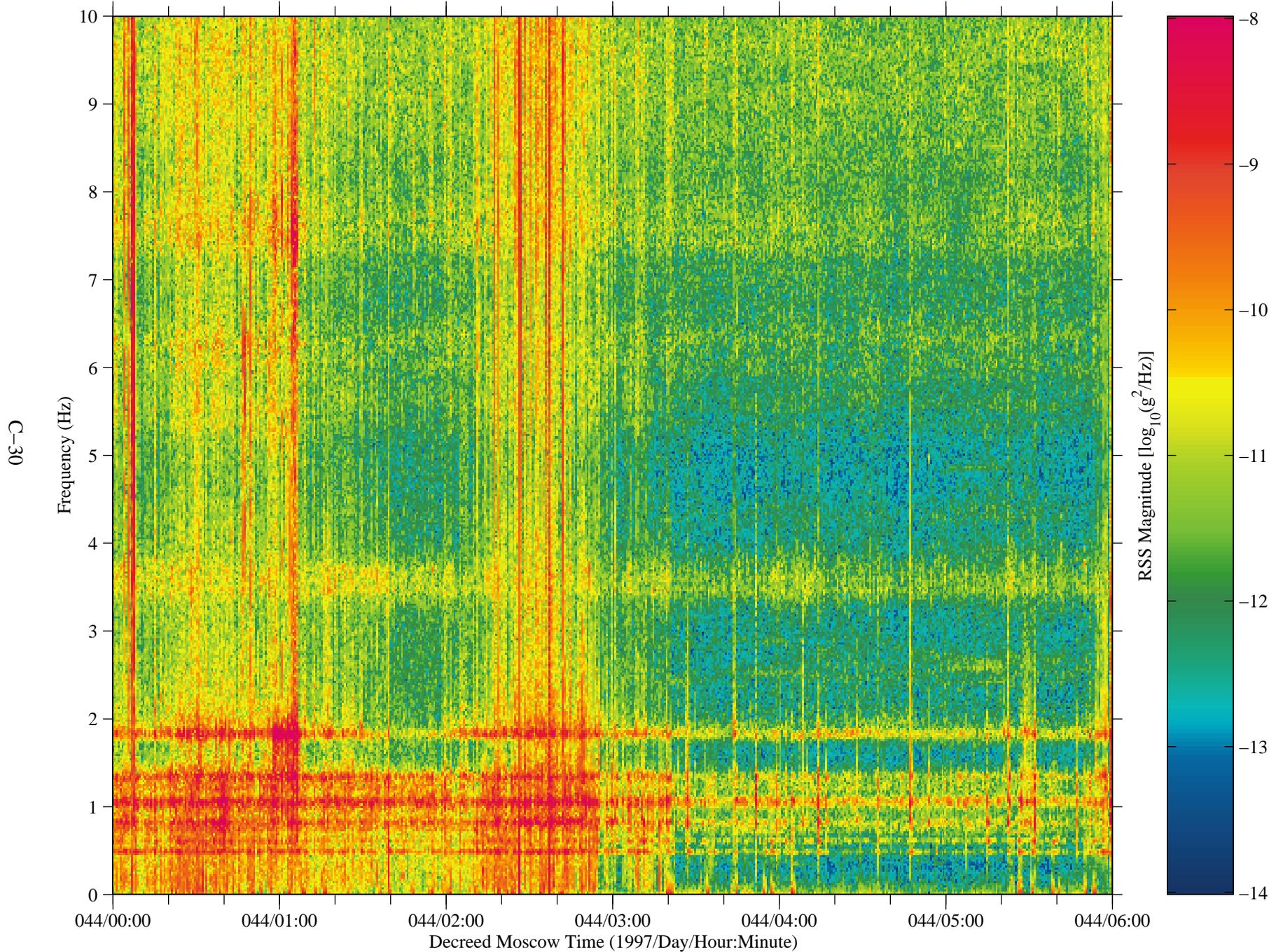
Figure 23: SAMS data from Mir, TSH B (fc=10 Hz)



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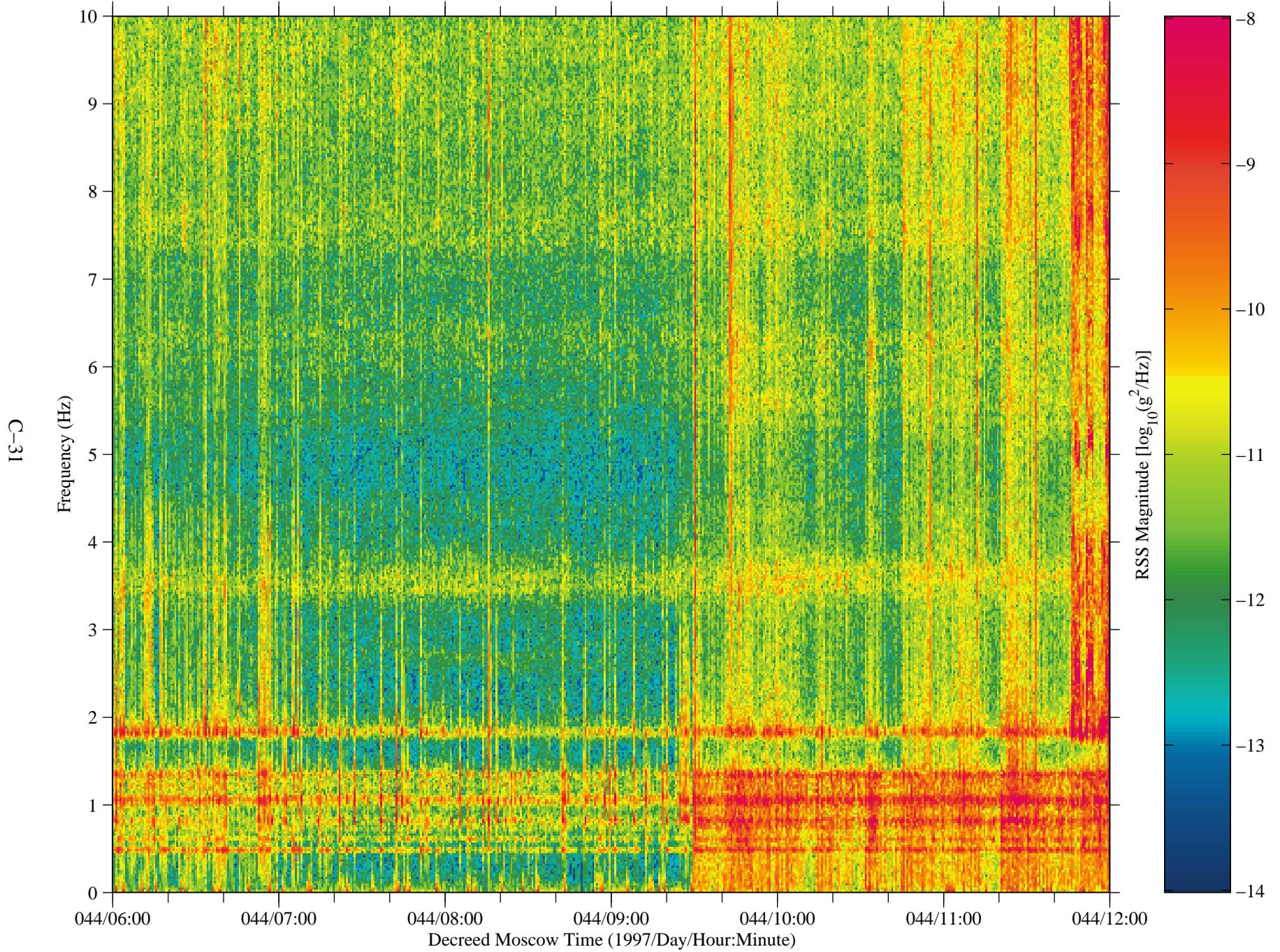
SAMS ACCELERATION MEASUREMENTS ON MIR FROM JANUARY TO MAY 1997

Figure 24: SAMS data from Mir, TSH B (fc=10 Hz)



SAMS ACCELERATION MEASUREMENTS ON MIR FROM JANUARY TO MAY 1997

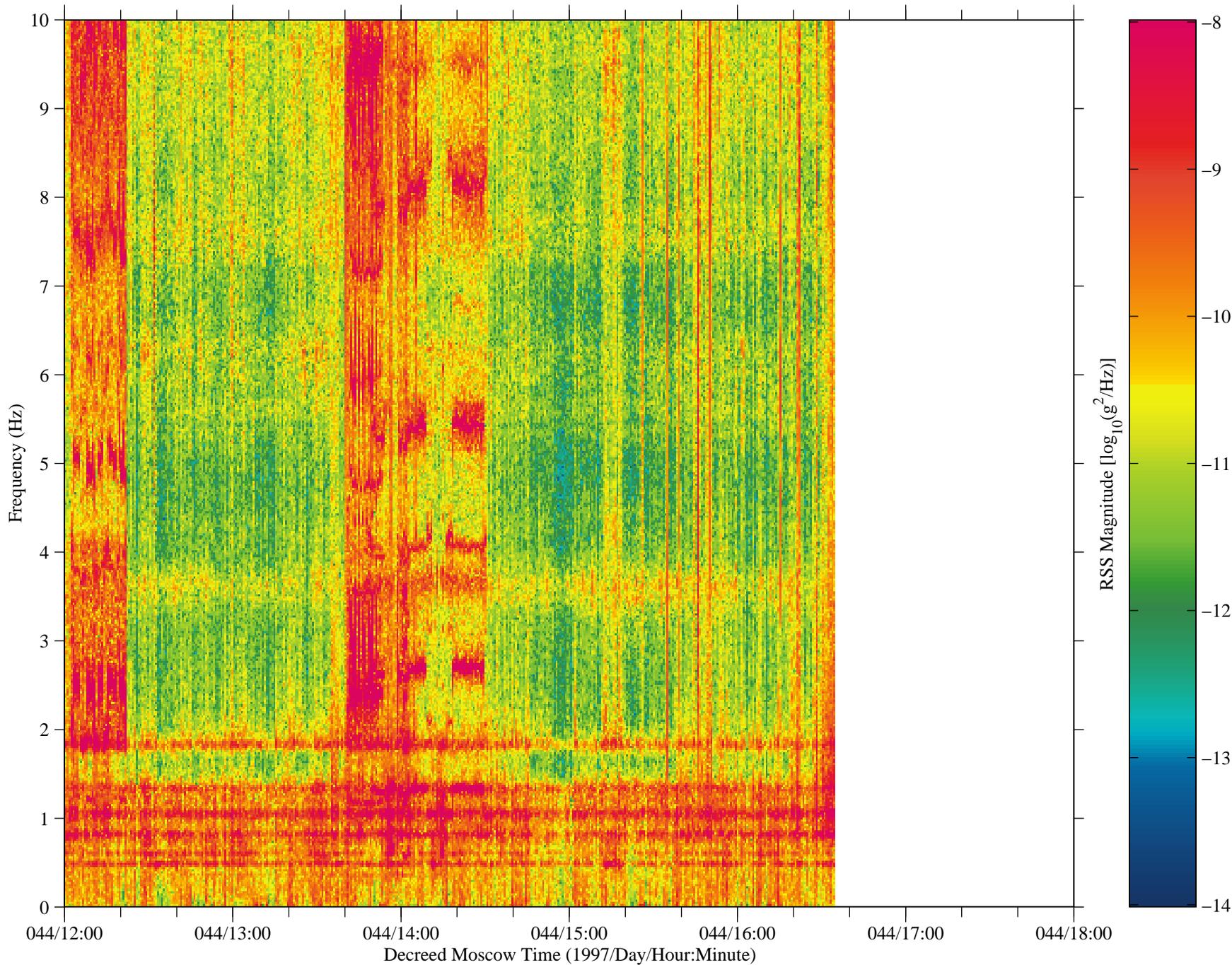
Figure 25: SAMS data from Mir, TSH B (fc=10 Hz)



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SAMS ACCELERATION MEASUREMENTS ON MIR FROM JANUARY TO MAY 1997

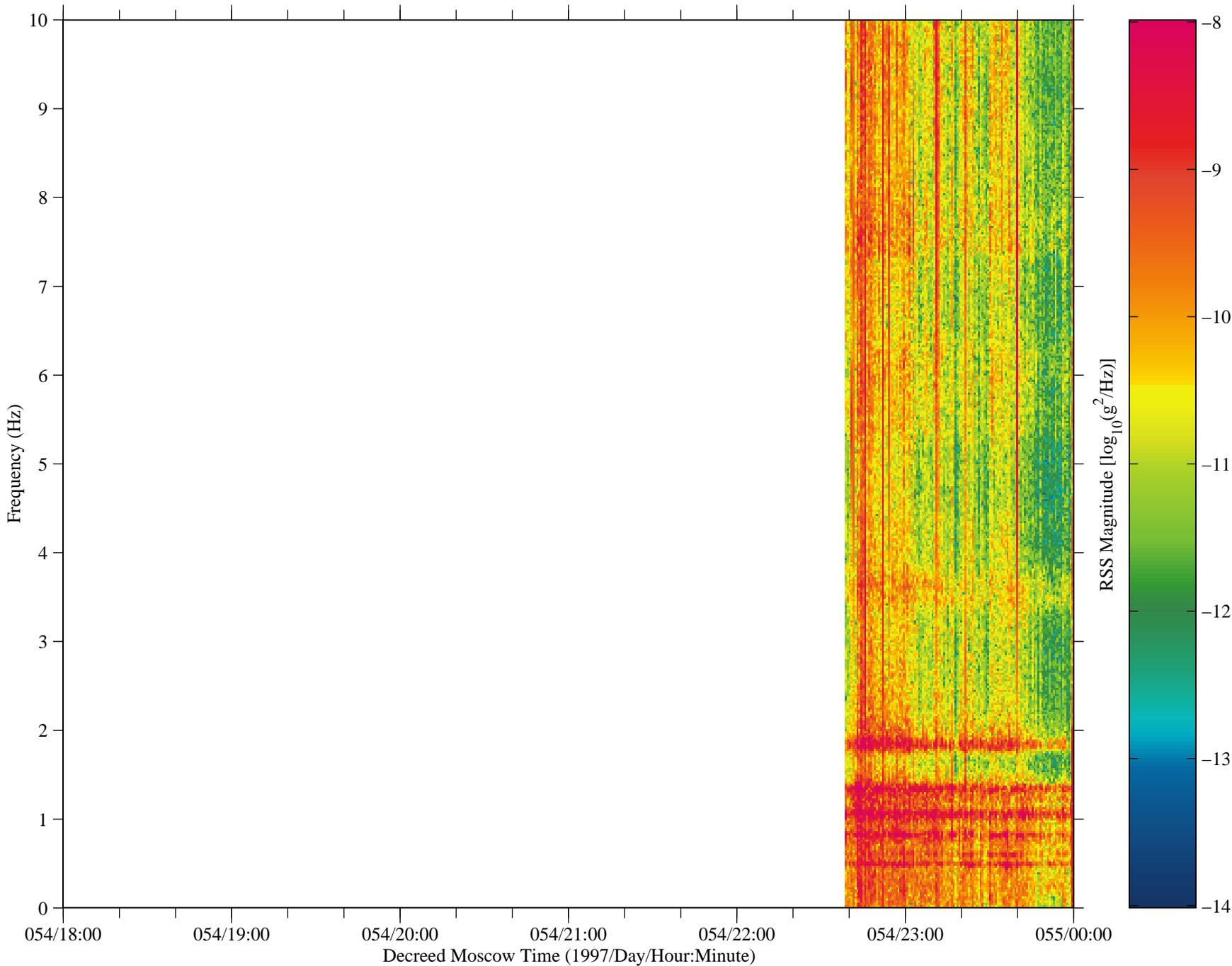
Figure 26: SAMS data from Mir, TSH B (fc=10 Hz)



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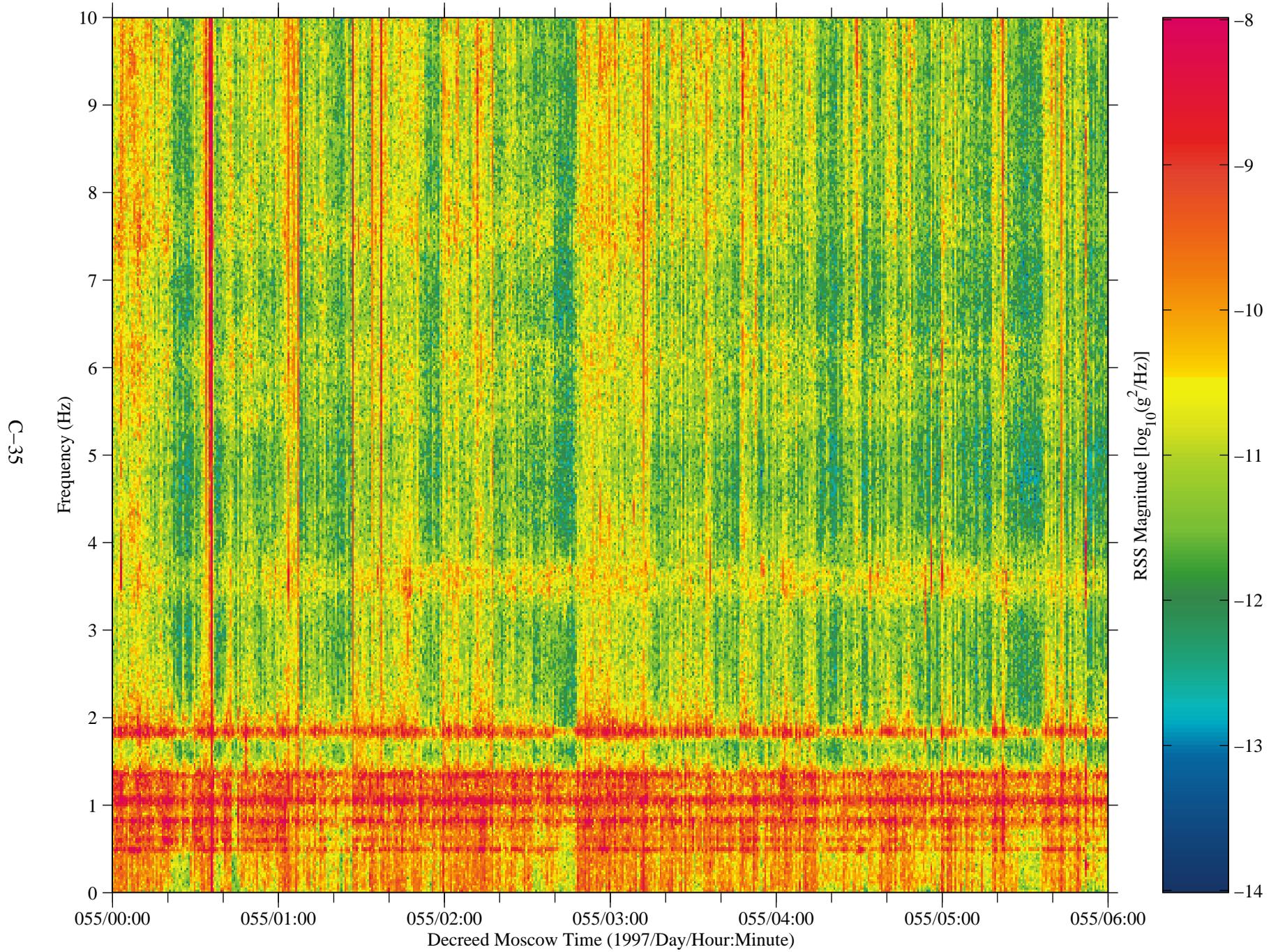
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from 044/18:00:00 – 054/18:00:00

Figure 27: SAMS data from Mir, TSH B (fc=10 Hz)



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Figure 28: SAMS data from Mir, TSH B (fc=10 Hz)



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SAMS ACCELERATION MEASUREMENTS ON MIR FROM JANUARY TO MAY 1997

Figure 29: SAMS data from Mir, TSH B (fc=10 Hz)

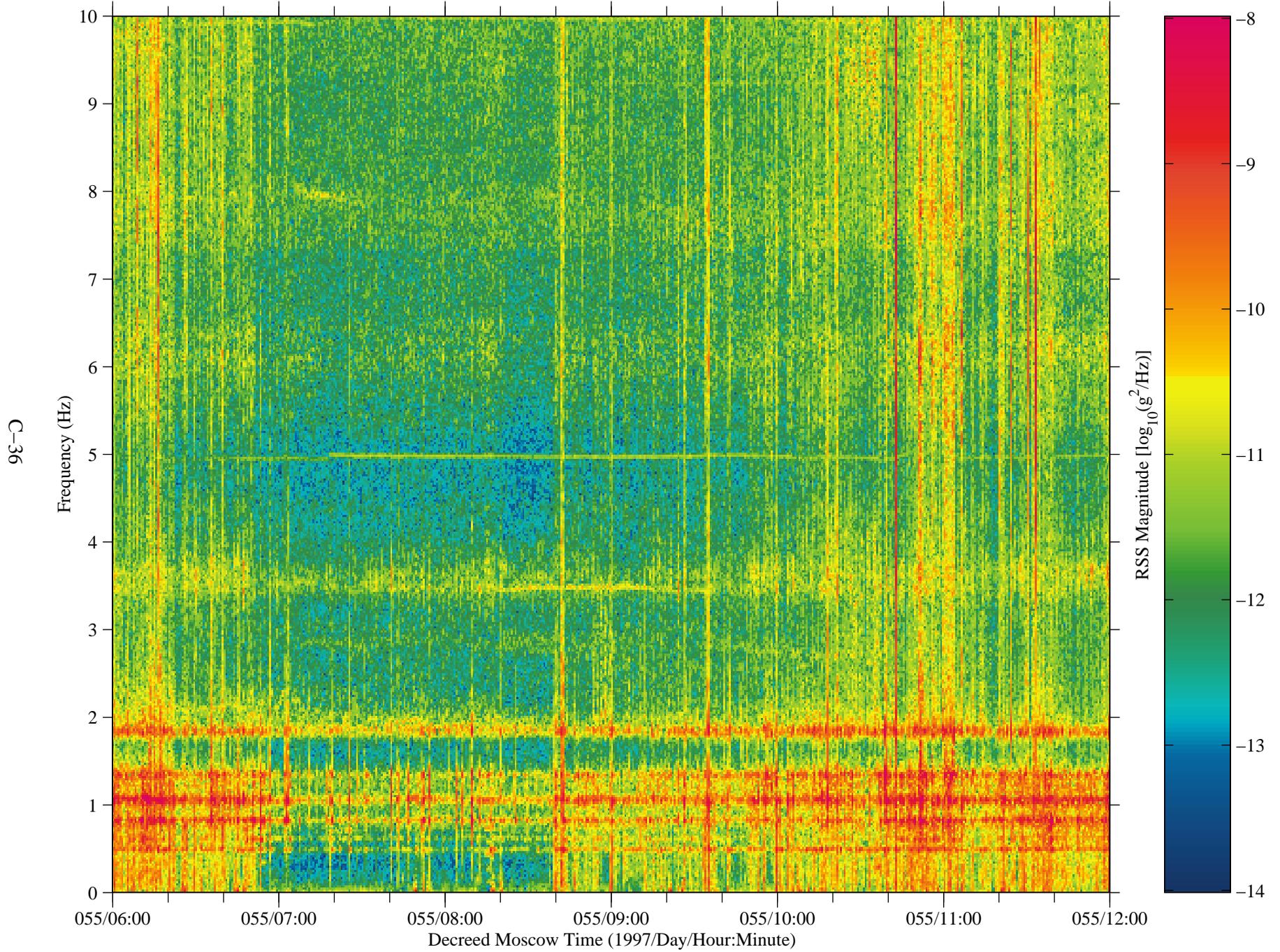
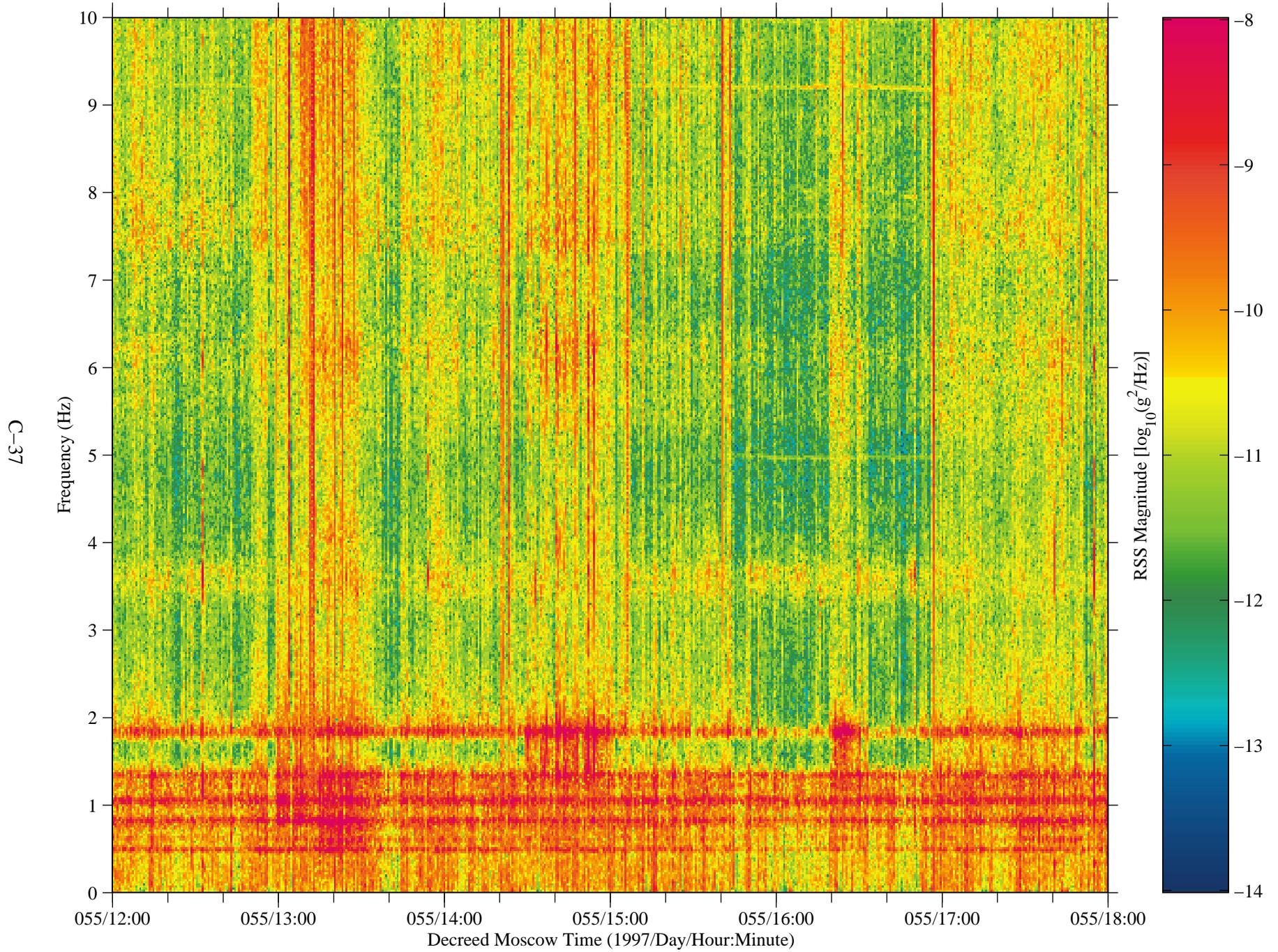


Figure 30: SAMS data from Mir, TSH B (fc=10 Hz)

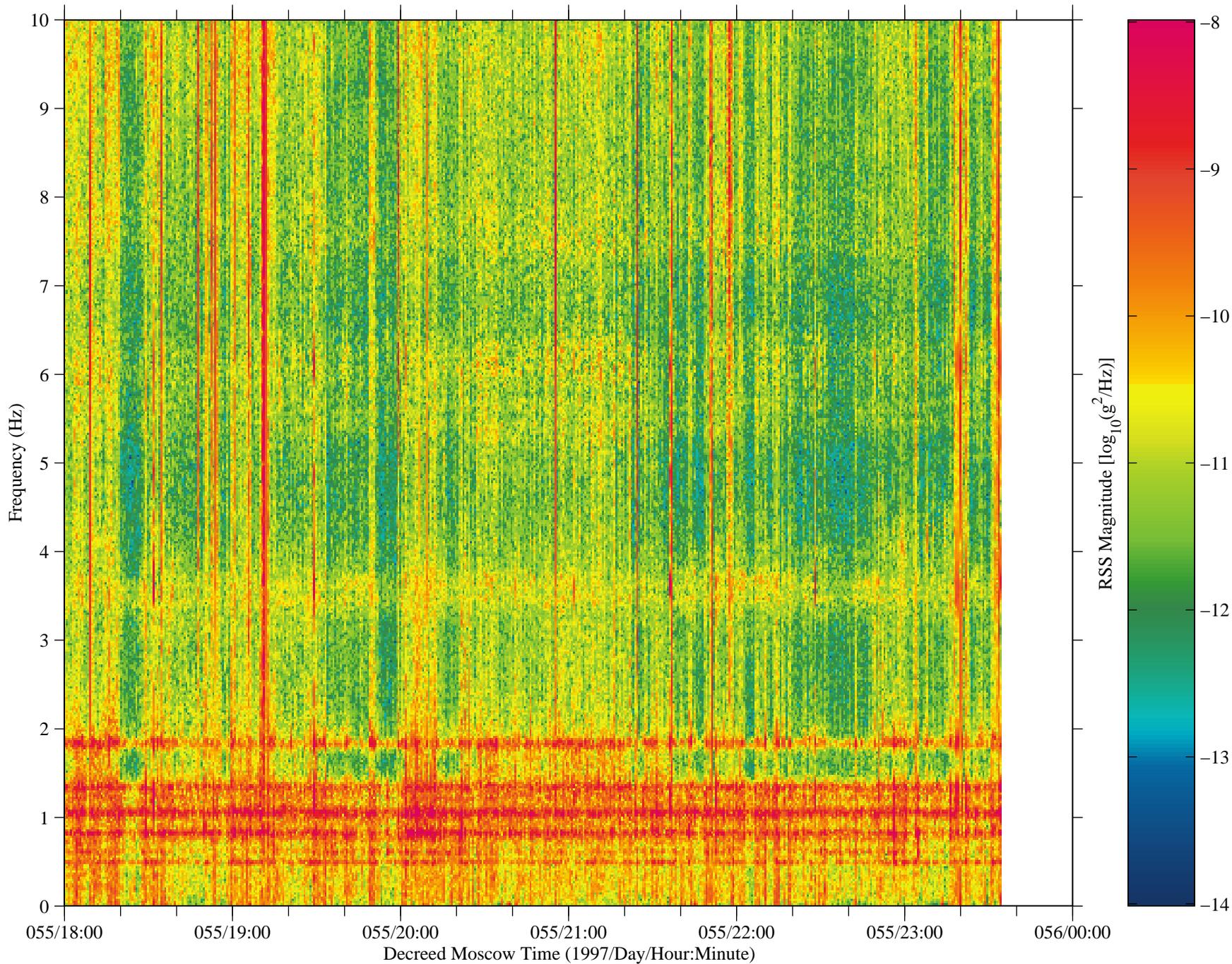


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SAMS ACCELERATION MEASUREMENTS ON MIR FROM JANUARY TO MAY 1997

Figure 31: SAMS data from Mir, TSH B (fc=10 Hz)

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SAMS ACCELERATION MEASUREMENTS ON MIR FROM JANUARY TO MAY 1997

No data are available
from 056/00:00:00 – 056/06:00:00

Figure 32: SAMS data from Mir, TSH B (fc=10 Hz)

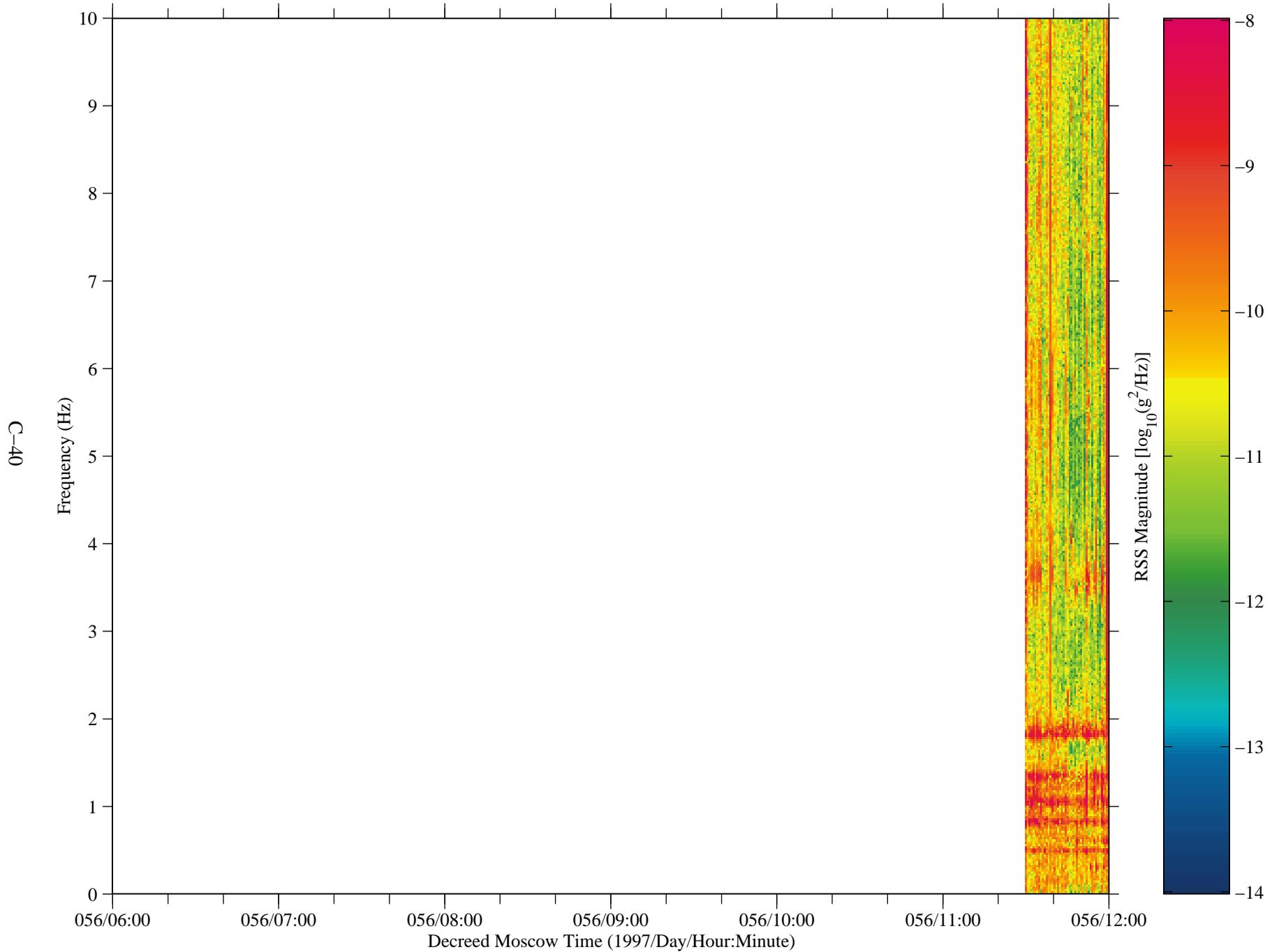


Figure 33: SAMS data from Mir, TSH B (fc=10 Hz)

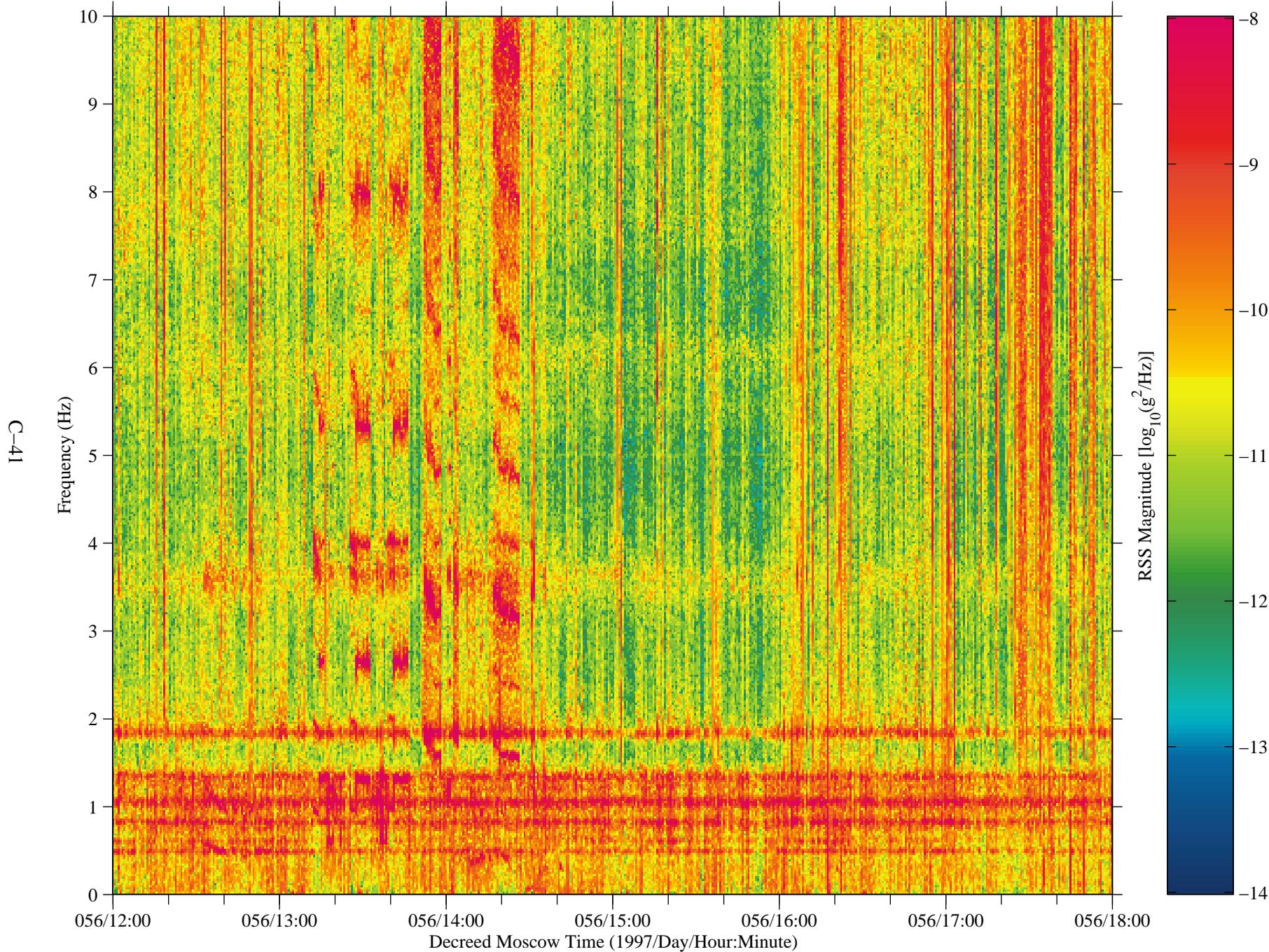
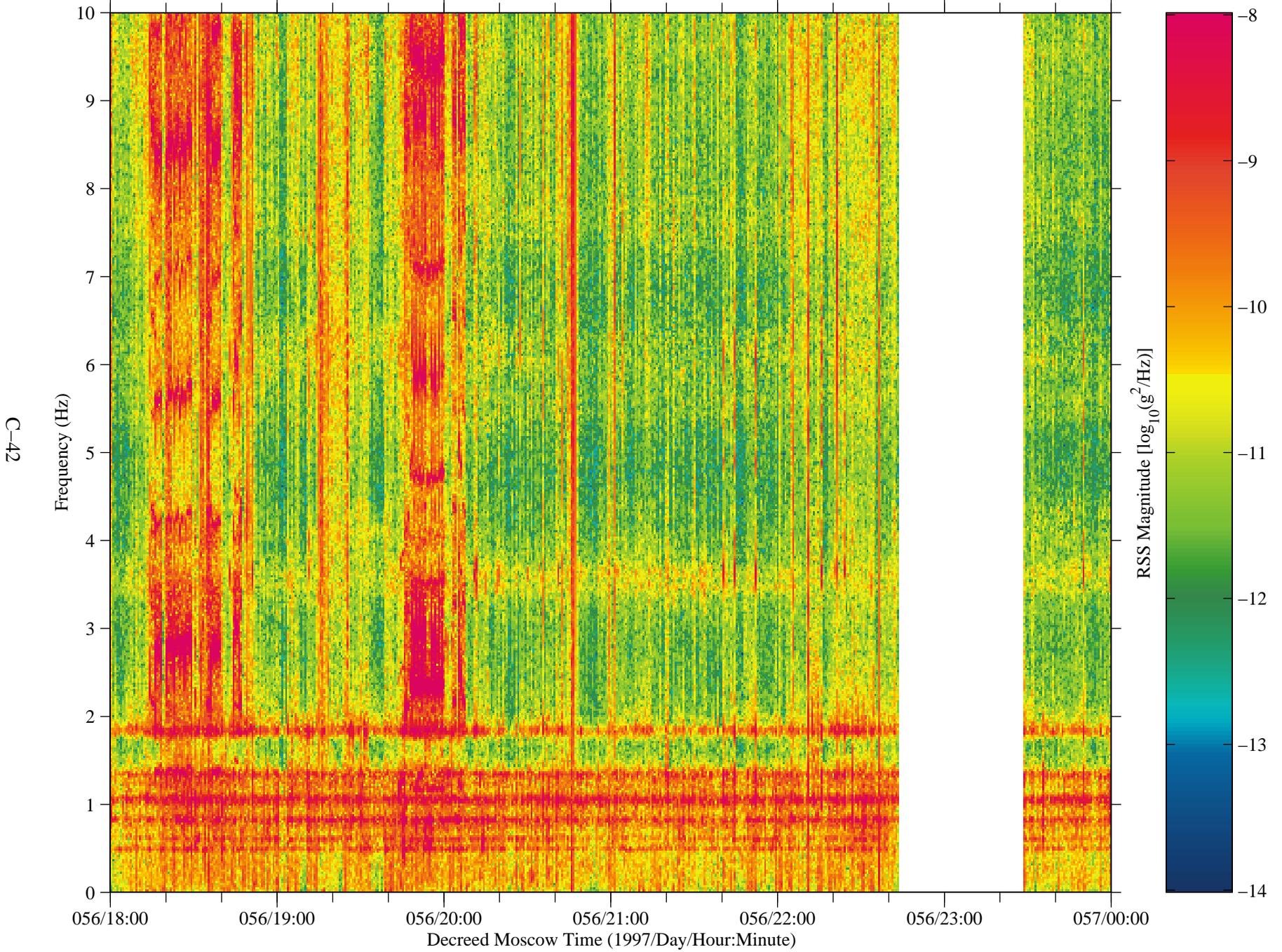


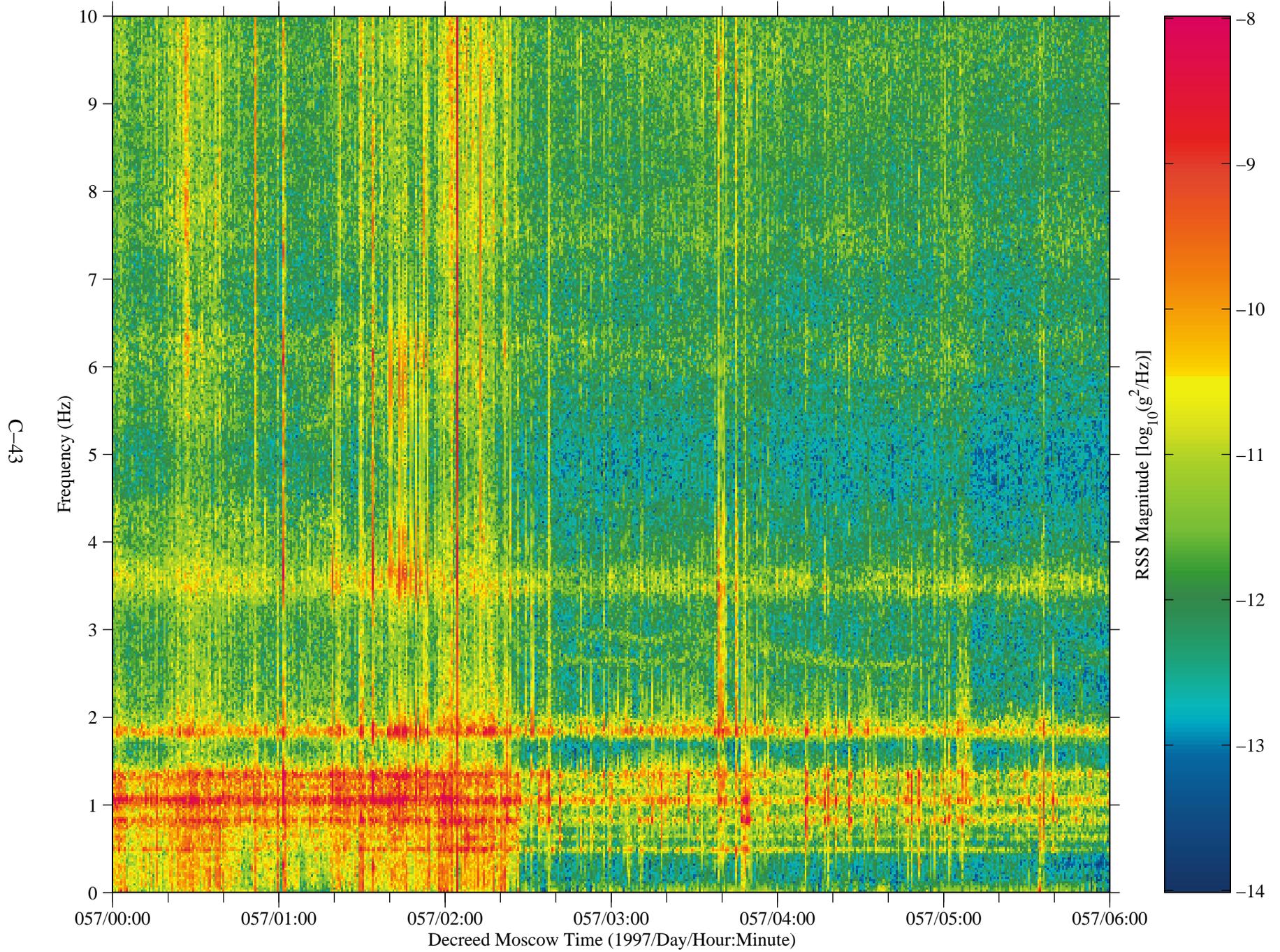
Figure 34: SAMS data from Mir, TSH B (fc=10 Hz)



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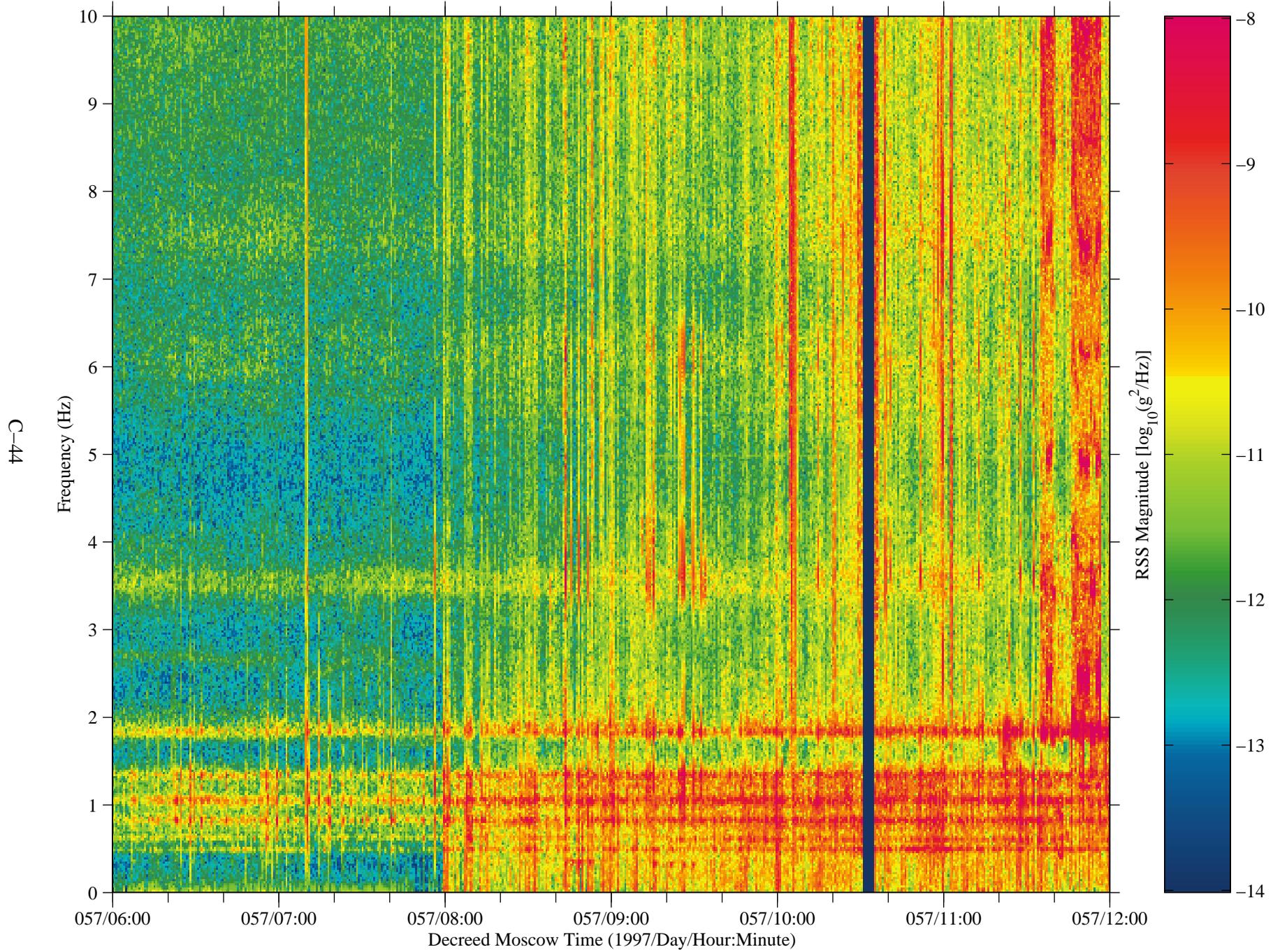
SAMS ACCELERATION MEASUREMENTS ON MIR FROM JANUARY TO MAY 1997

Figure 35: SAMS data from Mir, TSH B (fc=10 Hz)



SAMS ACCELERATION MEASUREMENTS ON MIR FROM JANUARY TO MAY 1997

Figure 36: SAMS data from Mir, TSH B (fc=10 Hz)



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SAMS ACCELERATION MEASUREMENTS ON MIR FROM JANUARY TO MAY 1997

Figure 37: SAMS data from Mir, TSH B (fc=10 Hz)

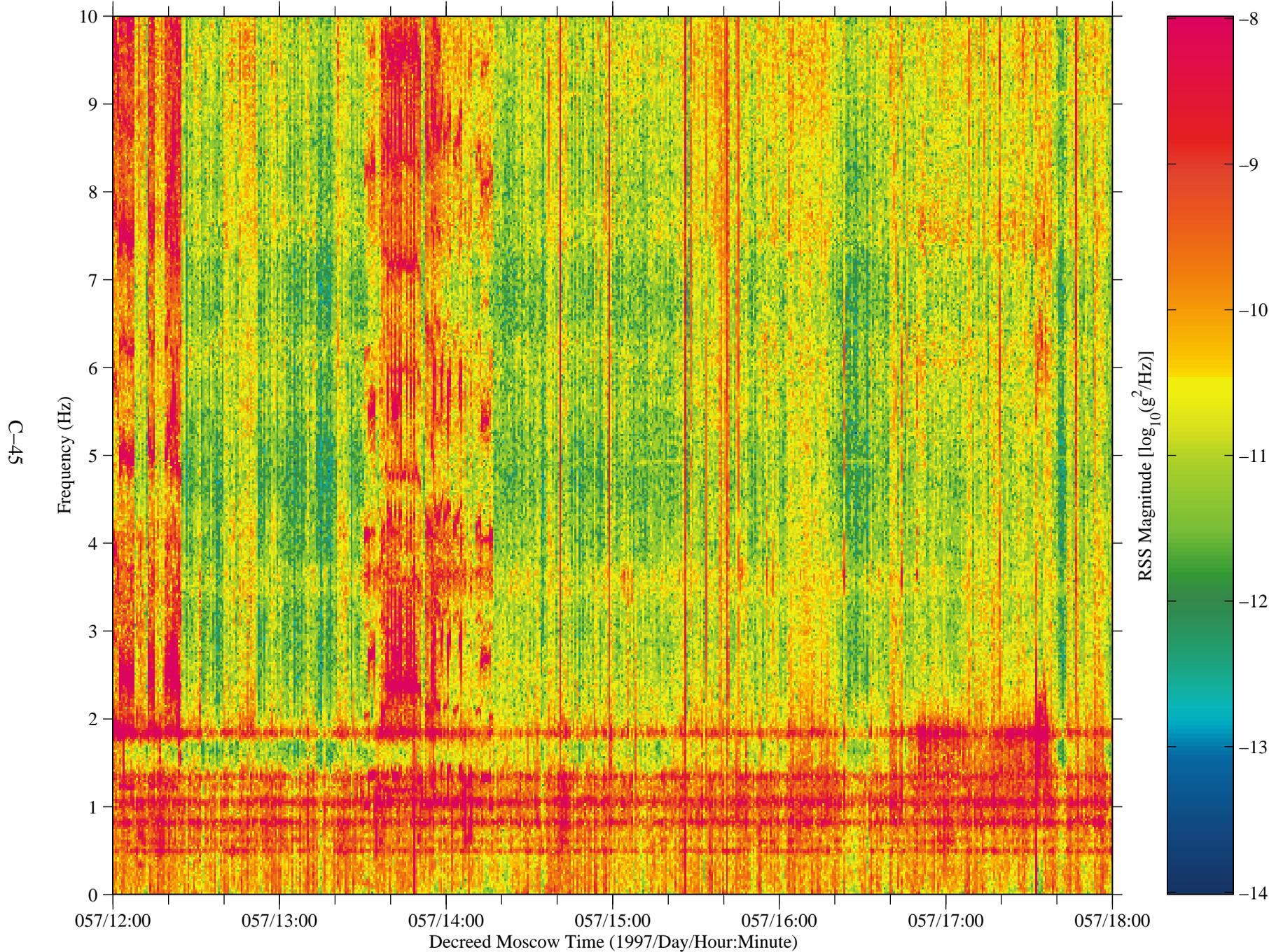
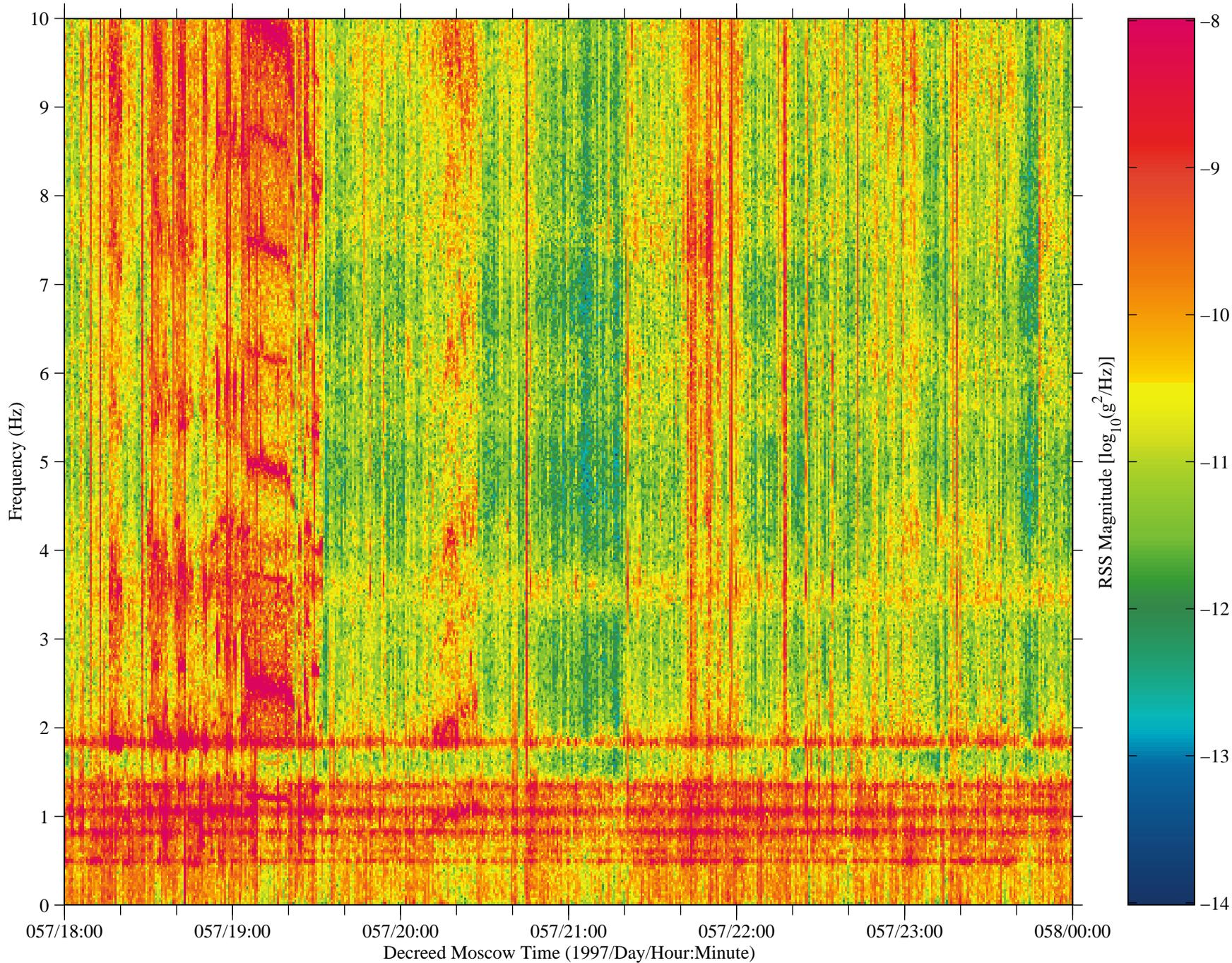


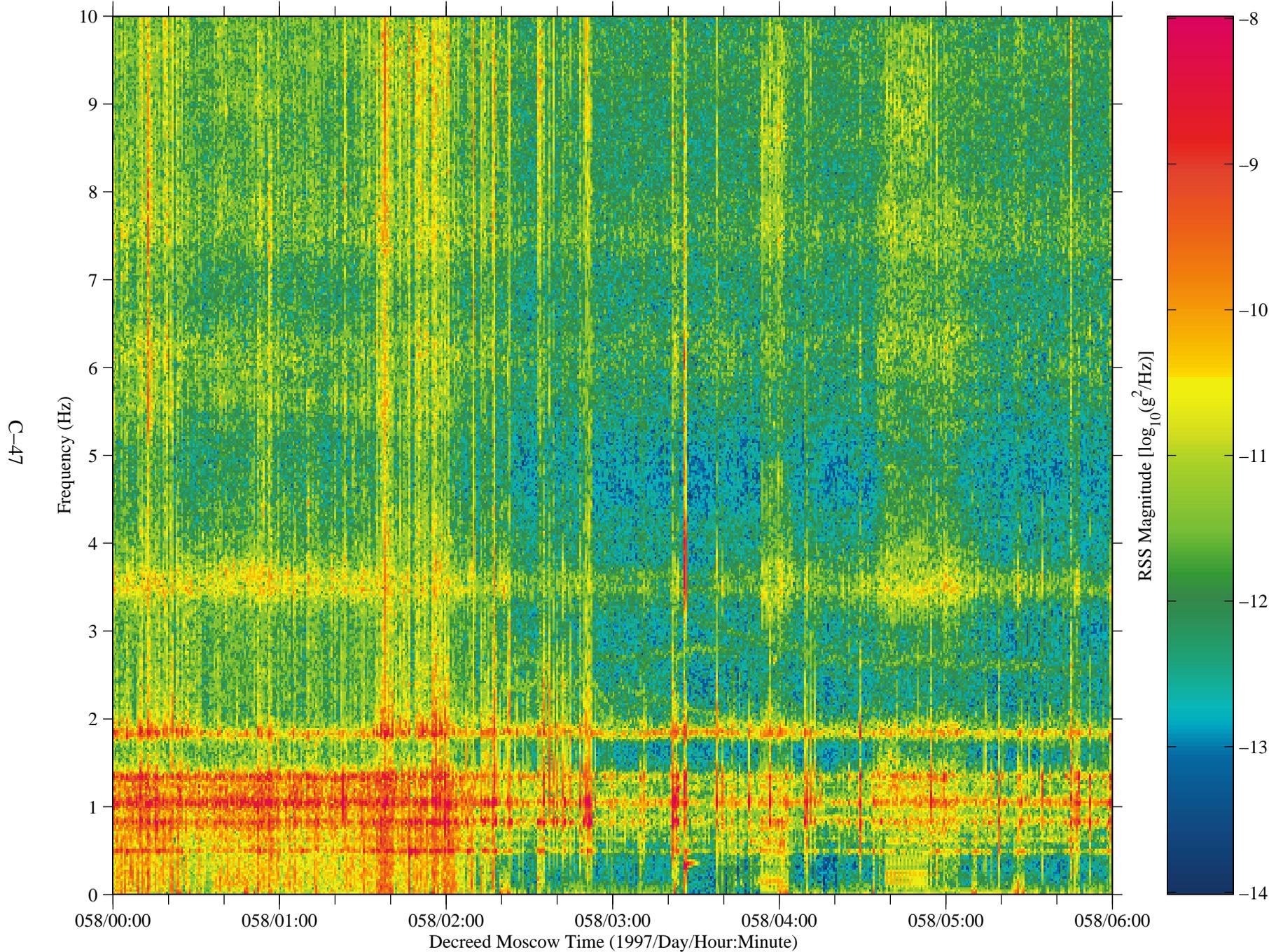
Figure 38: SAMS data from Mir, TSH B (fc=10 Hz)

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SAMS ACCELERATION MEASUREMENTS ON MIR FROM JANUARY TO MAY 1997

Figure 39: SAMS data from Mir, TSH B (fc=10 Hz)



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SAMS ACCELERATION MEASUREMENTS ON MIR FROM JANUARY TO MAY 1997

Figure 40: SAMS data from Mir, TSH B (fc=10 Hz)

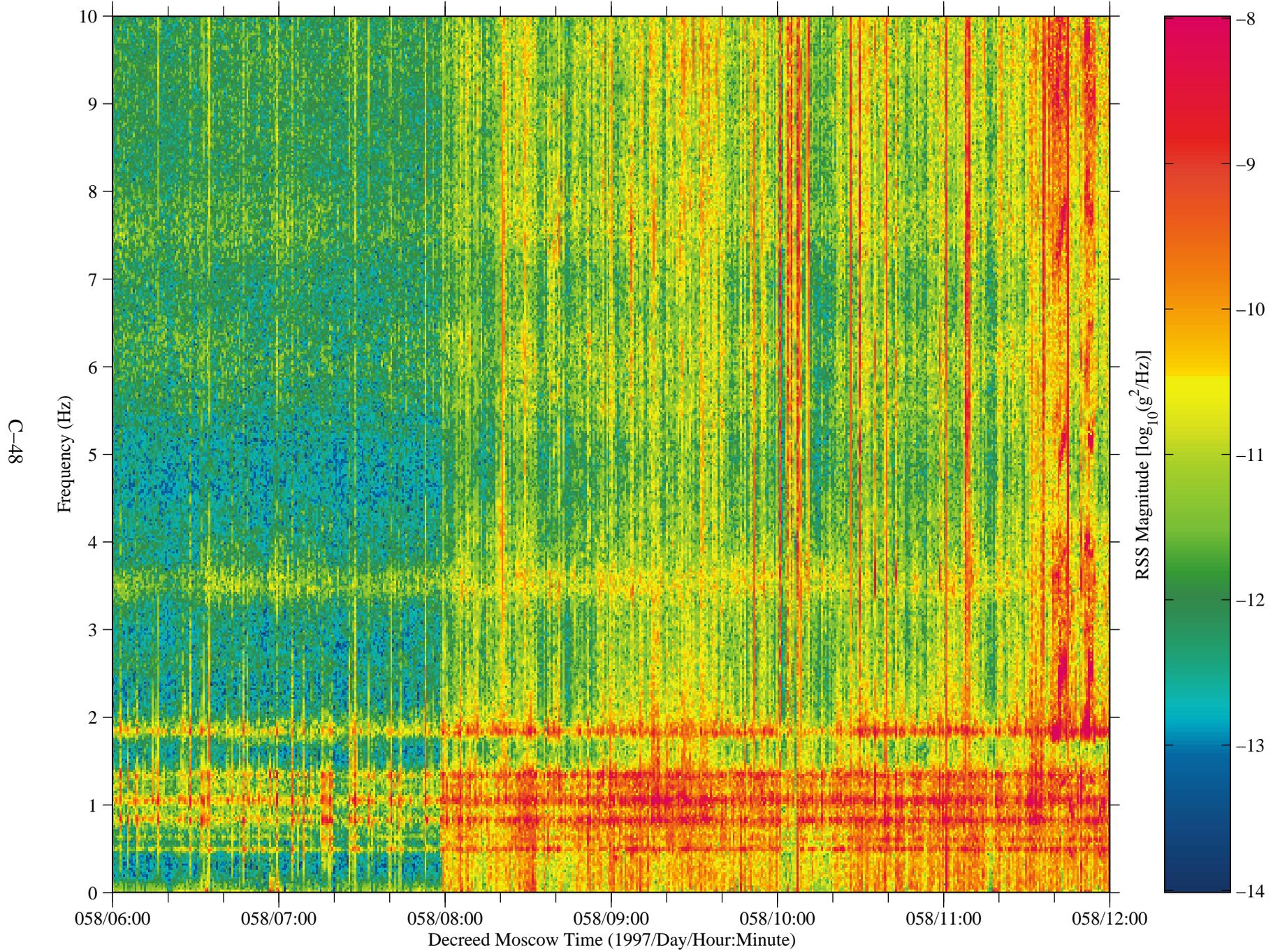


Figure 41: SAMS data from Mir, TSH B (fc=10 Hz)

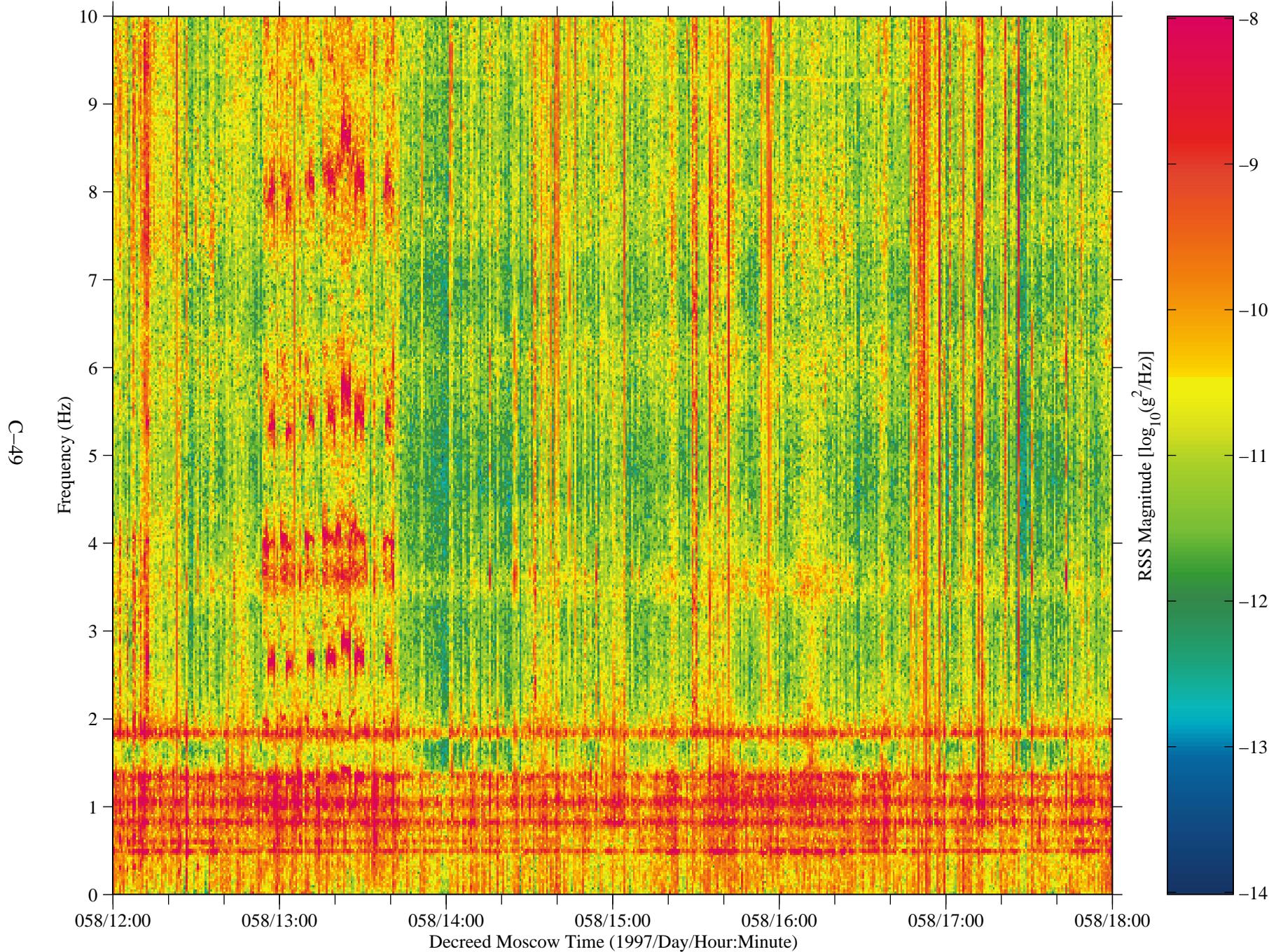


Figure 42: SAMS data from Mir, TSH B (fc=10 Hz)

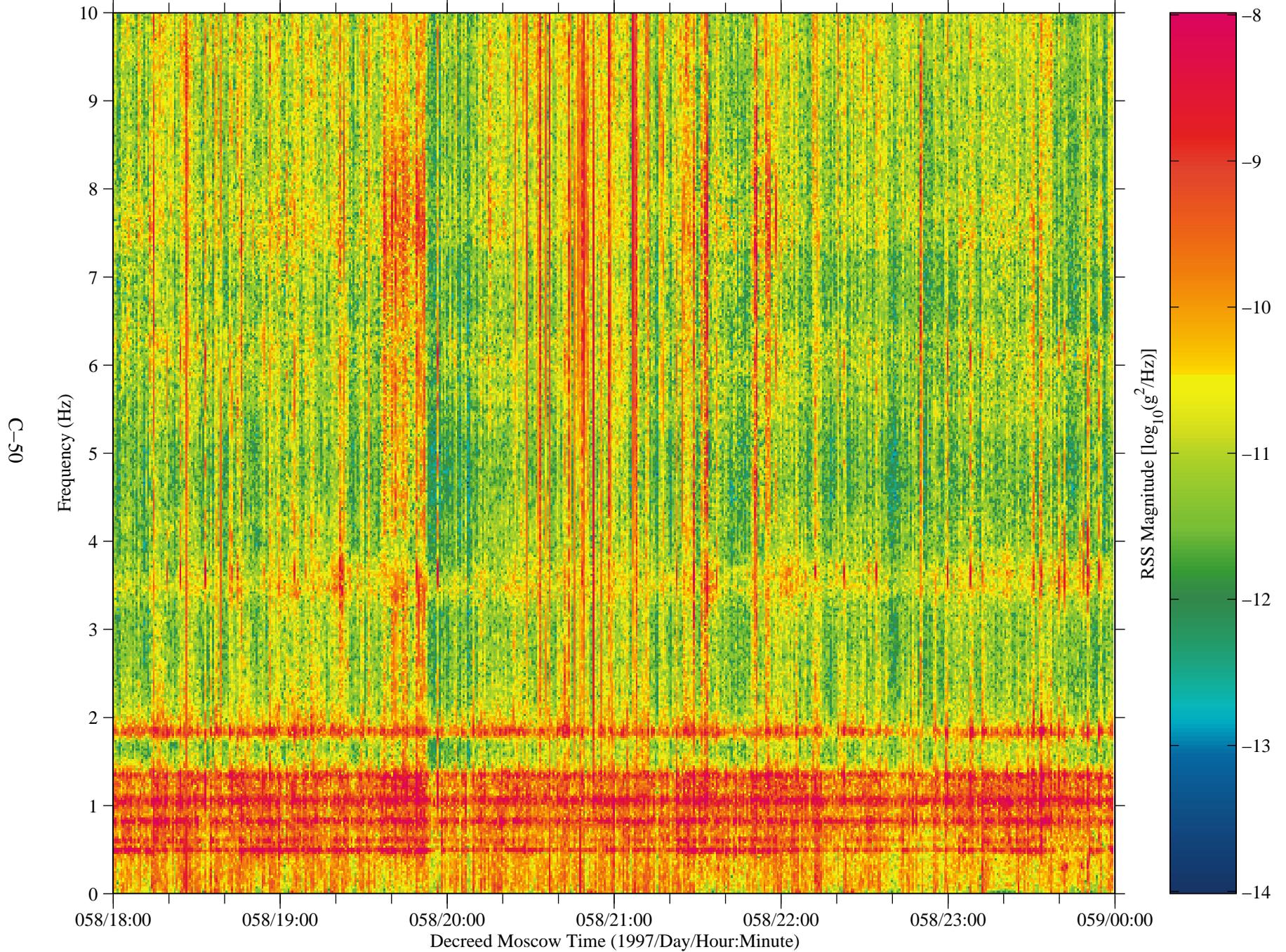
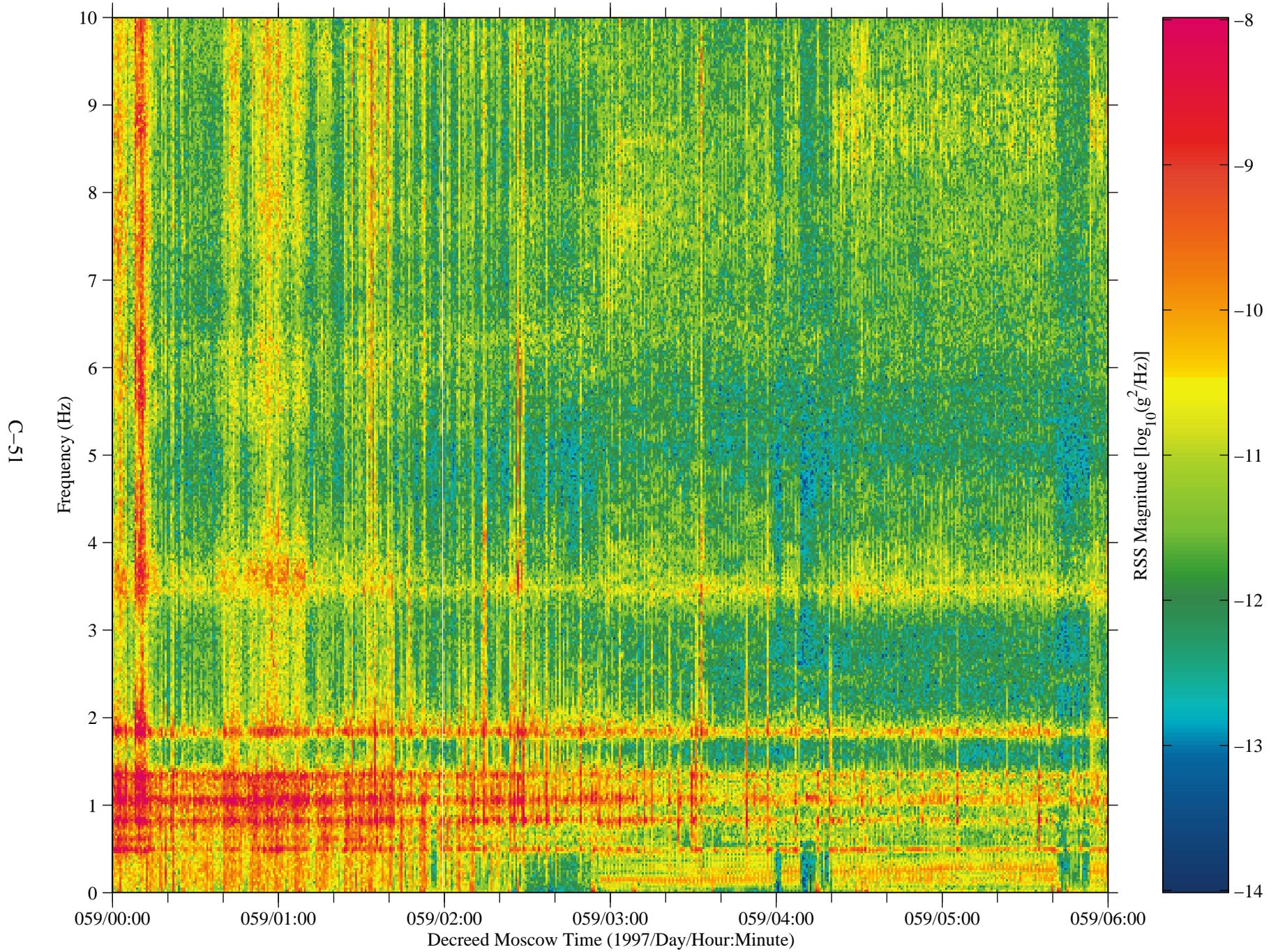
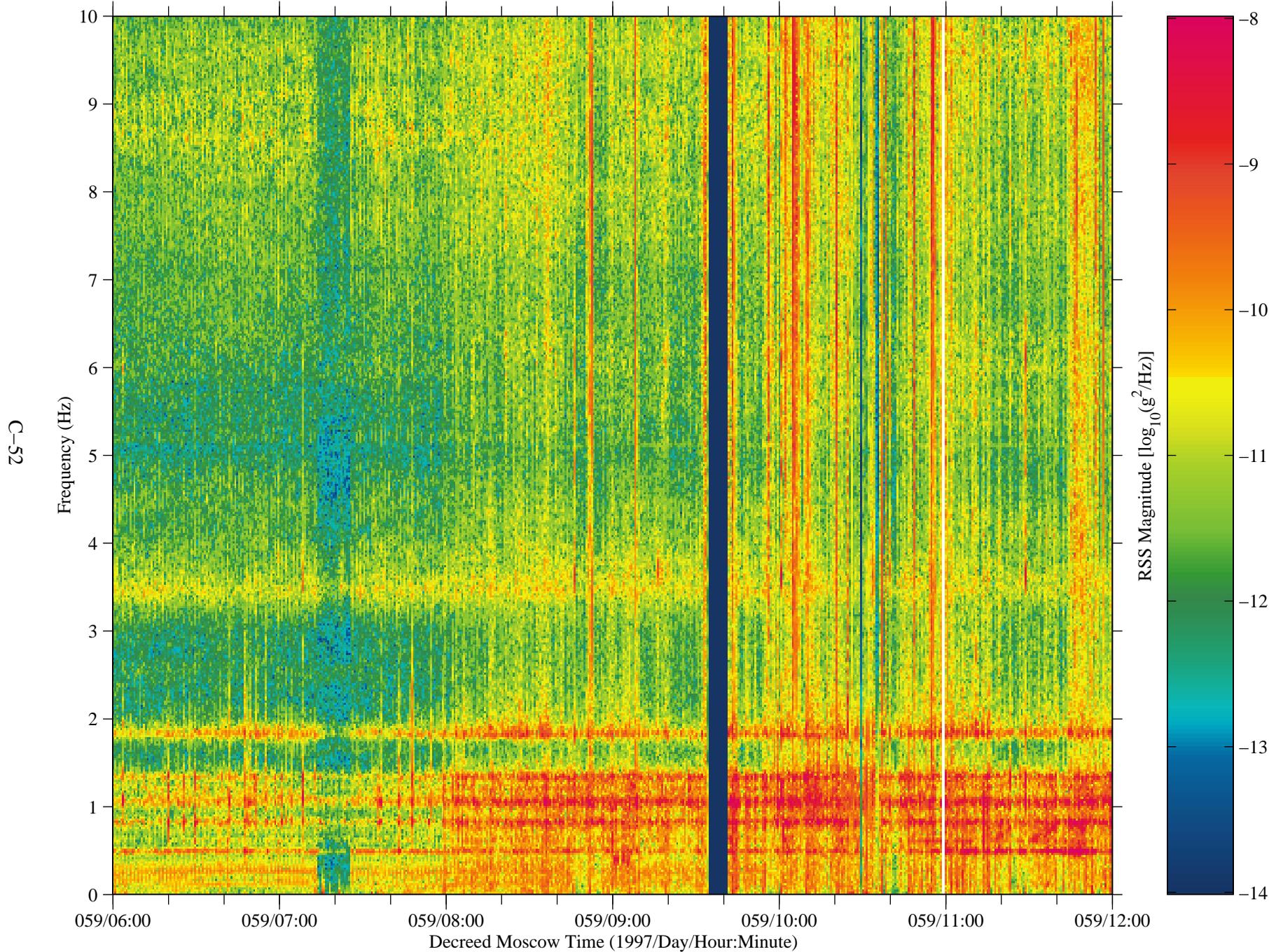


Figure 43: SAMS data from Mir, TSH B (fc=10 Hz)



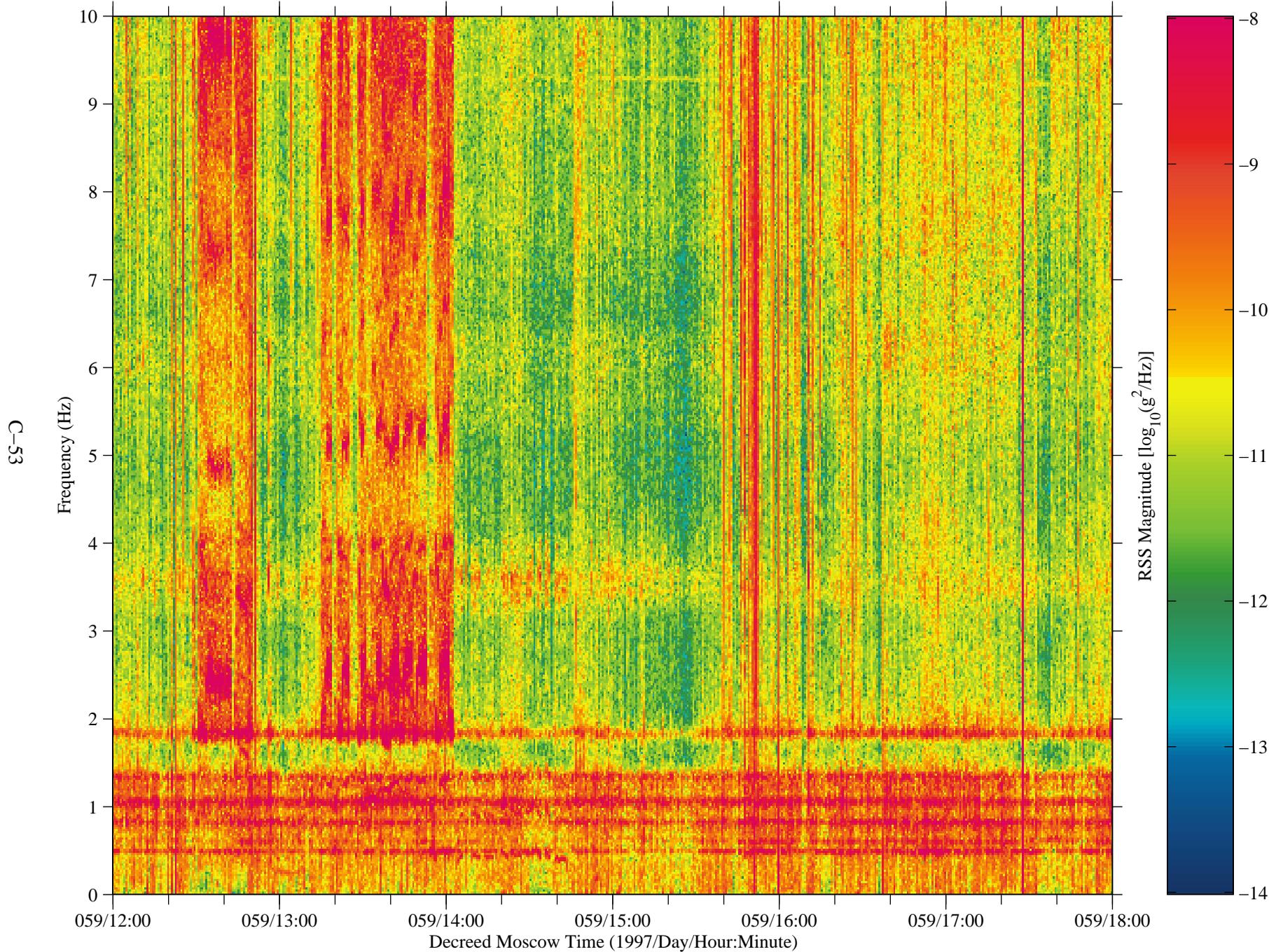
SAMS ACCELERATION MEASUREMENTS ON MIR FROM JANUARY TO MAY 1997

Figure 44: SAMS data from Mir, TSH B (fc=10 Hz)



SAMS ACCELERATION MEASUREMENTS ON MIR FROM JANUARY TO MAY 1997

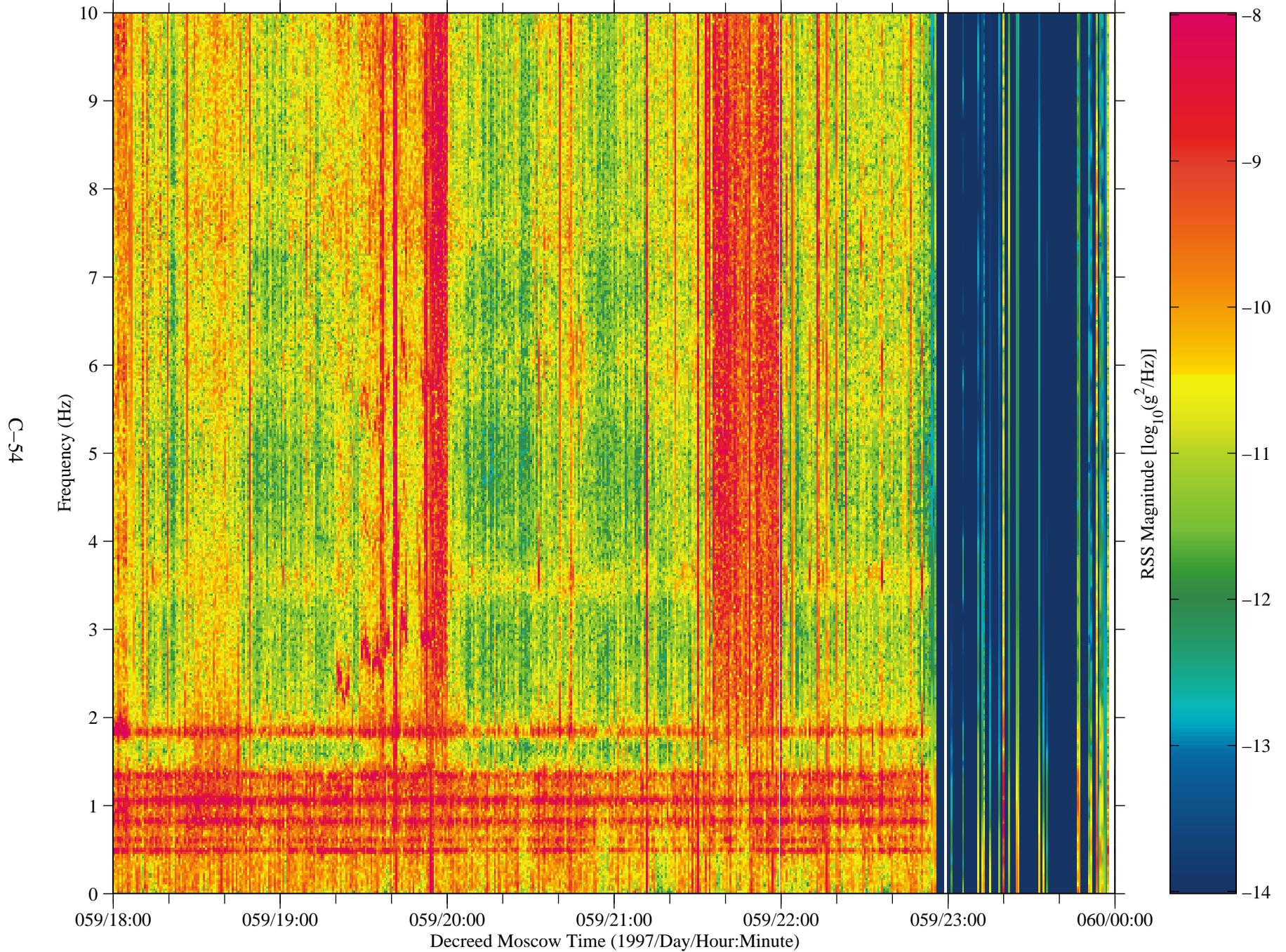
Figure 45: SAMS data from Mir, TSH B (fc=10 Hz)



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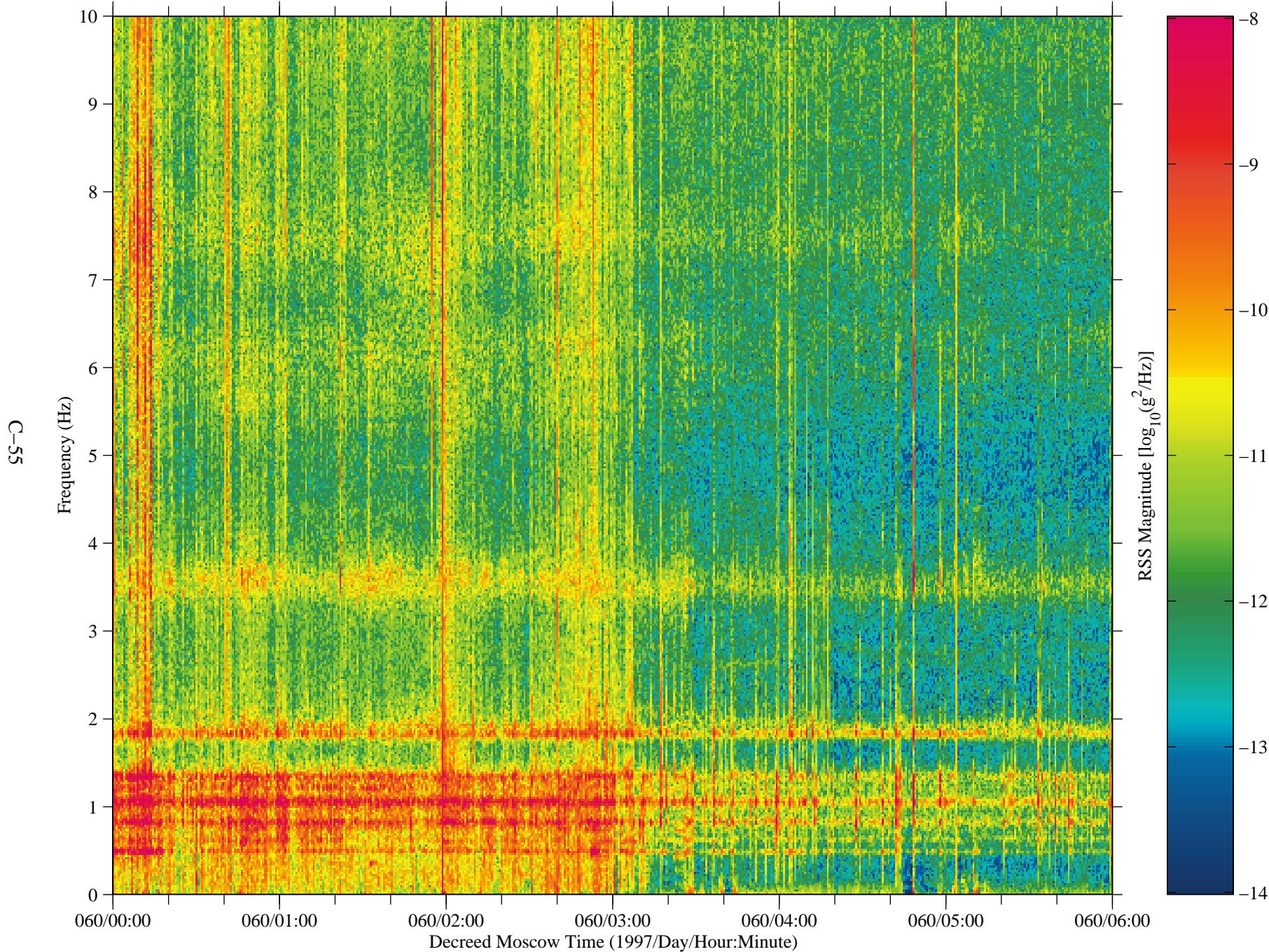
SAMS ACCELERATION MEASUREMENTS ON MIR FROM JANUARY TO MAY 1997

Figure 46: SAMS data from Mir, TSH B (fc=10 Hz)



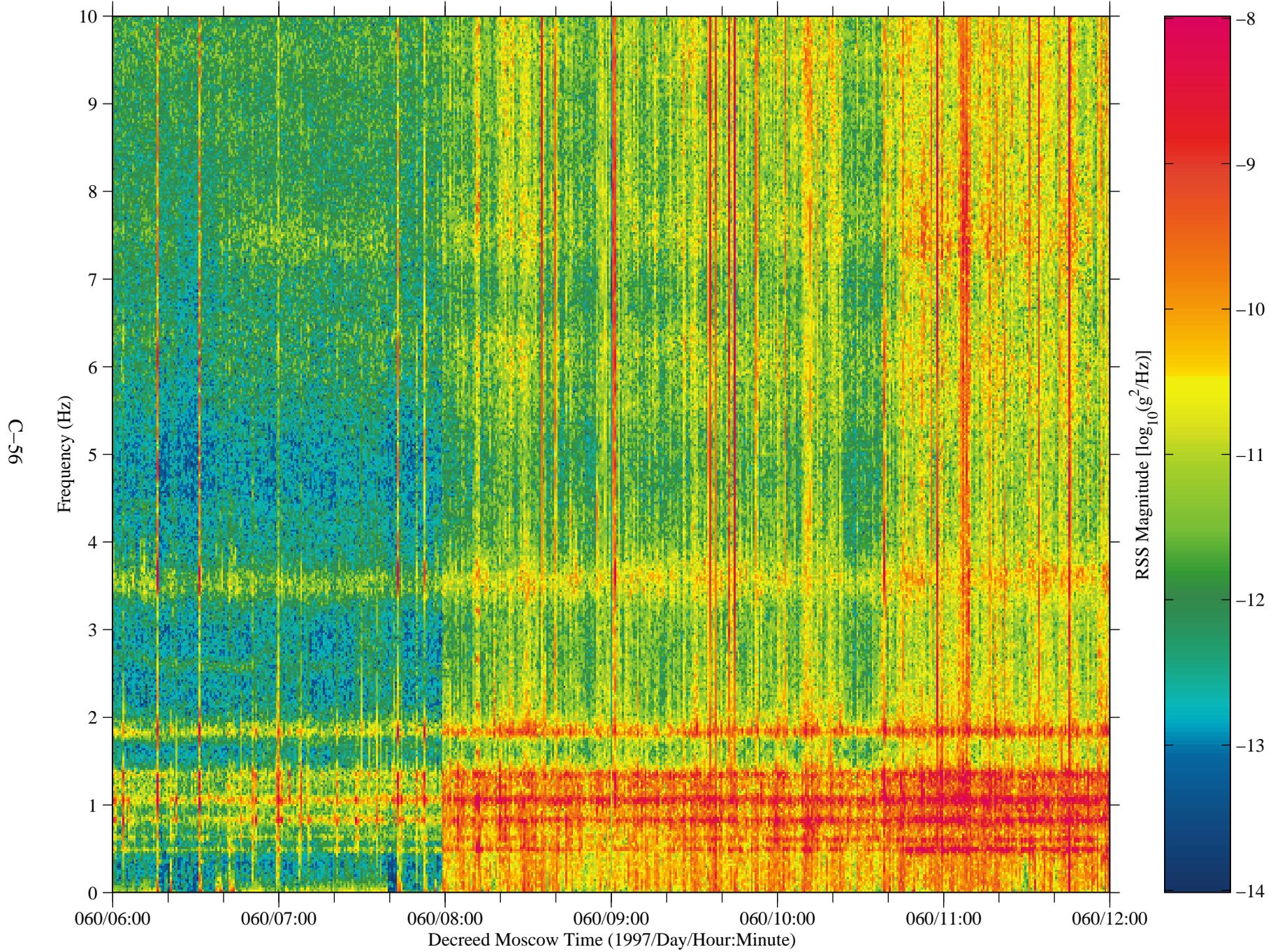
SAMS ACCELERATION MEASUREMENTS ON MIR FROM JANUARY TO MAY 1997

Figure 47: SAMS data from Mir, TSH B (fc=10 Hz)



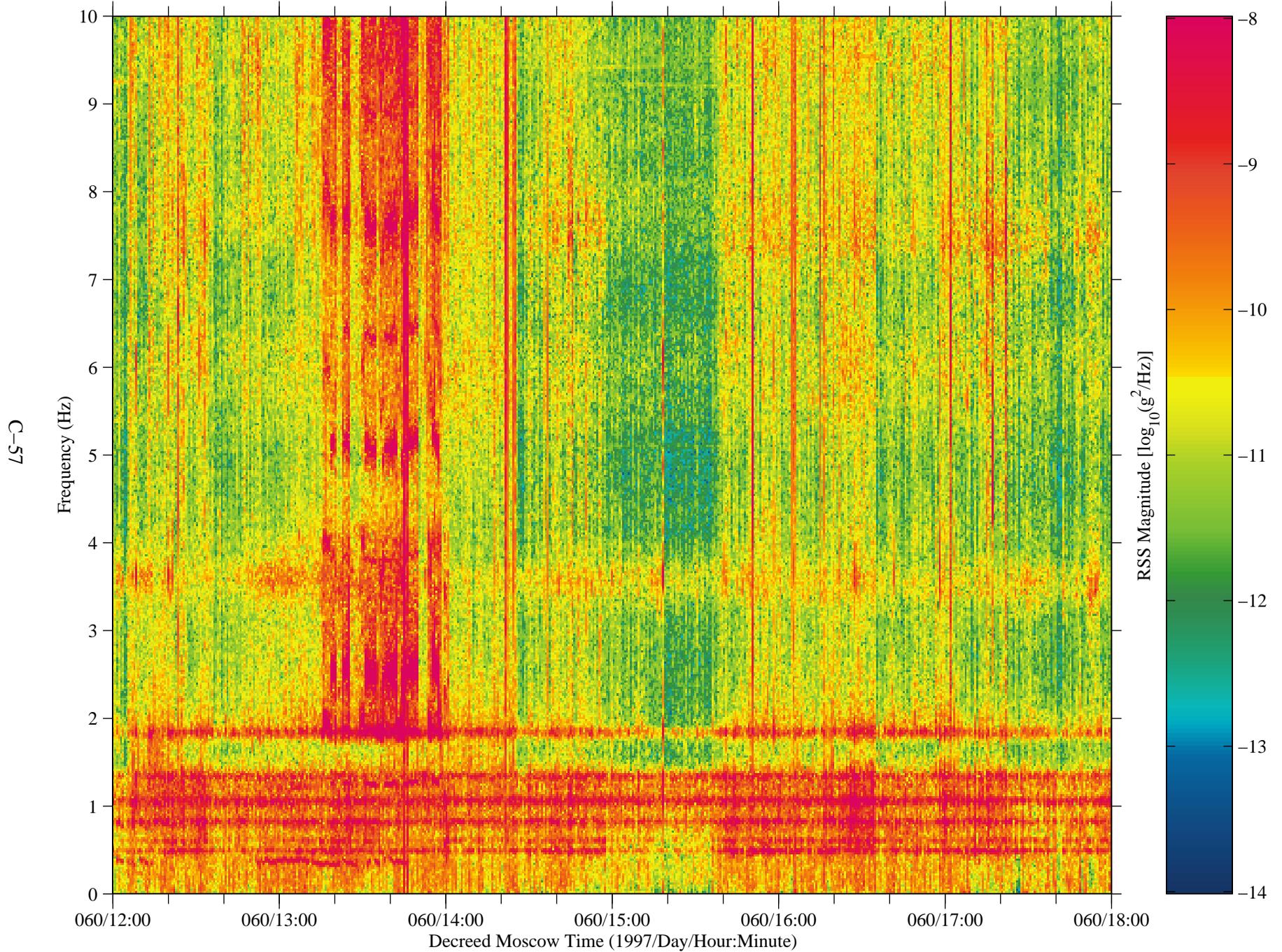
SAMS ACCELERATION MEASUREMENTS ON MIR FROM JANUARY TO MAY 1997

Figure 48: SAMS data from Mir, TSH B (fc=10 Hz)



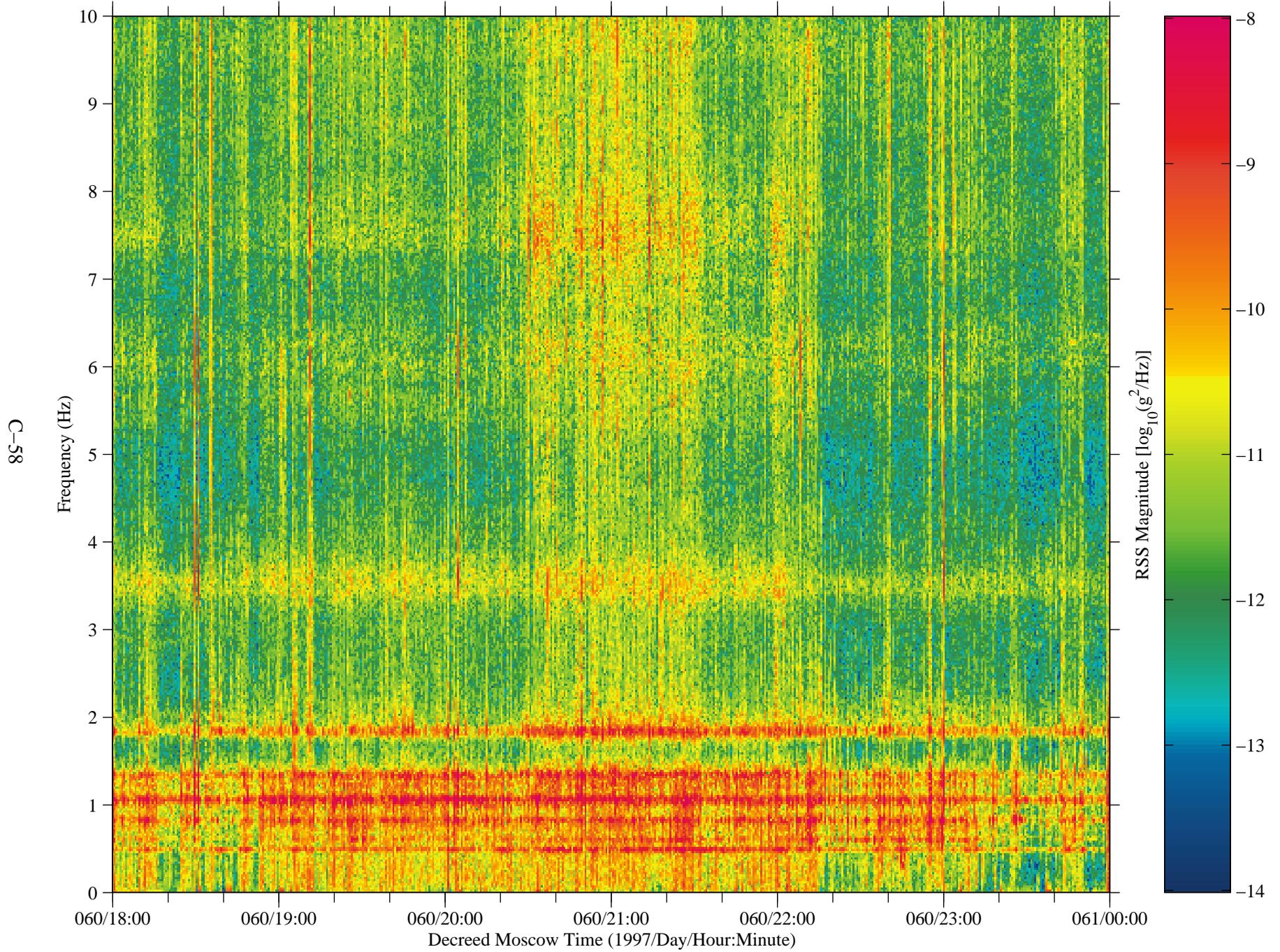
SAMS ACCELERATION MEASUREMENTS ON MIR FROM JANUARY TO MAY 1997

Figure 49: SAMS data from Mir, TSH B (fc=10 Hz)



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Figure 50: SAMS data from Mir, TSH B (fc=10 Hz)



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SAMS ACCELERATION MEASUREMENTS ON MIR FROM JANUARY TO MAY 1997

Figure 51: SAMS data from Mir, TSH B (fc=10 Hz)

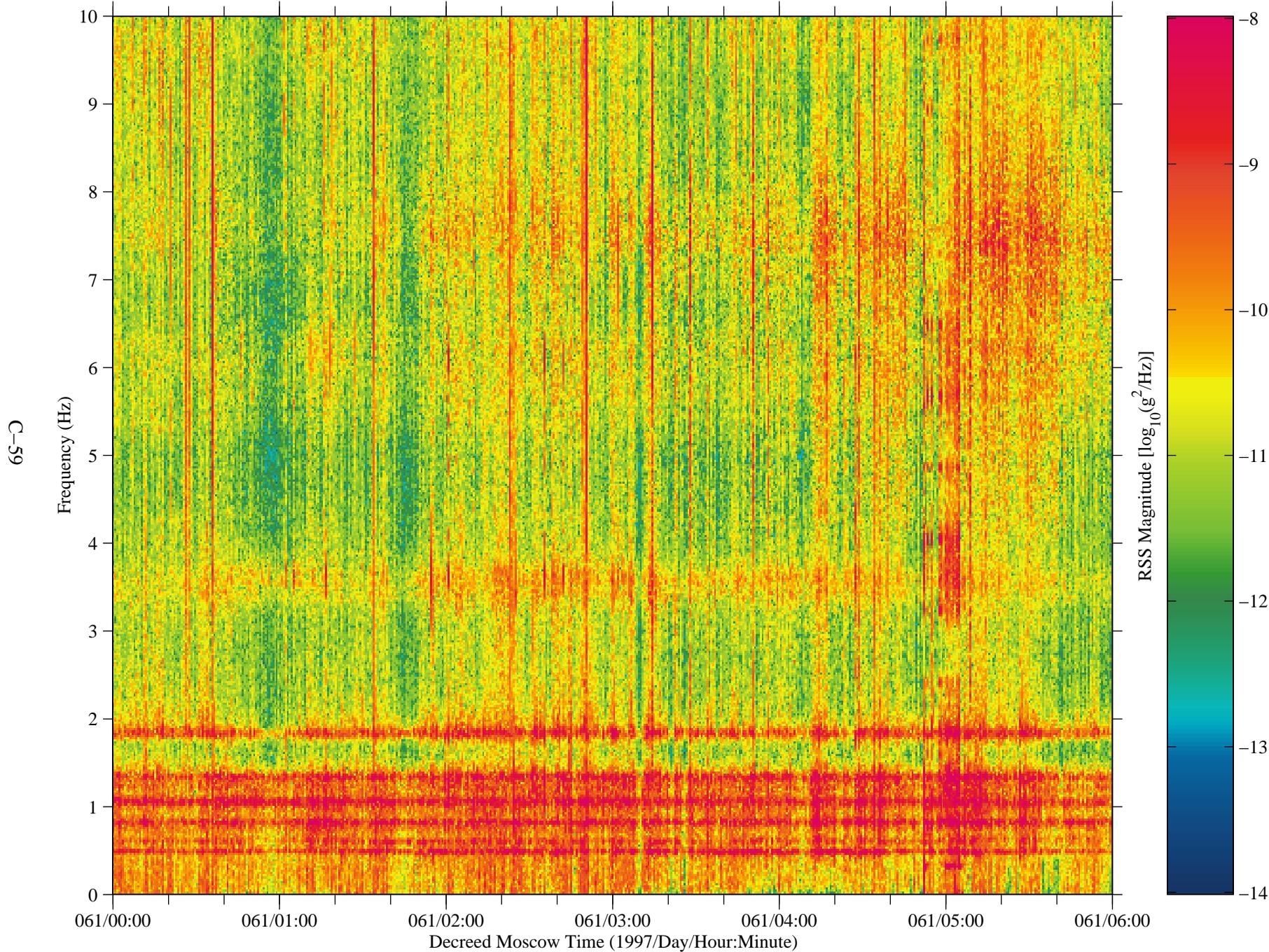
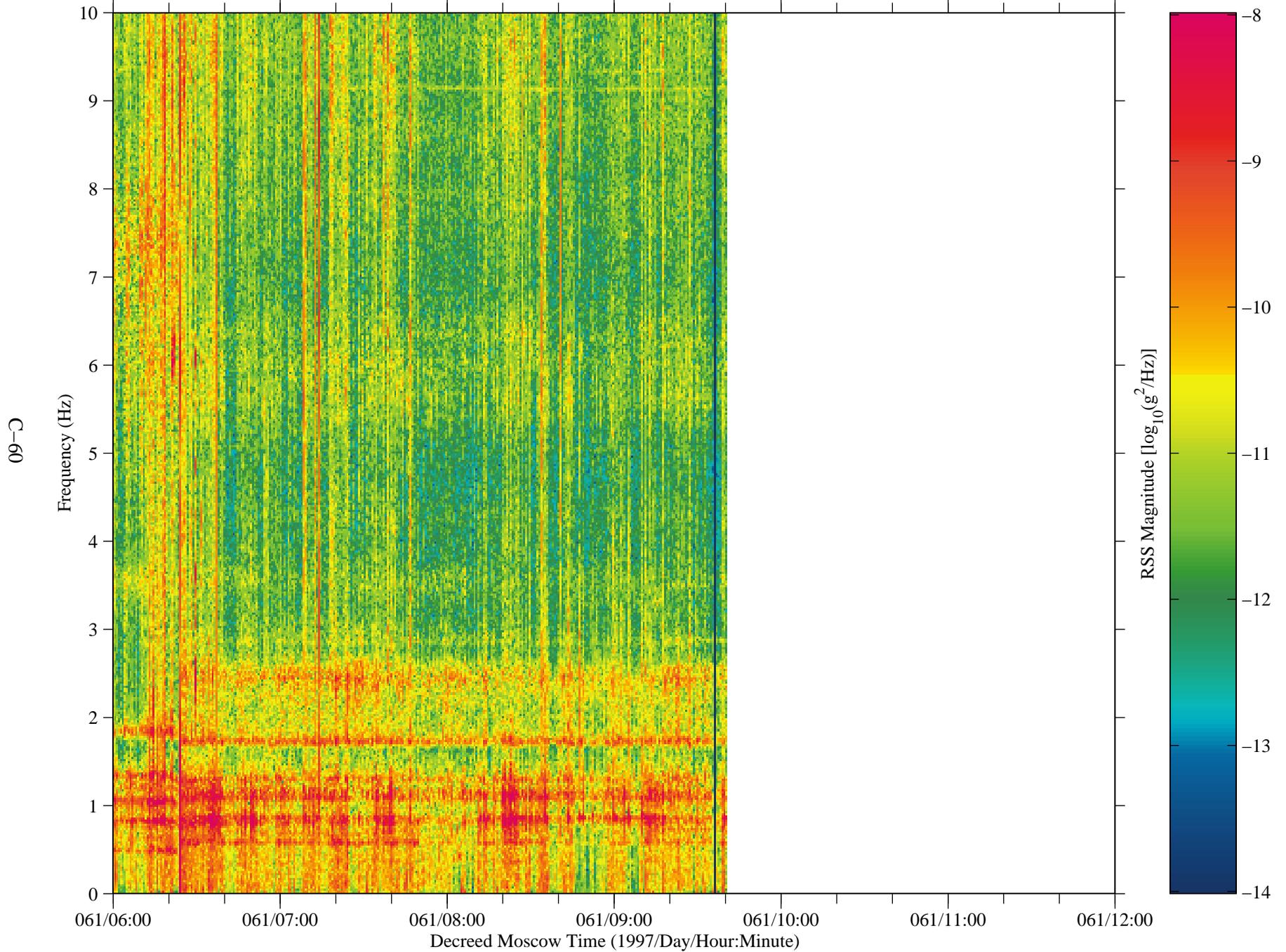


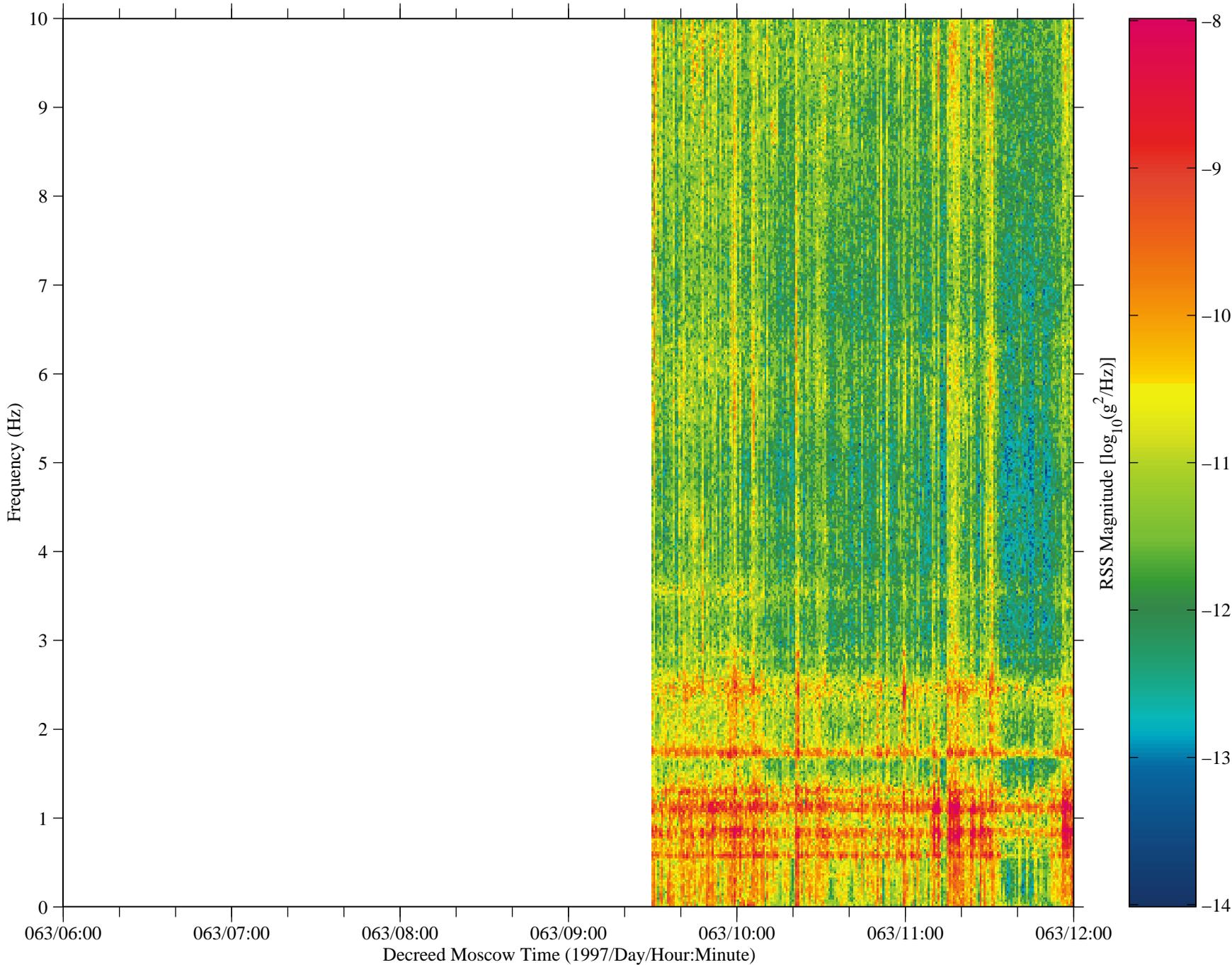
Figure 52: SAMS data from Mir, TSH B (fc=10 Hz)



SAMS ACCELERATION MEASUREMENTS ON MIR FROM JANUARY TO MAY 1997

No data are available
from 061/12:00:00 – 063/06:00:00

Figure 53: SAMS data from Mir, TSH B (fc=10 Hz)



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SAMS ACCELERATION MEASUREMENTS ON MIR FROM JANUARY TO MAY 1997

Figure 54: SAMS data from Mir, TSH B (fc=10 Hz)

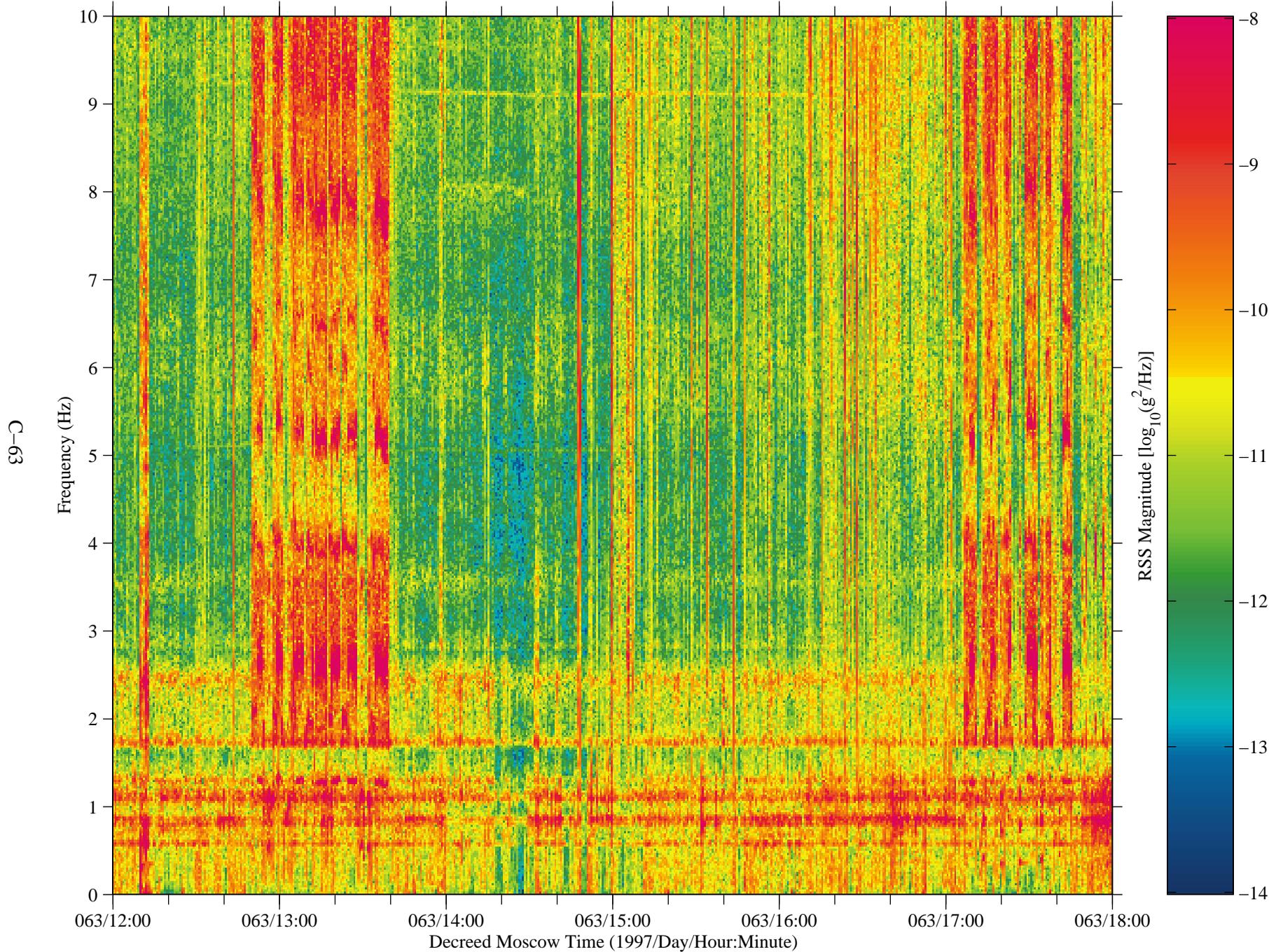
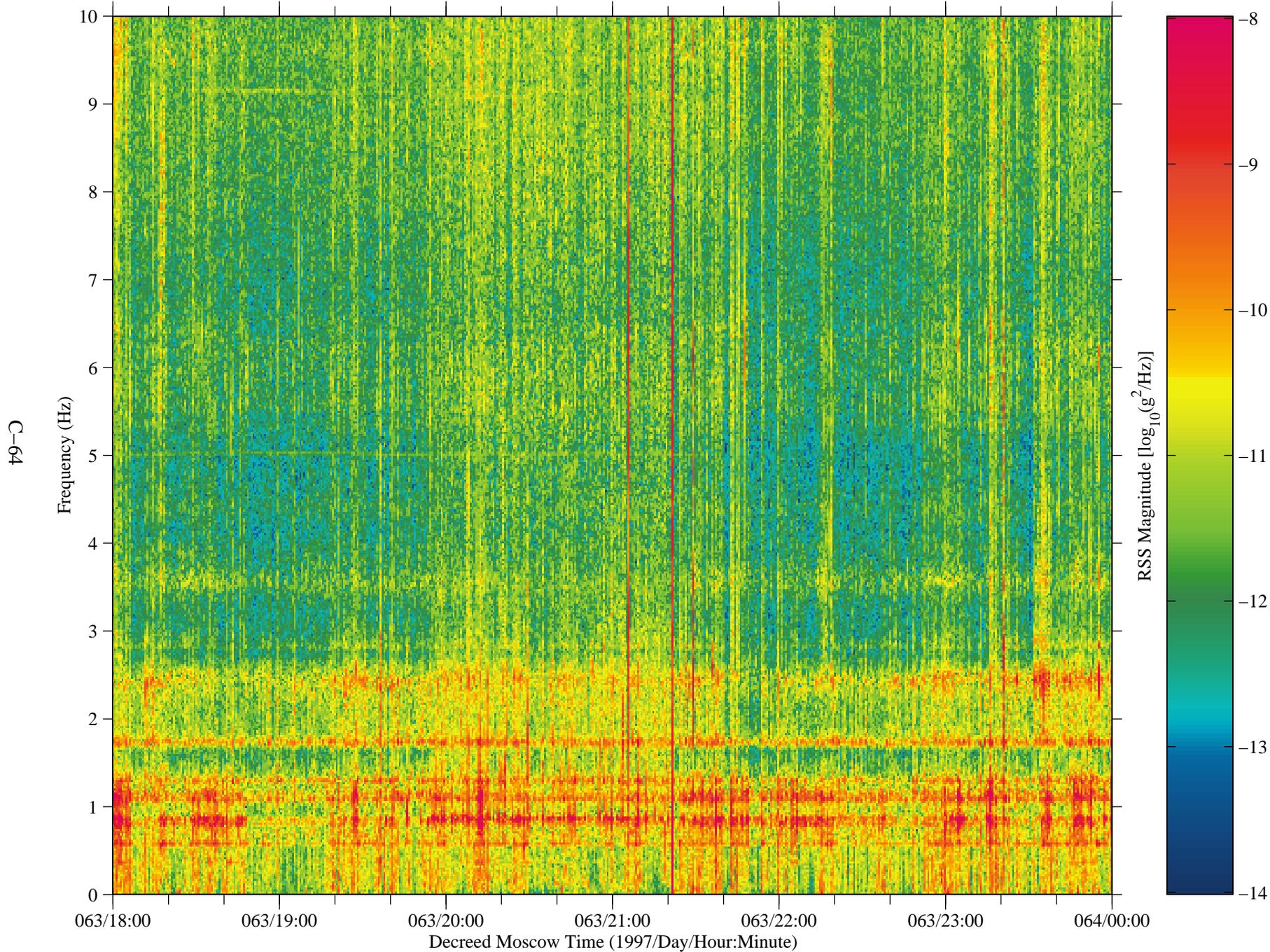
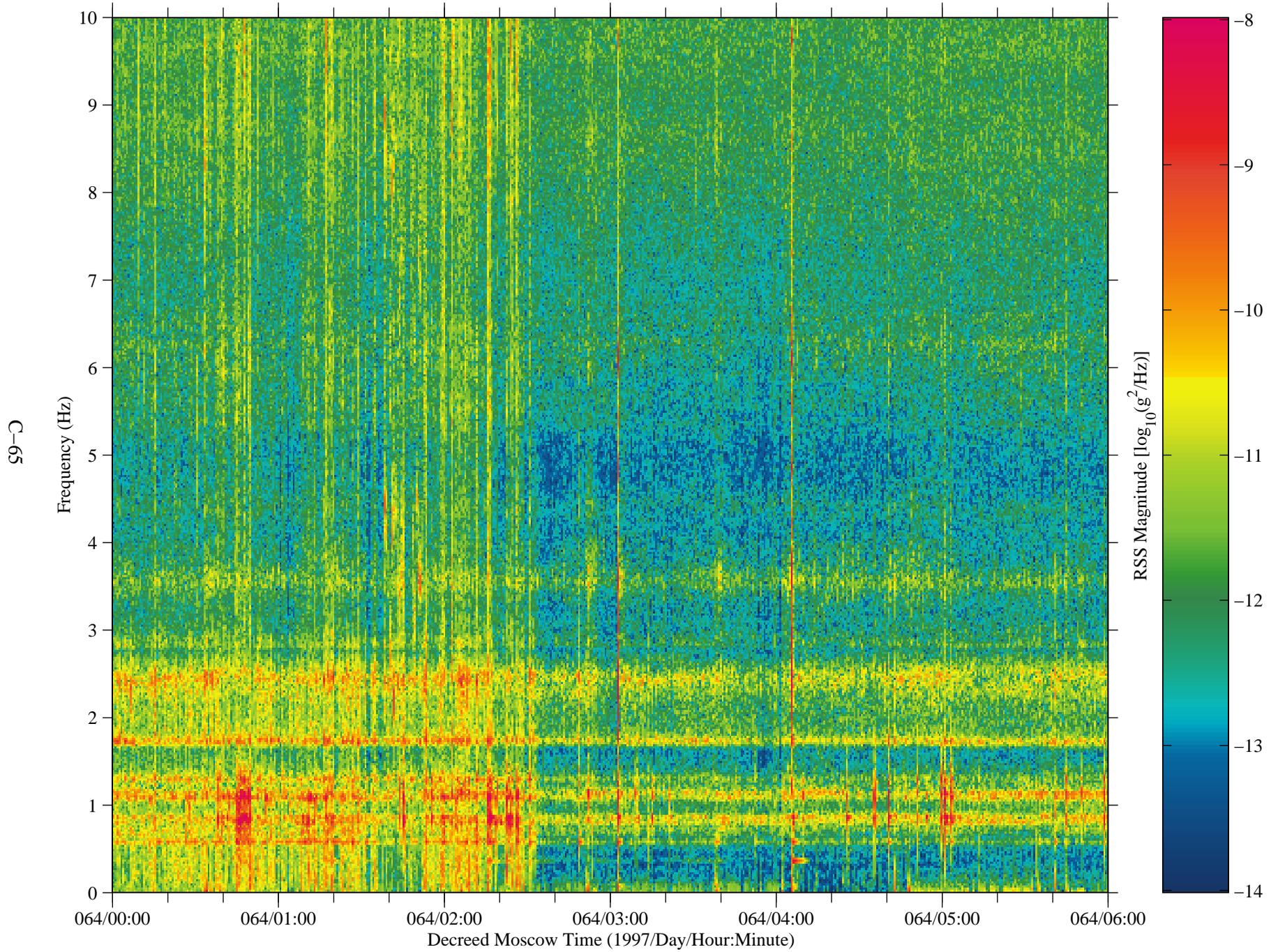


Figure 55: SAMS data from Mir, TSH B (fc=10 Hz)



SAMS ACCELERATION MEASUREMENTS ON MIR FROM JANUARY TO MAY 1997

Figure 56: SAMS data from Mir, TSH B (fc=10 Hz)



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Figure 57: SAMS data from Mir, TSH B (fc=10 Hz)

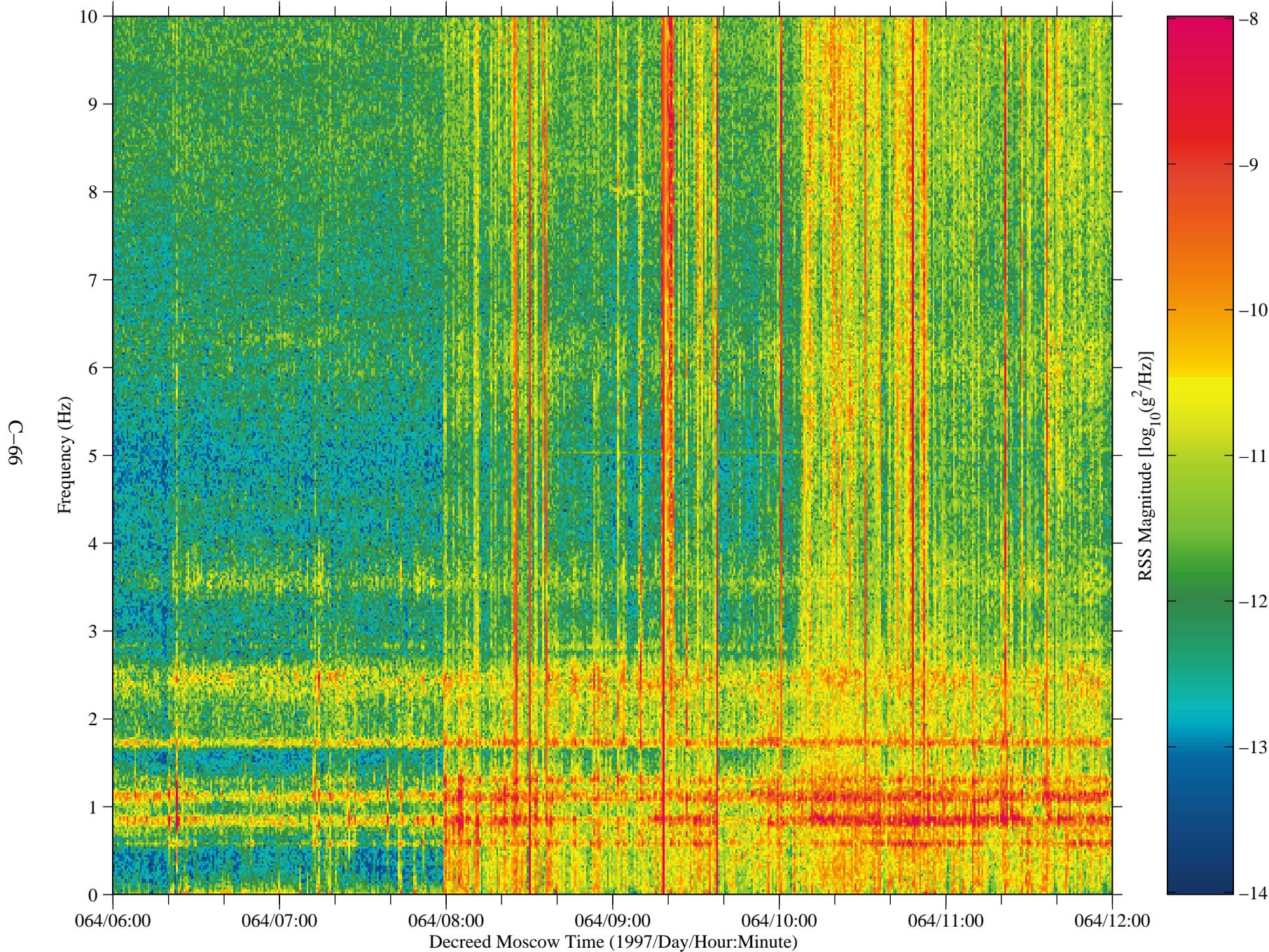


Figure 58: SAMS data from Mir, TSH B (fc=10 Hz)

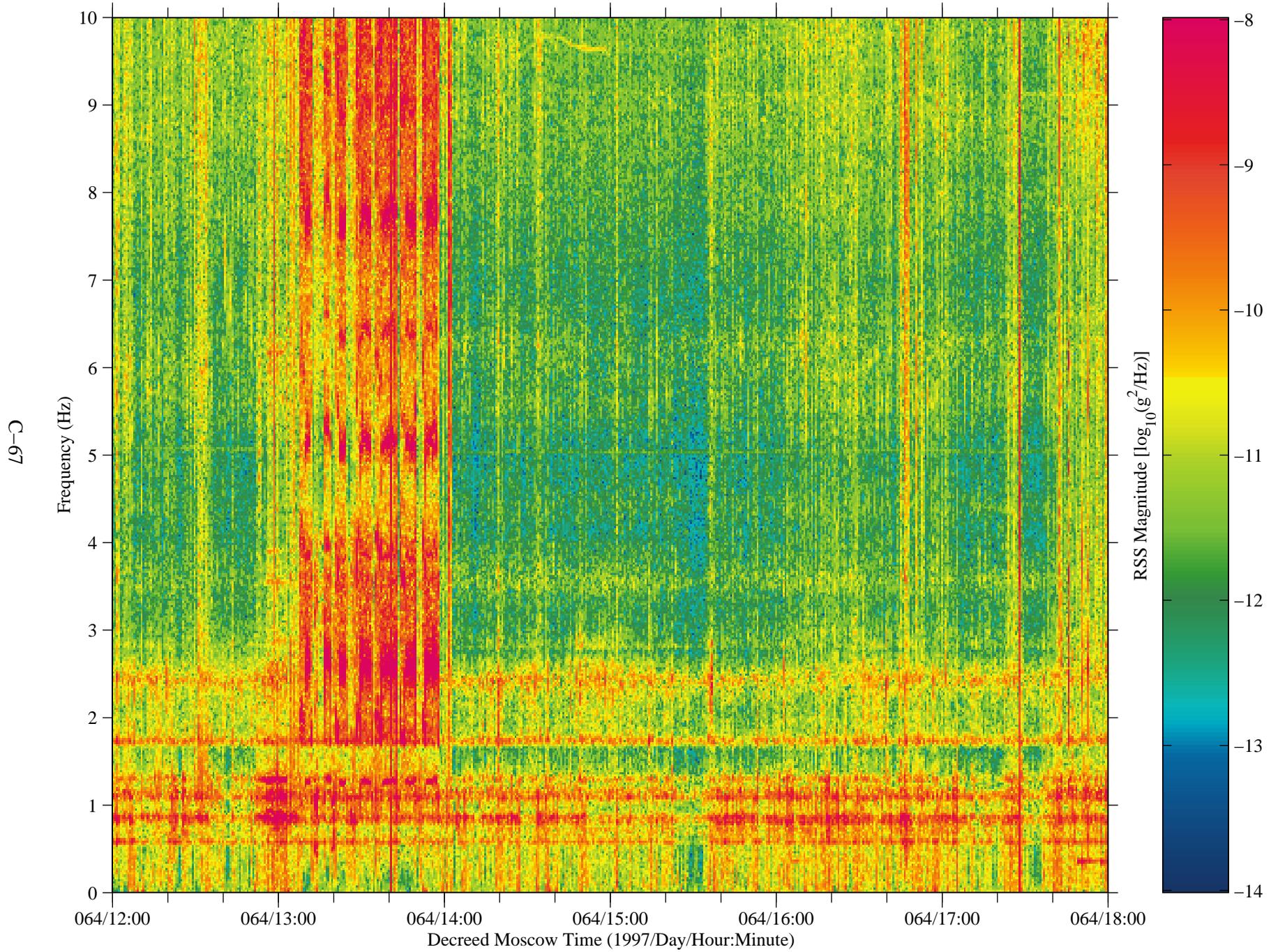


Figure 59: SAMS data from Mir, TSH B (fc=10 Hz)

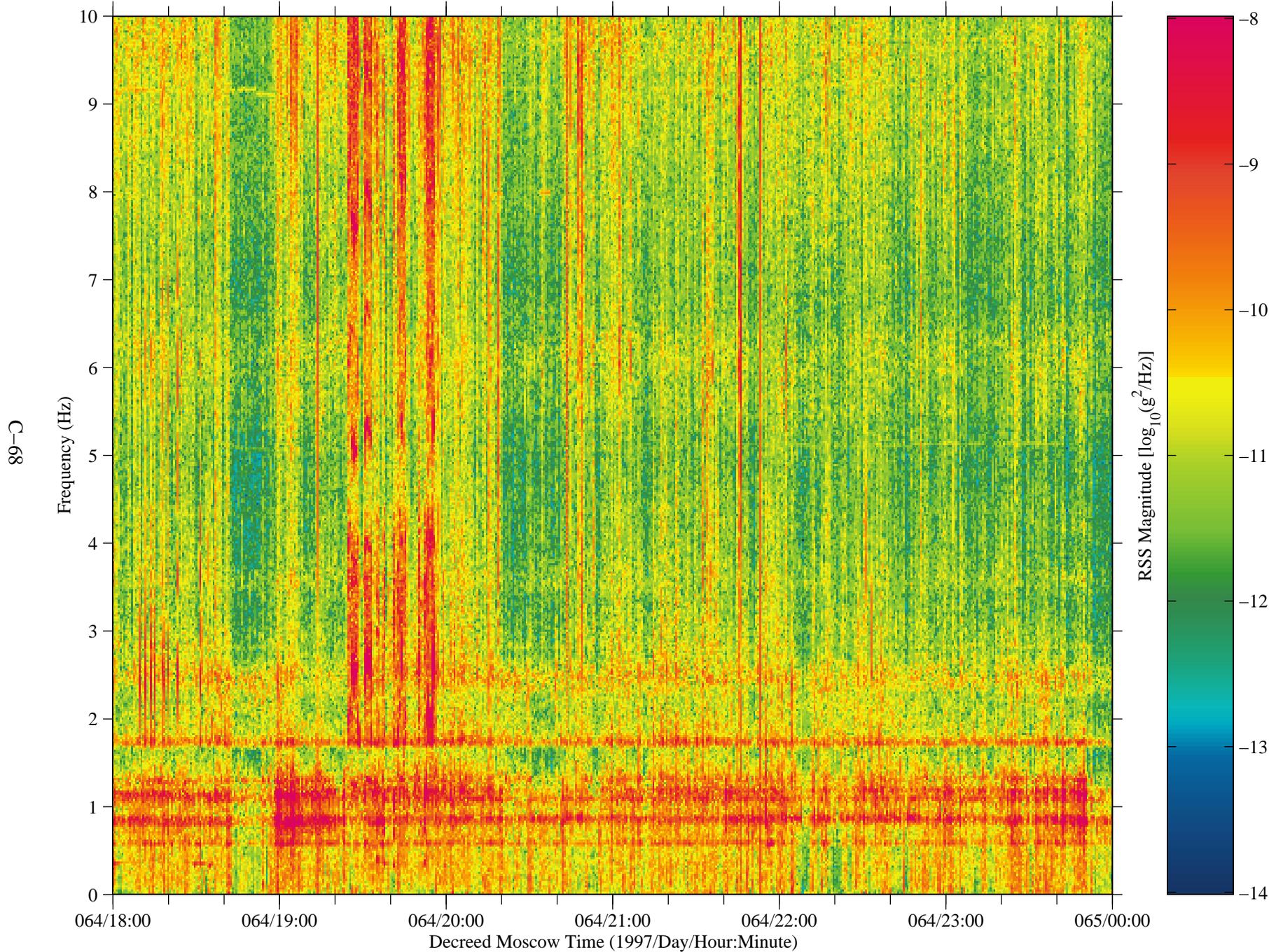
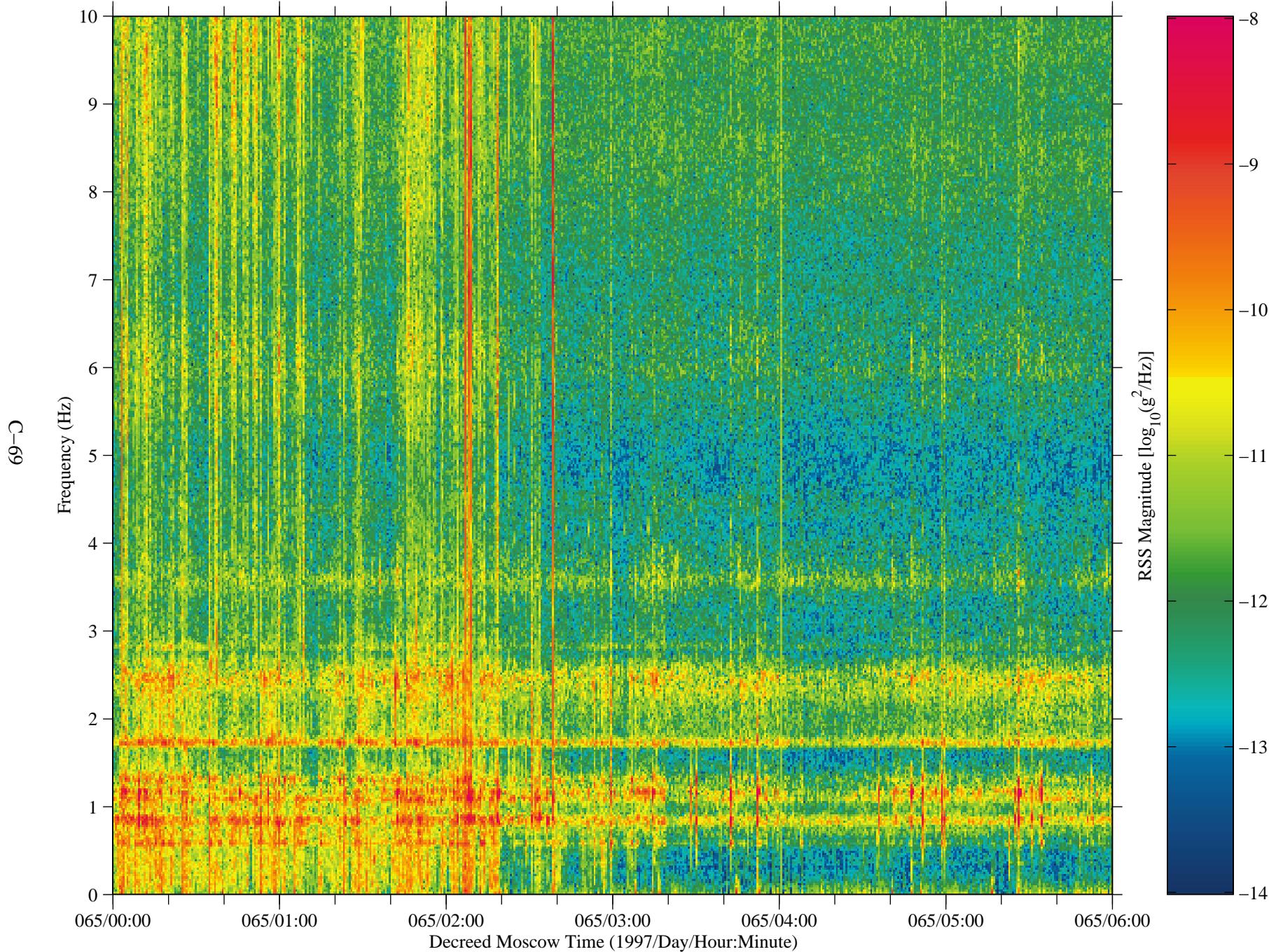


Figure 60: SAMS data from Mir, TSH B (fc=10 Hz)



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SAMS ACCELERATION MEASUREMENTS ON MIR FROM JANUARY TO MAY 1997

Figure 61: SAMS data from Mir, TSH B (fc=10 Hz)

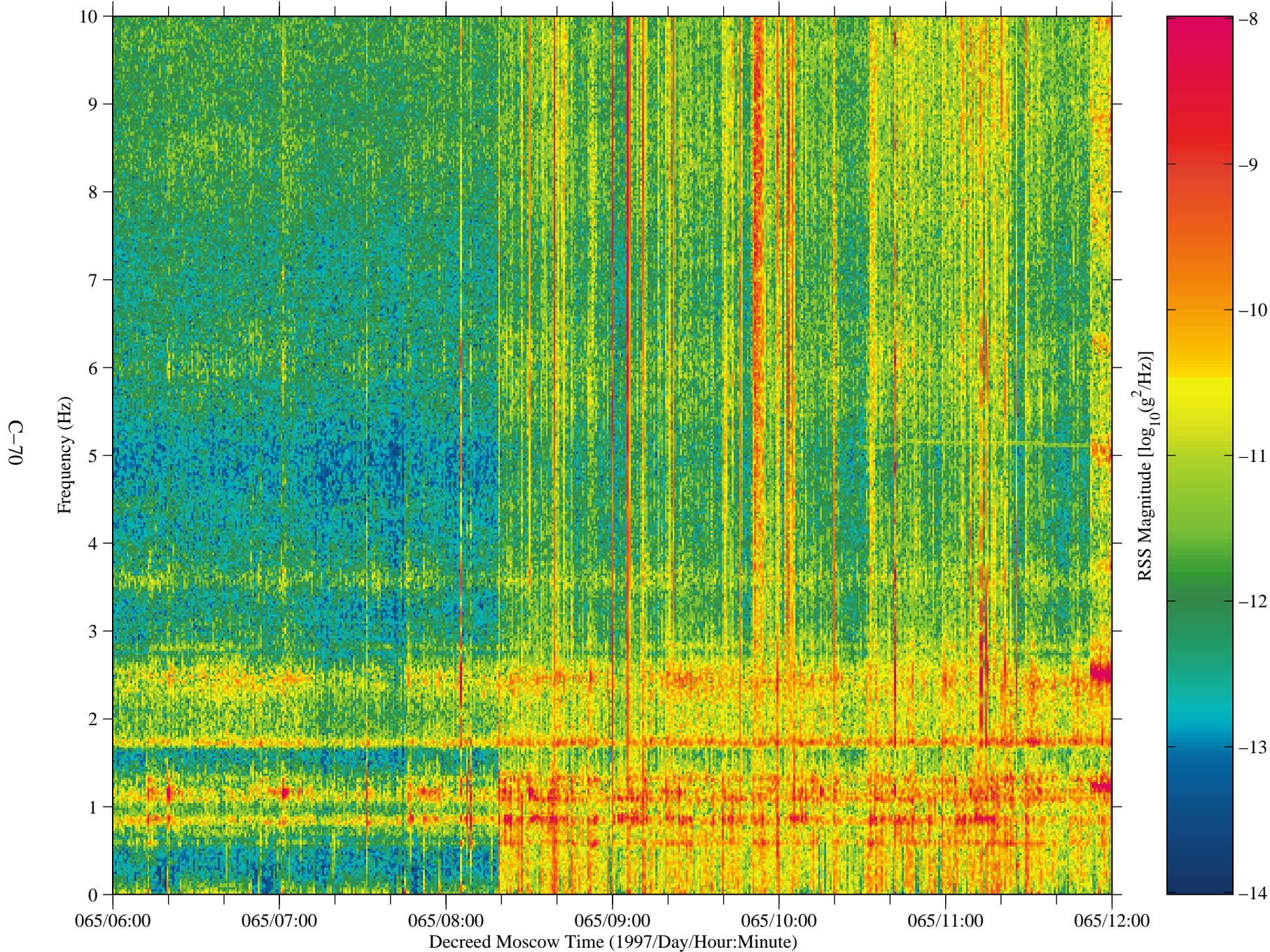


Figure 62: SAMS data from Mir, TSH B (fc=10 Hz)

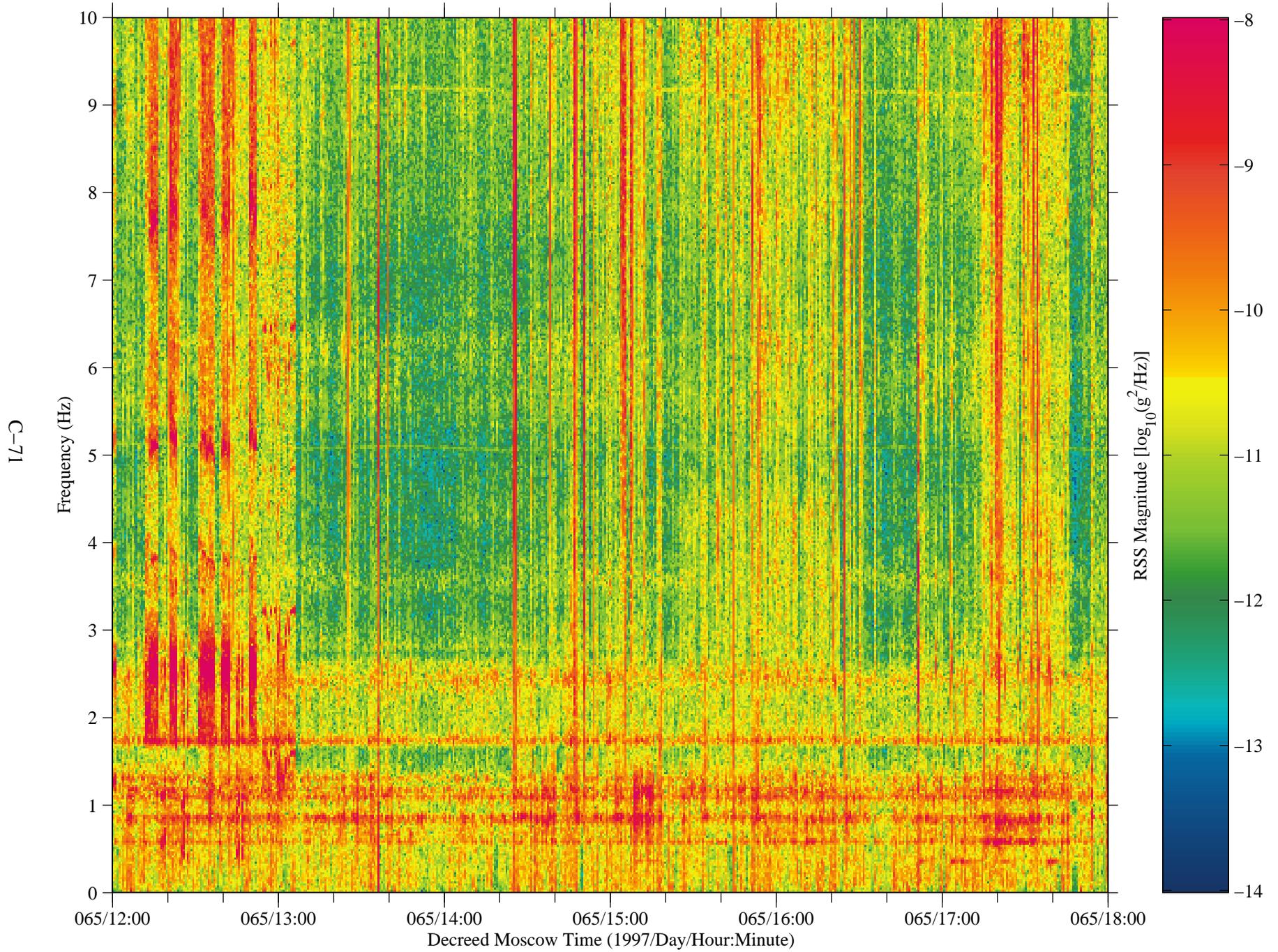
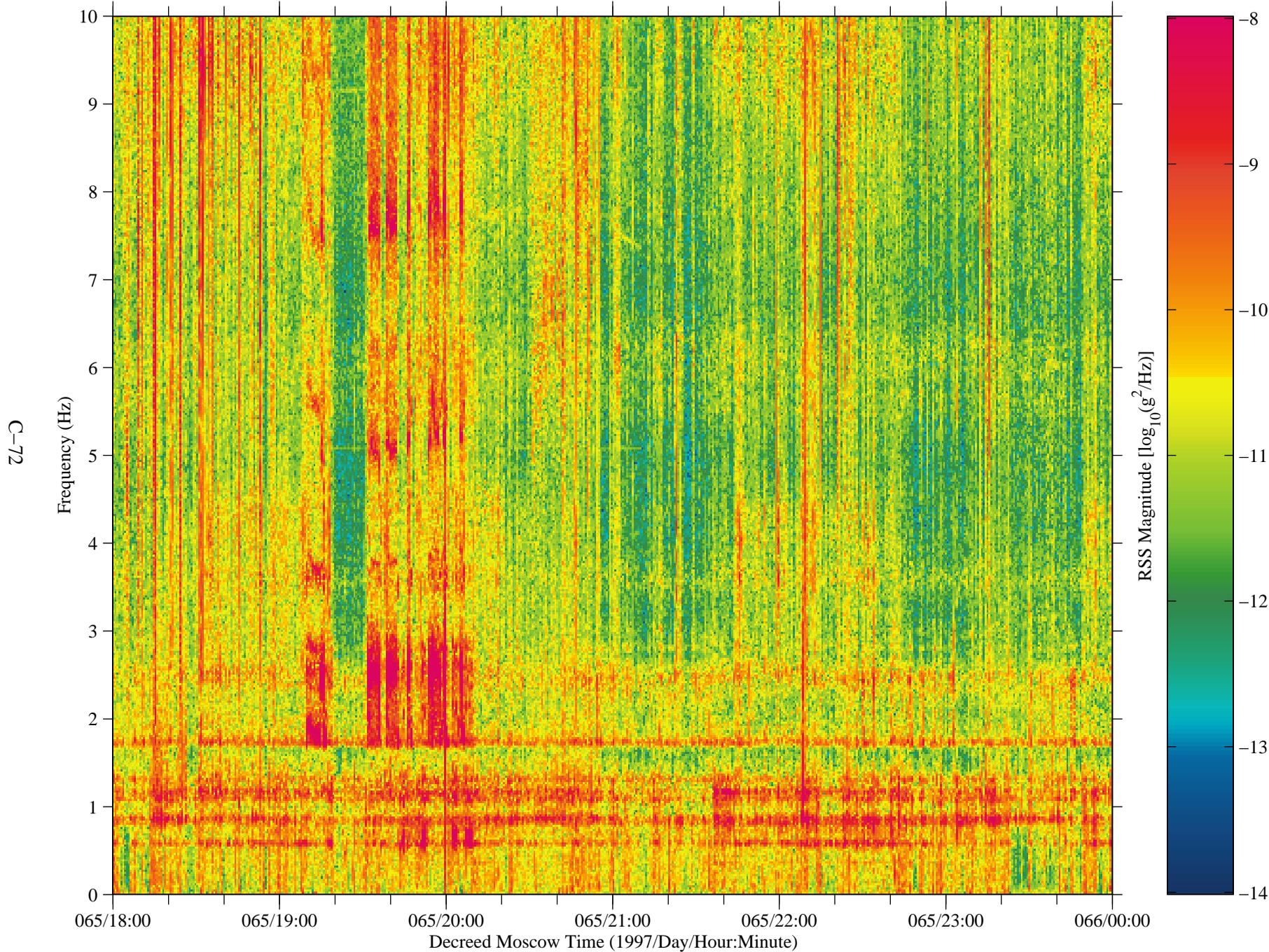


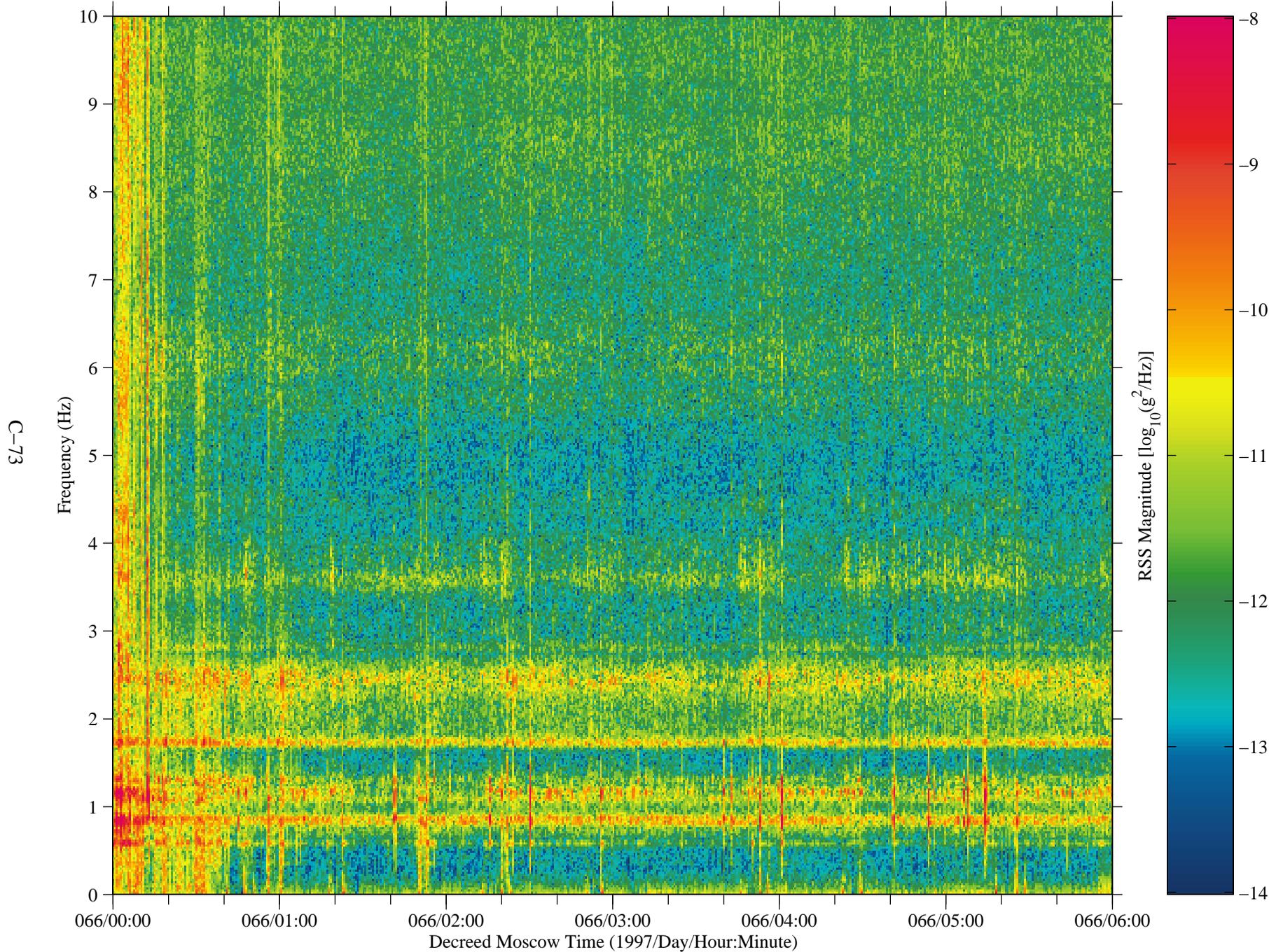
Figure 63: SAMS data from Mir, TSH B (fc=10 Hz)



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SAMS ACCELERATION MEASUREMENTS ON MIR FROM JANUARY TO MAY 1997

Figure 64: SAMS data from Mir, TSH B (fc=10 Hz)



SAMS ACCELERATION MEASUREMENTS ON MIR FROM JANUARY TO MAY 1997

Figure 65: SAMS data from Mir, TSH B (fc=10 Hz)

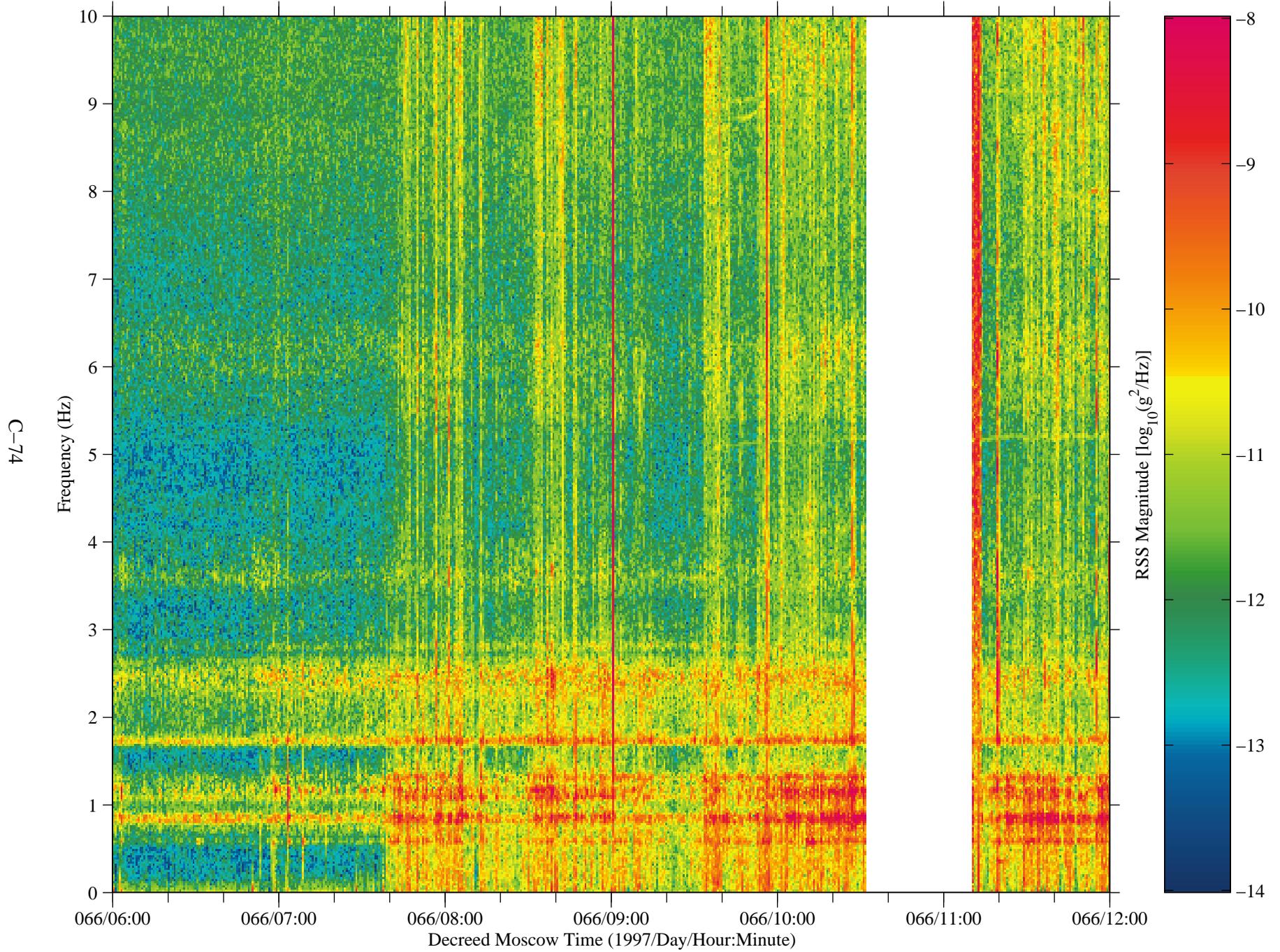


Figure 66: SAMS data from Mir, TSH B (fc=10 Hz)

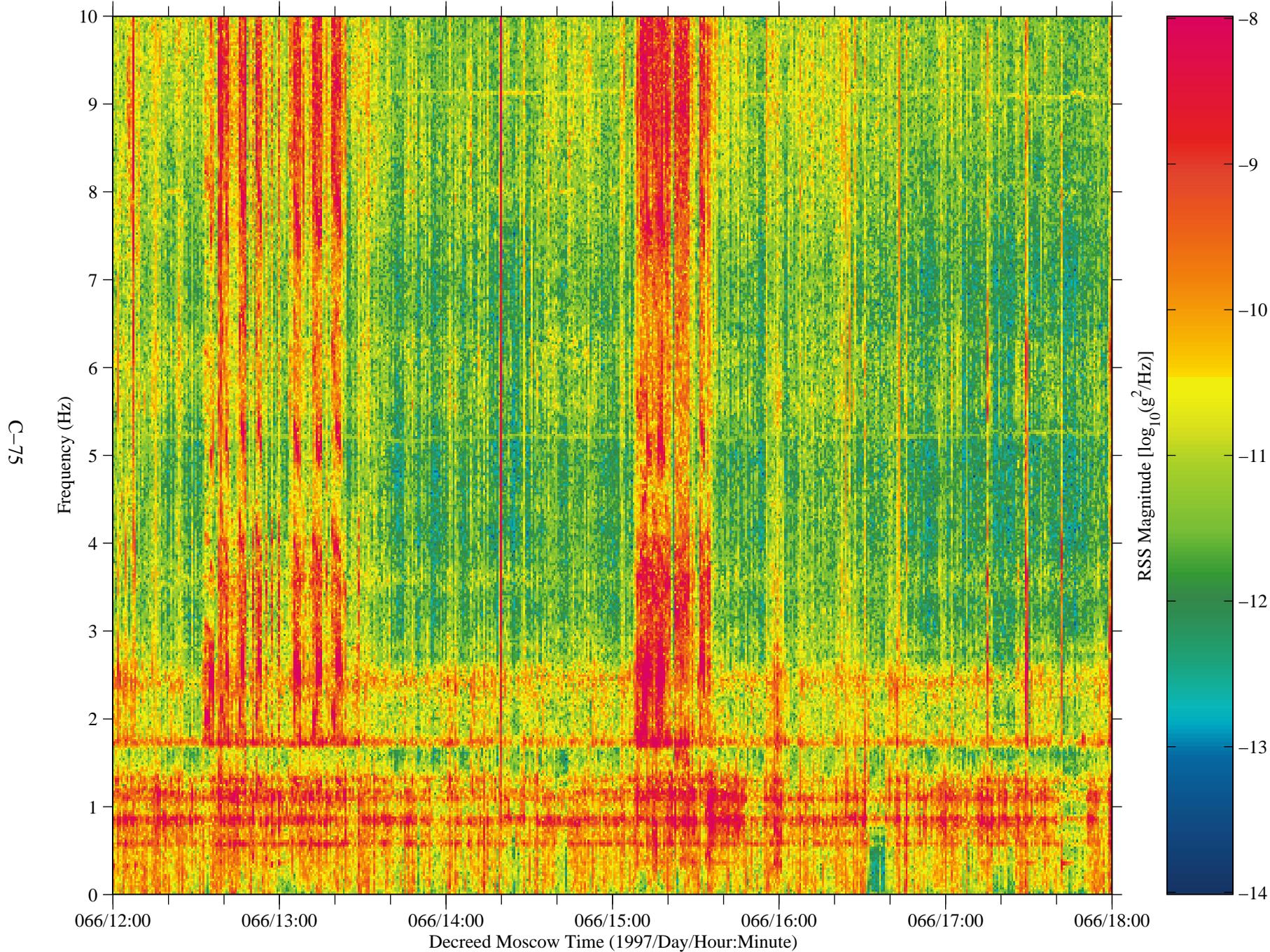


Figure 67: SAMS data from Mir, TSH B (fc=10 Hz)

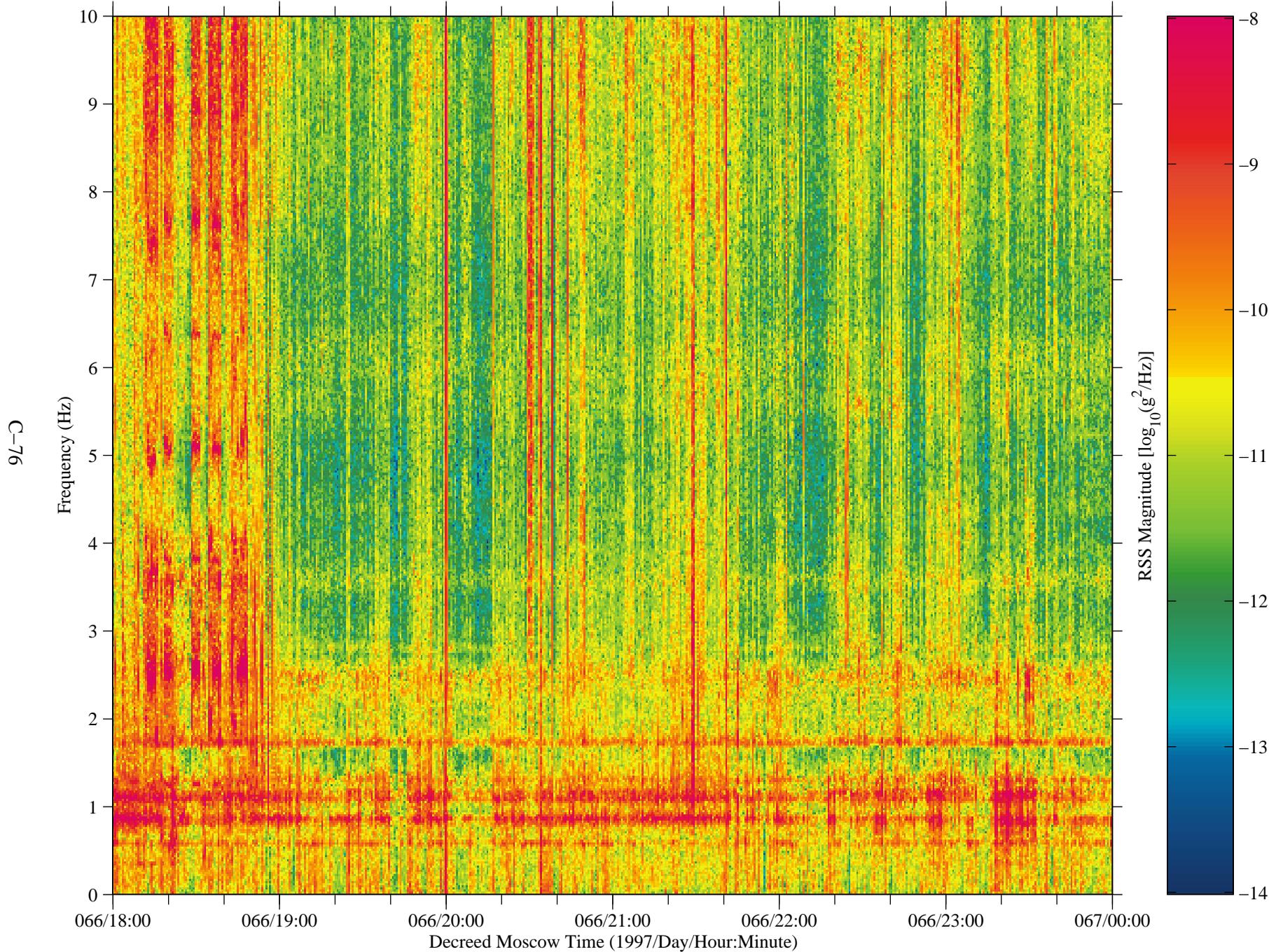
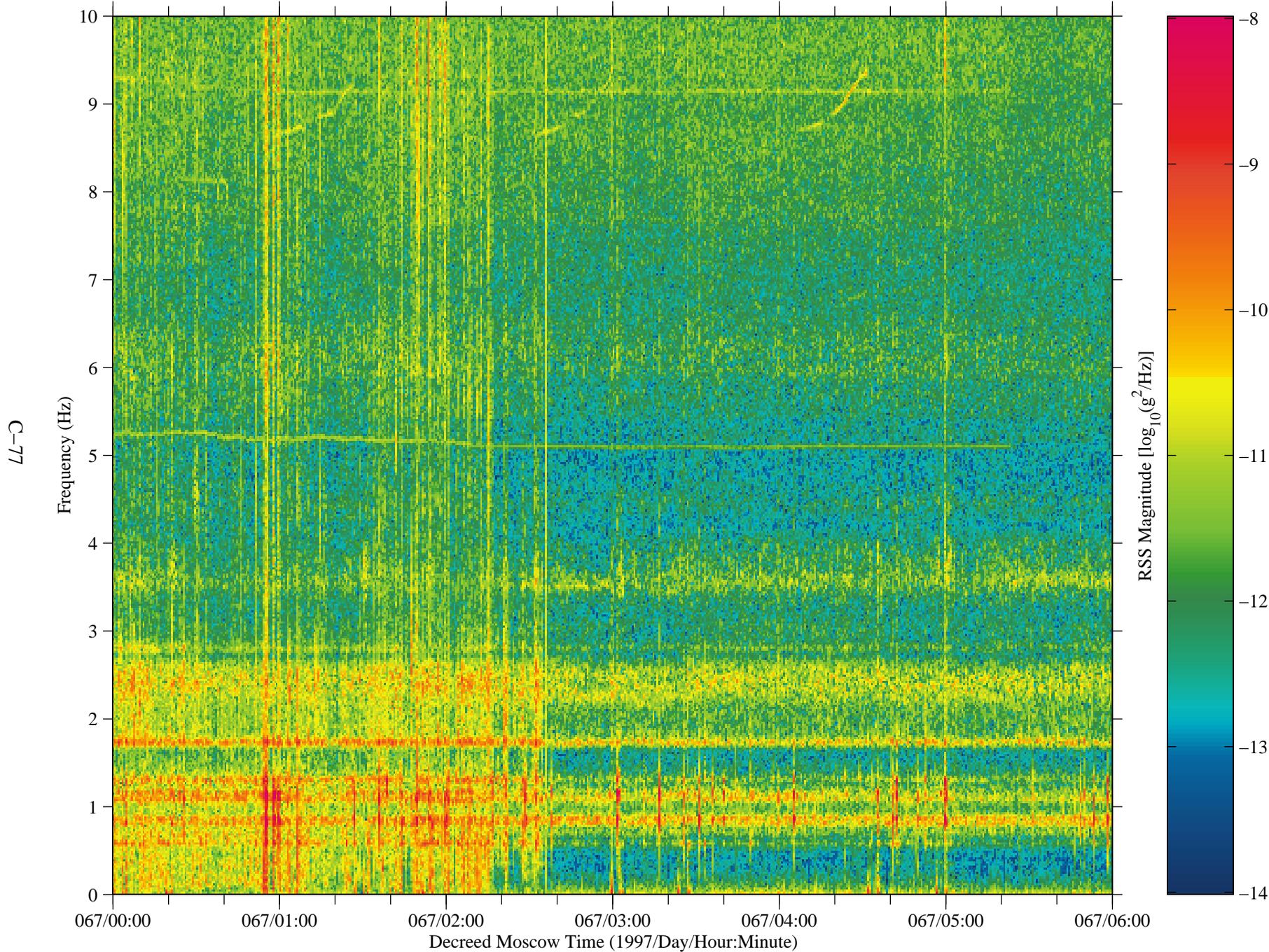


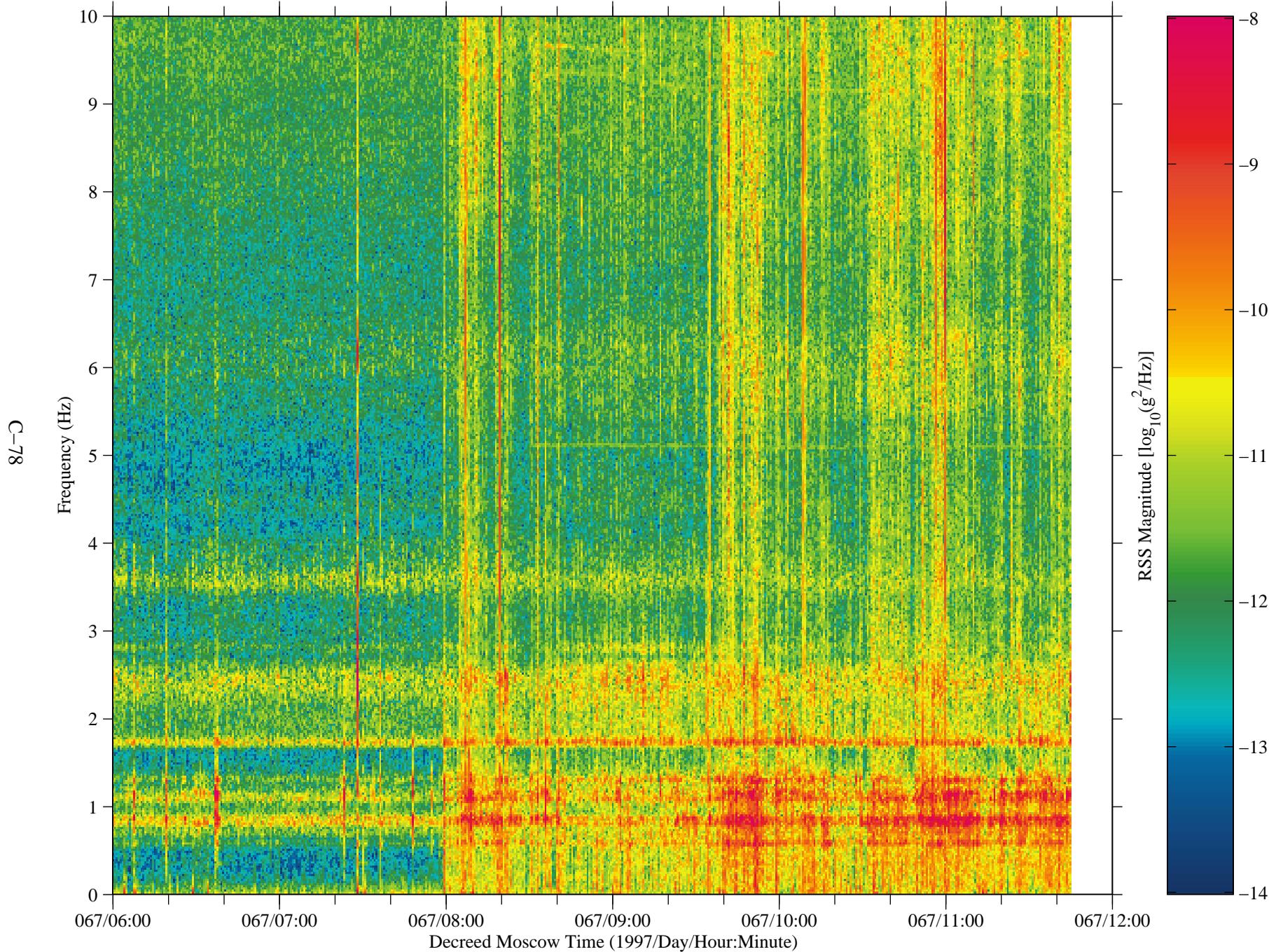
Figure 68: SAMS data from Mir, TSH B (fc=10 Hz)



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SAMS ACCELERATION MEASUREMENTS ON MIR FROM JANUARY TO MAY 1997

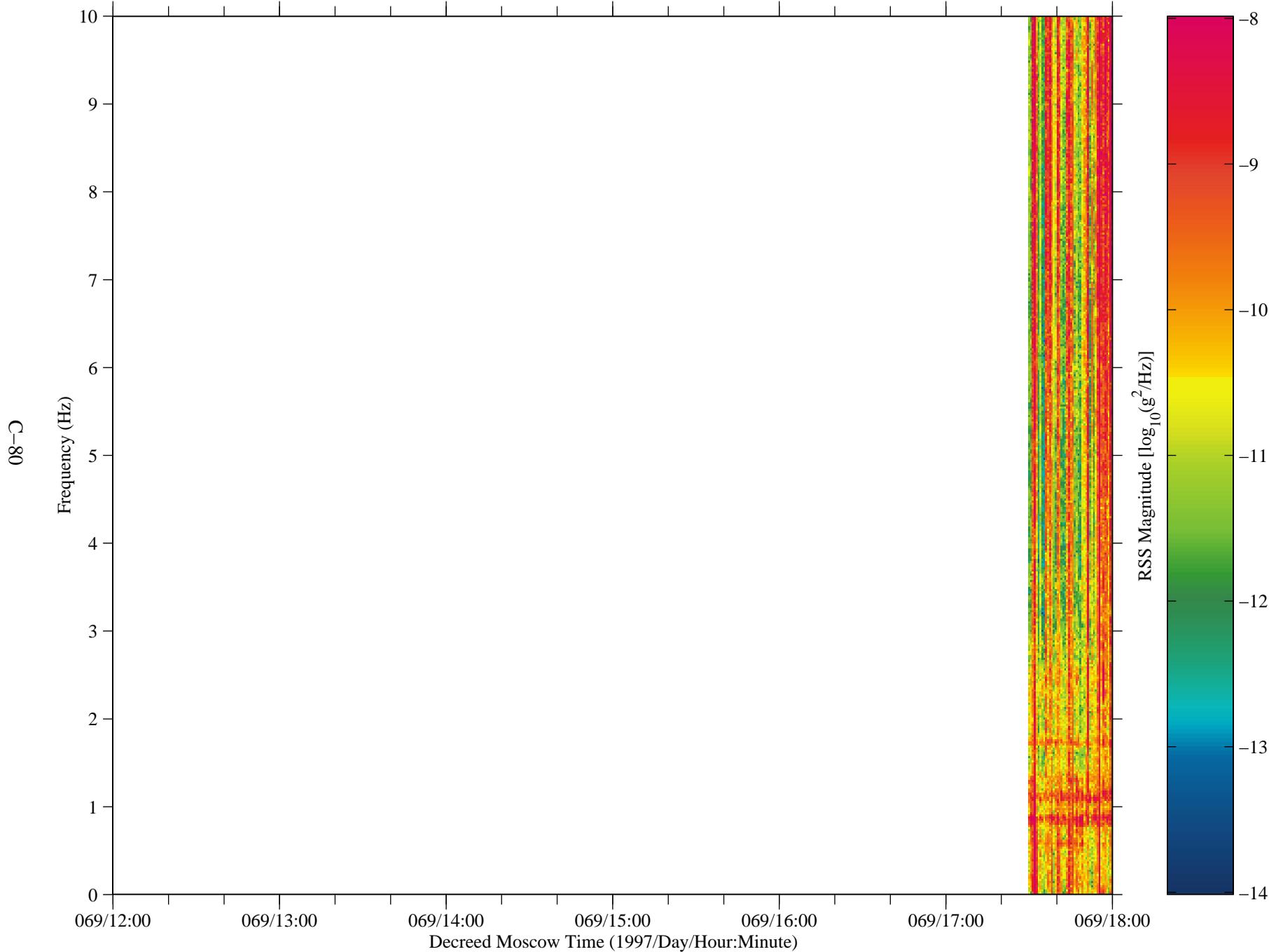
Figure 69: SAMS data from Mir, TSH B (fc=10 Hz)



SAMS ACCELERATION MEASUREMENTS ON MIR FROM JANUARY TO MAY 1997

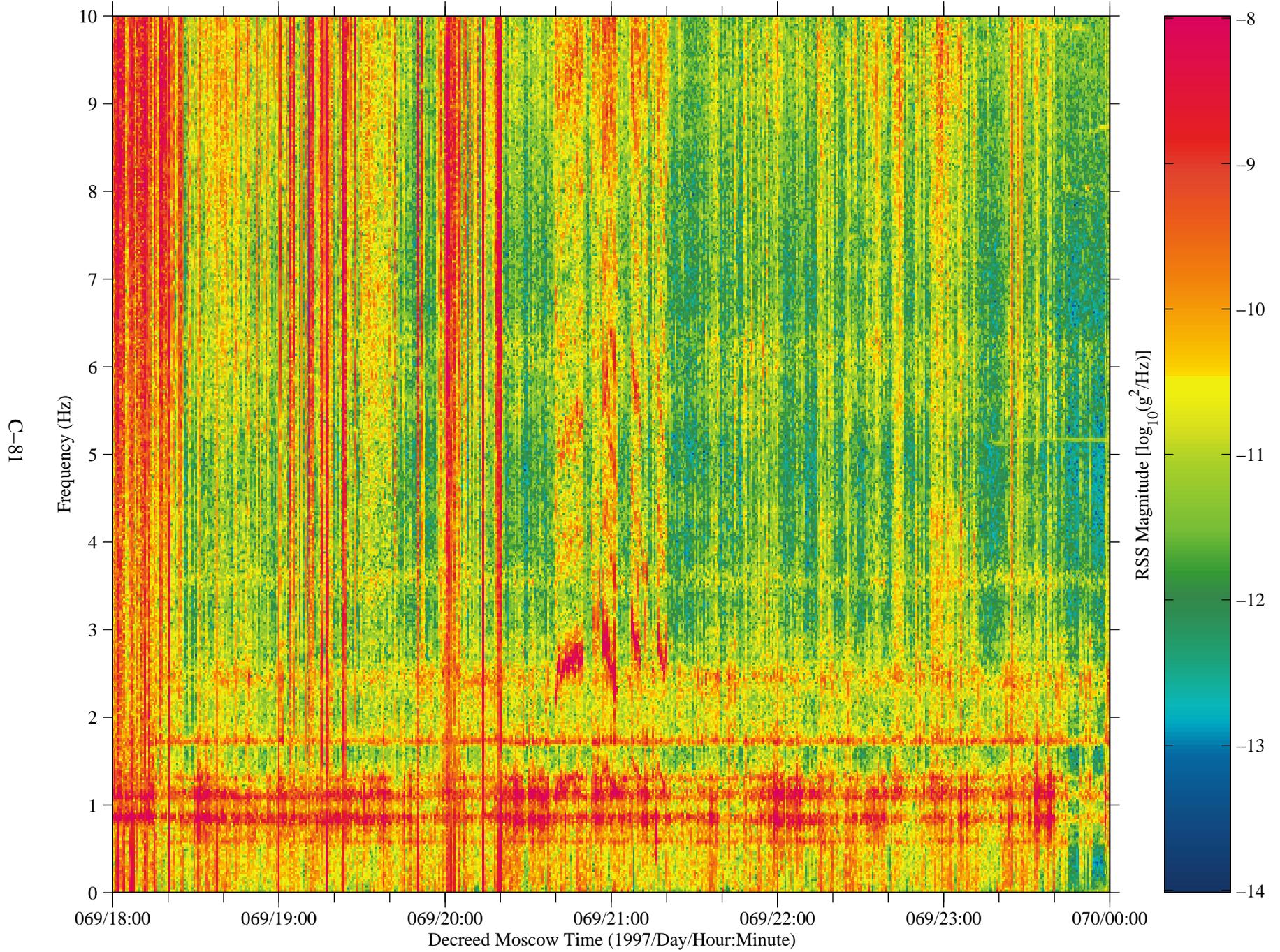
No data are available
from 067/12:00:00 – 069/12:00:00

Figure 70: SAMS data from Mir, TSH B (fc=10 Hz)



SAMS ACCELERATION MEASUREMENTS ON MIR FROM JANUARY TO MAY 1997

Figure 71: SAMS data from Mir, TSH B (fc=10 Hz)



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Figure 72: SAMS data from Mir, TSH B (fc=10 Hz)

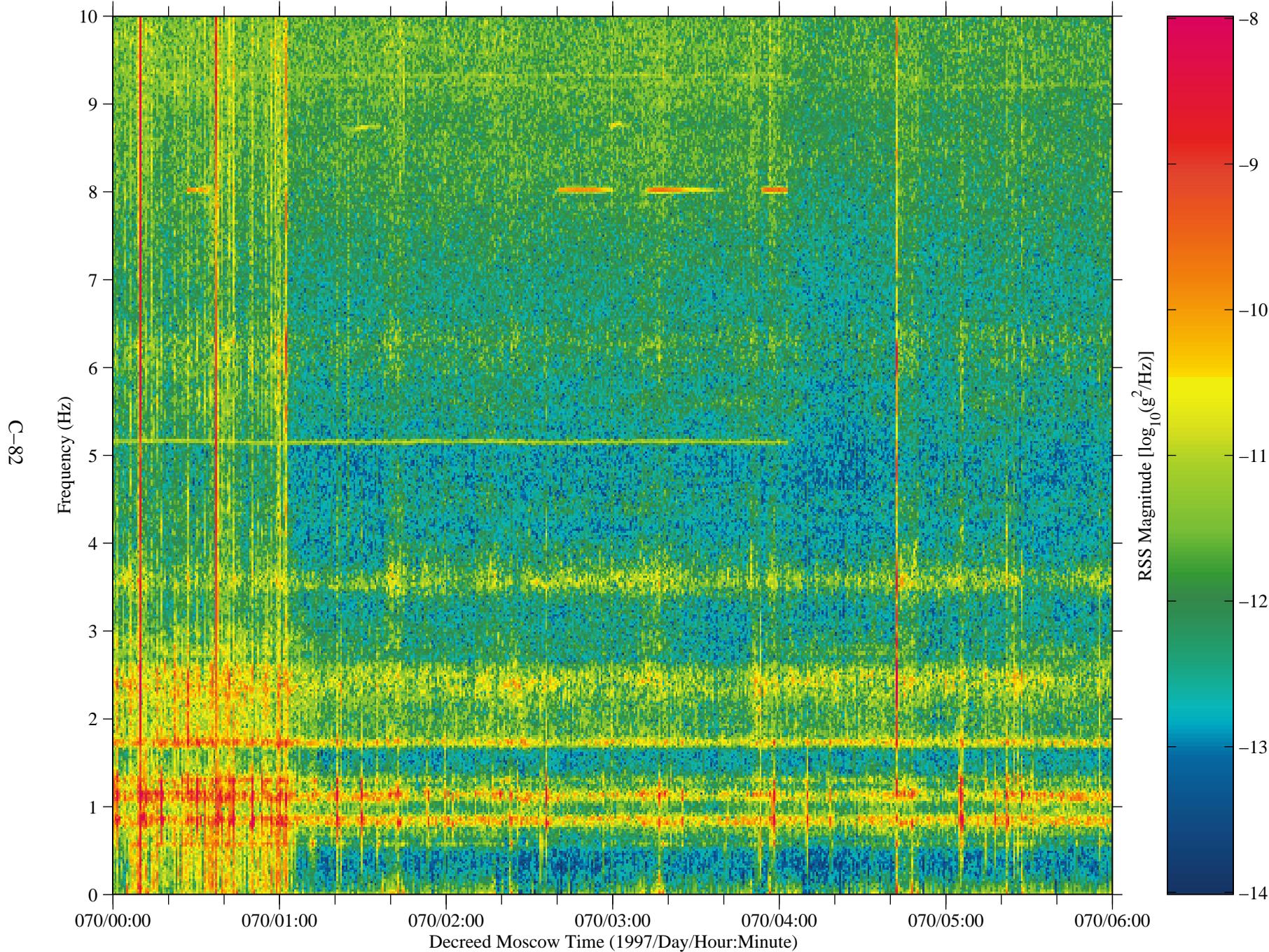
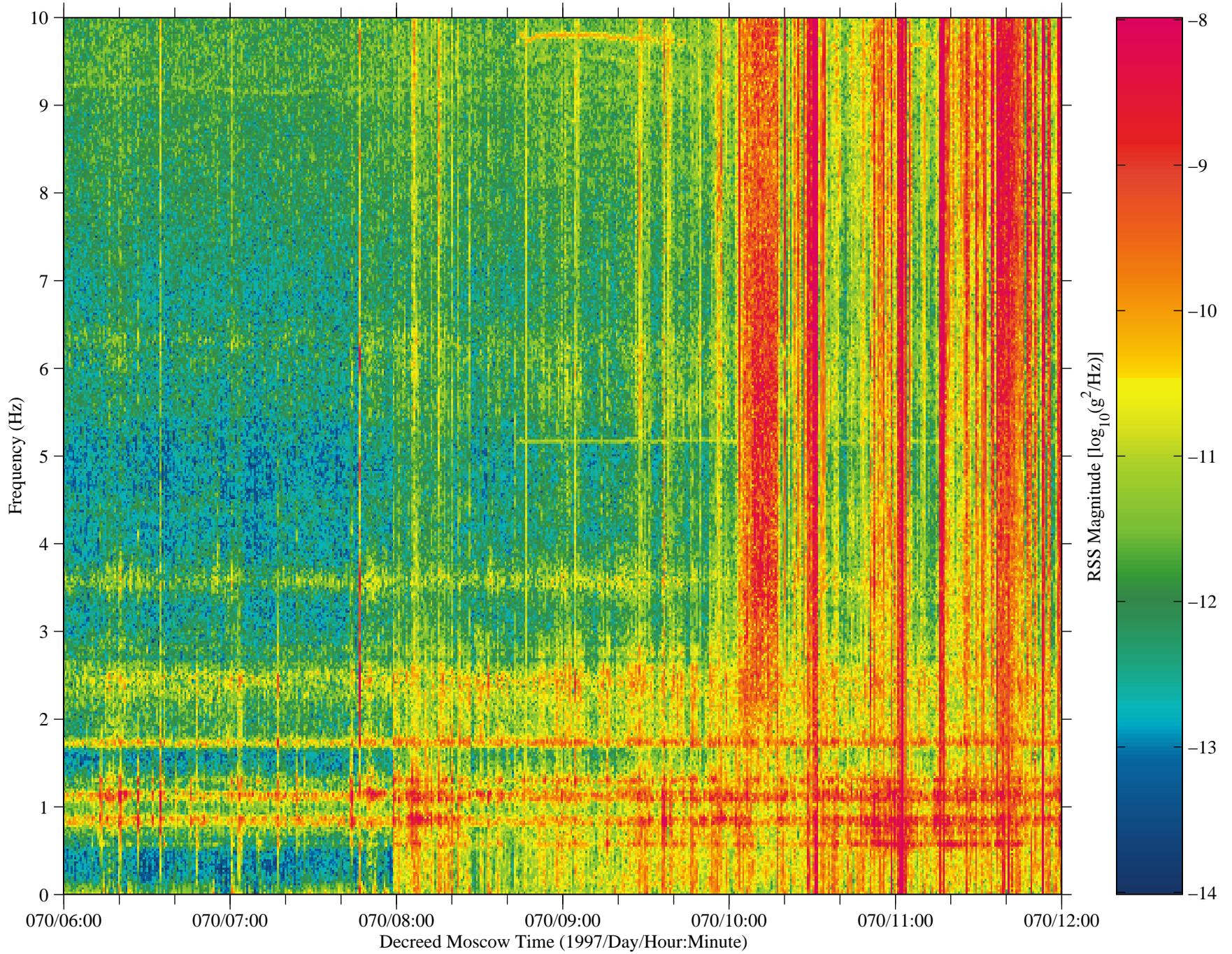


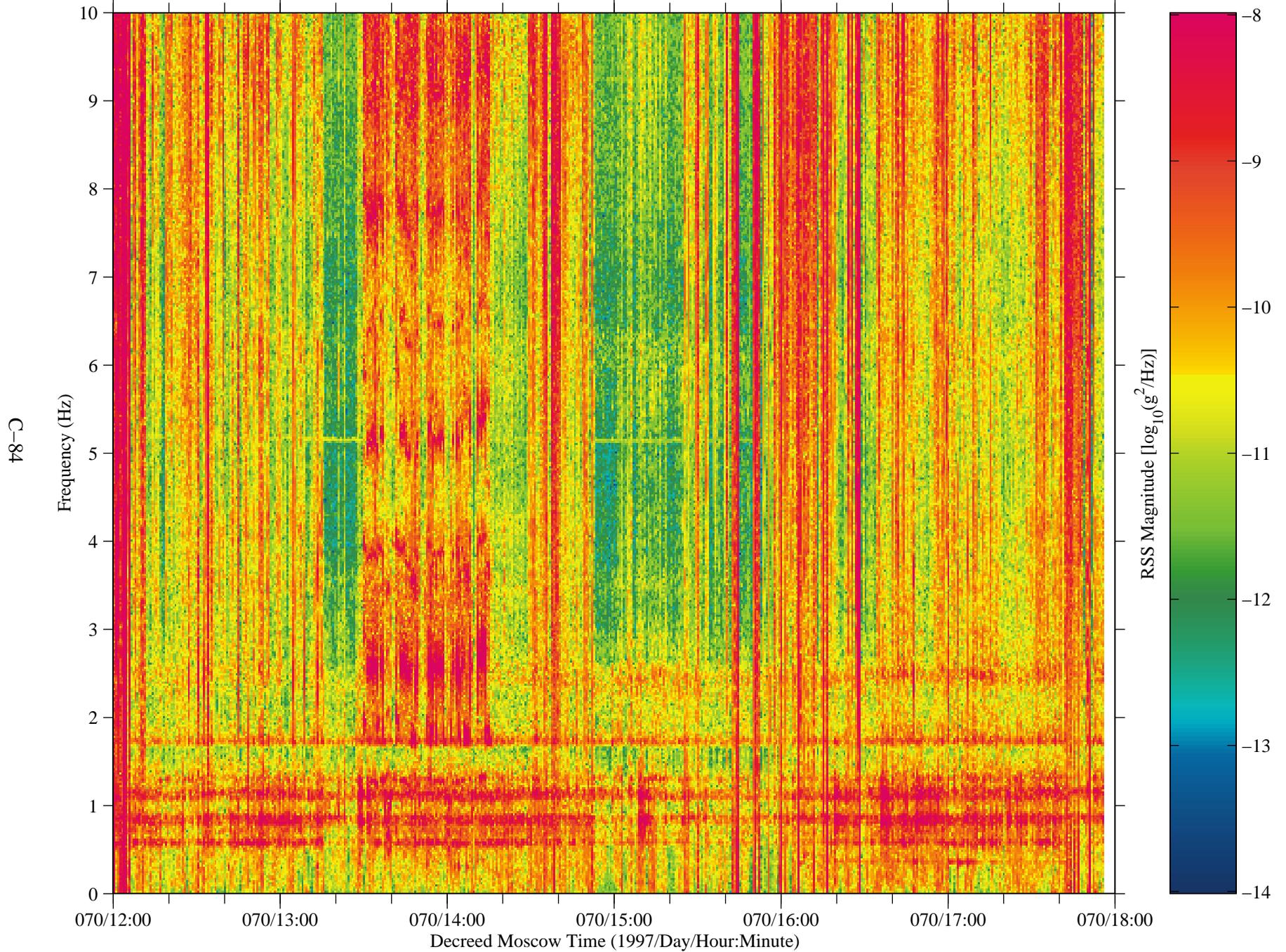
Figure 73: SAMS data from Mir, TSH B (fc=10 Hz)

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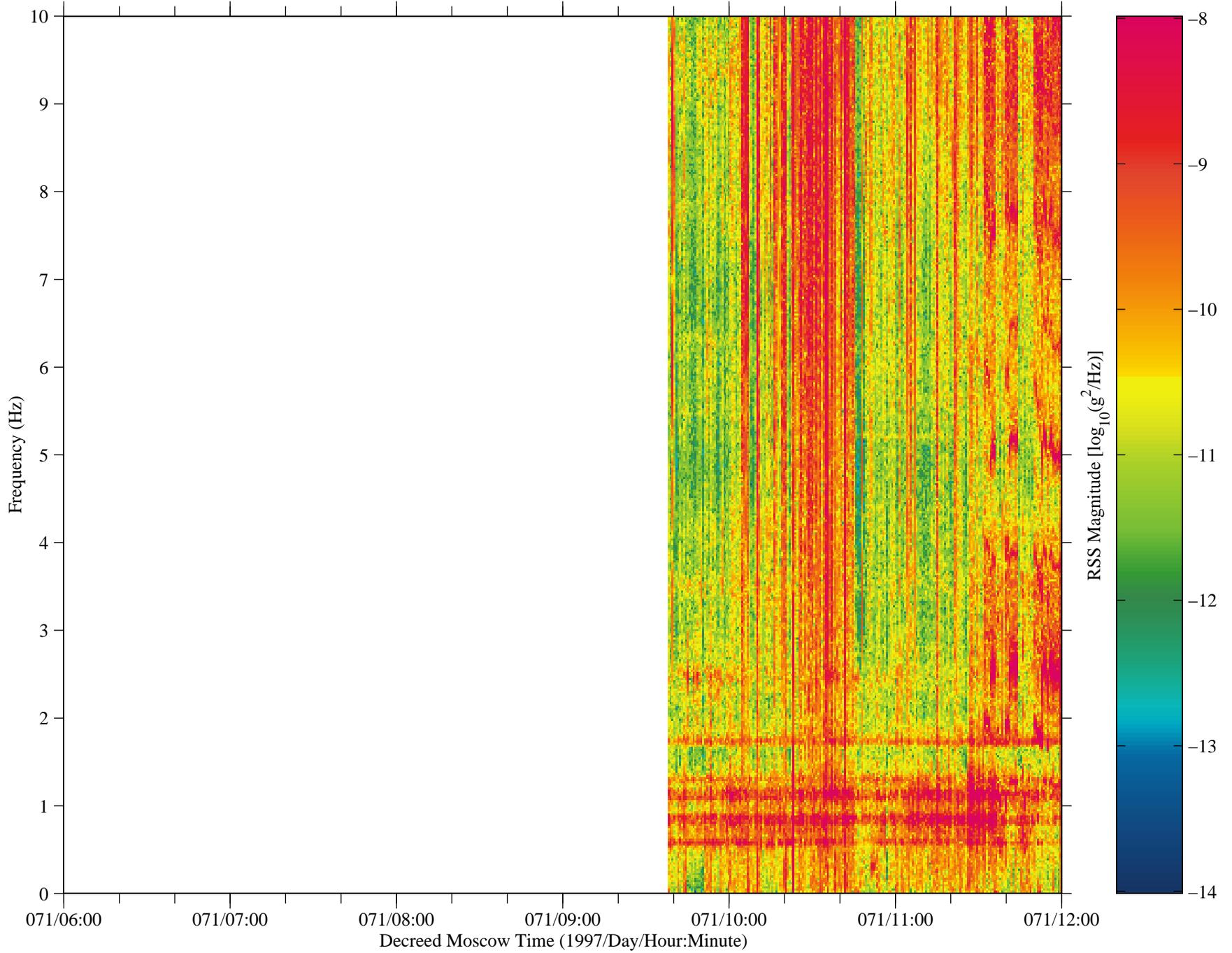
SAMS ACCELERATION MEASUREMENTS ON MIR FROM JANUARY TO MAY 1997

Figure 74: SAMS data from Mir, TSH B (fc=10 Hz)



No data are available
from 070/18:00:00 – 071/06:00:00

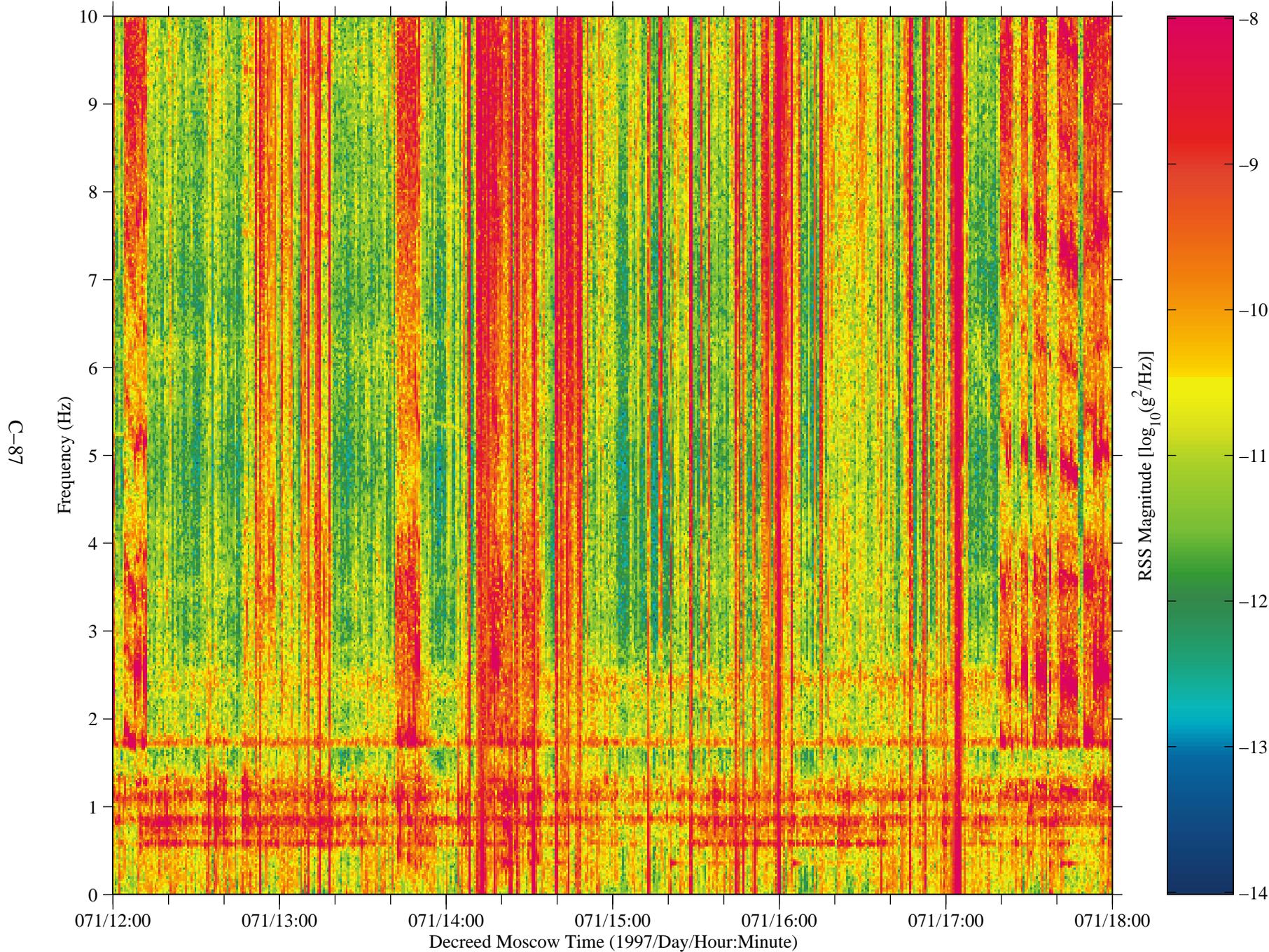
Figure 75: SAMS data from Mir, TSH B (fc=10 Hz)



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SAMS ACCELERATION MEASUREMENTS ON MIR FROM JANUARY TO MAY 1997

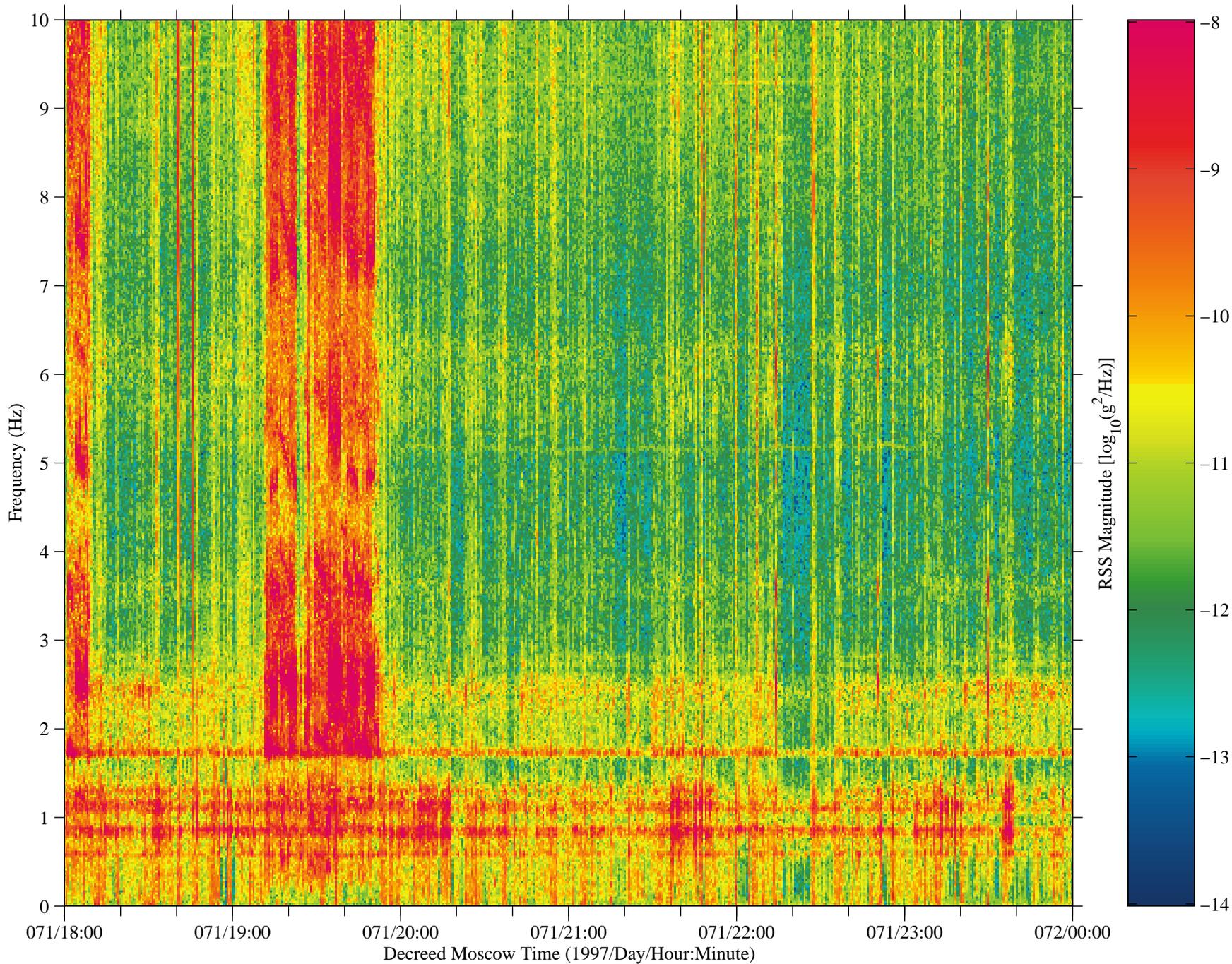
Figure 76: SAMS data from Mir, TSH B (fc=10 Hz)



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Figure 77: SAMS data from Mir, TSH B (fc=10 Hz)

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SAMS ACCELERATION MEASUREMENTS ON MIR FROM JANUARY TO MAY 1997

Figure 78: SAMS data from Mir, TSH B (fc=10 Hz)

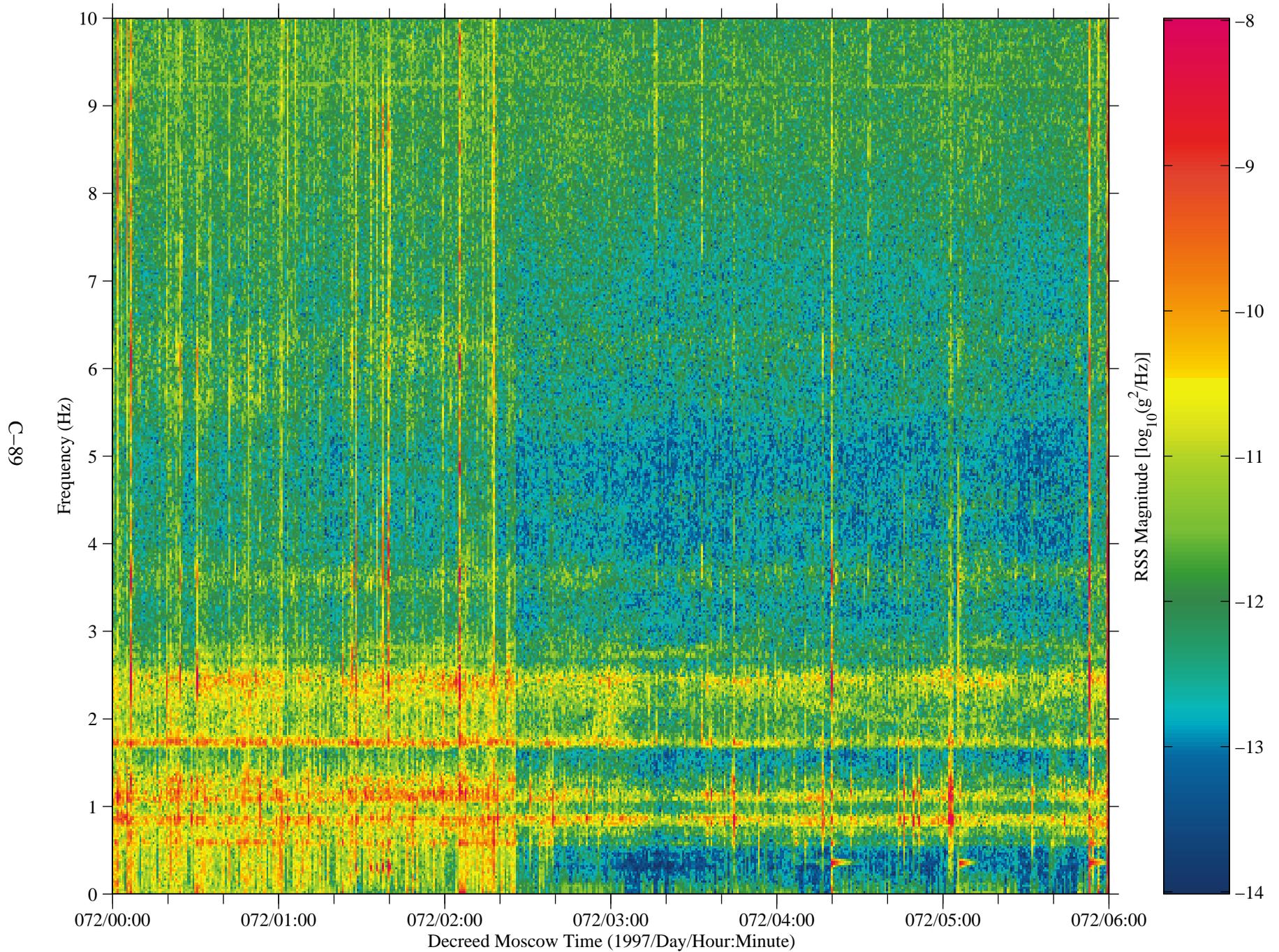
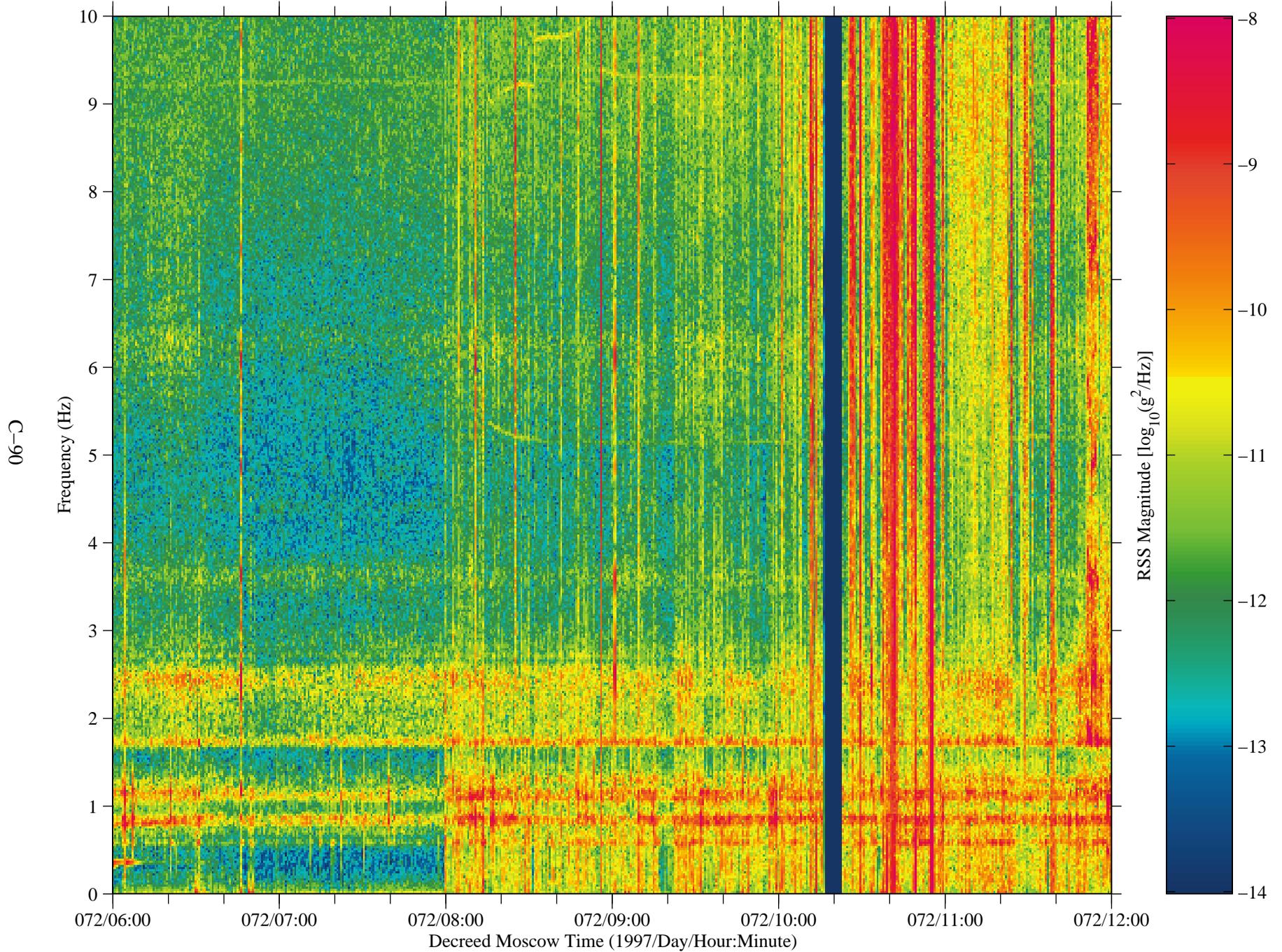


Figure 79: SAMS data from Mir, TSH B (fc=10 Hz)



SAMS ACCELERATION MEASUREMENTS ON MIR FROM JANUARY TO MAY 1997

Figure 80: SAMS data from Mir, TSH B (fc=10 Hz)

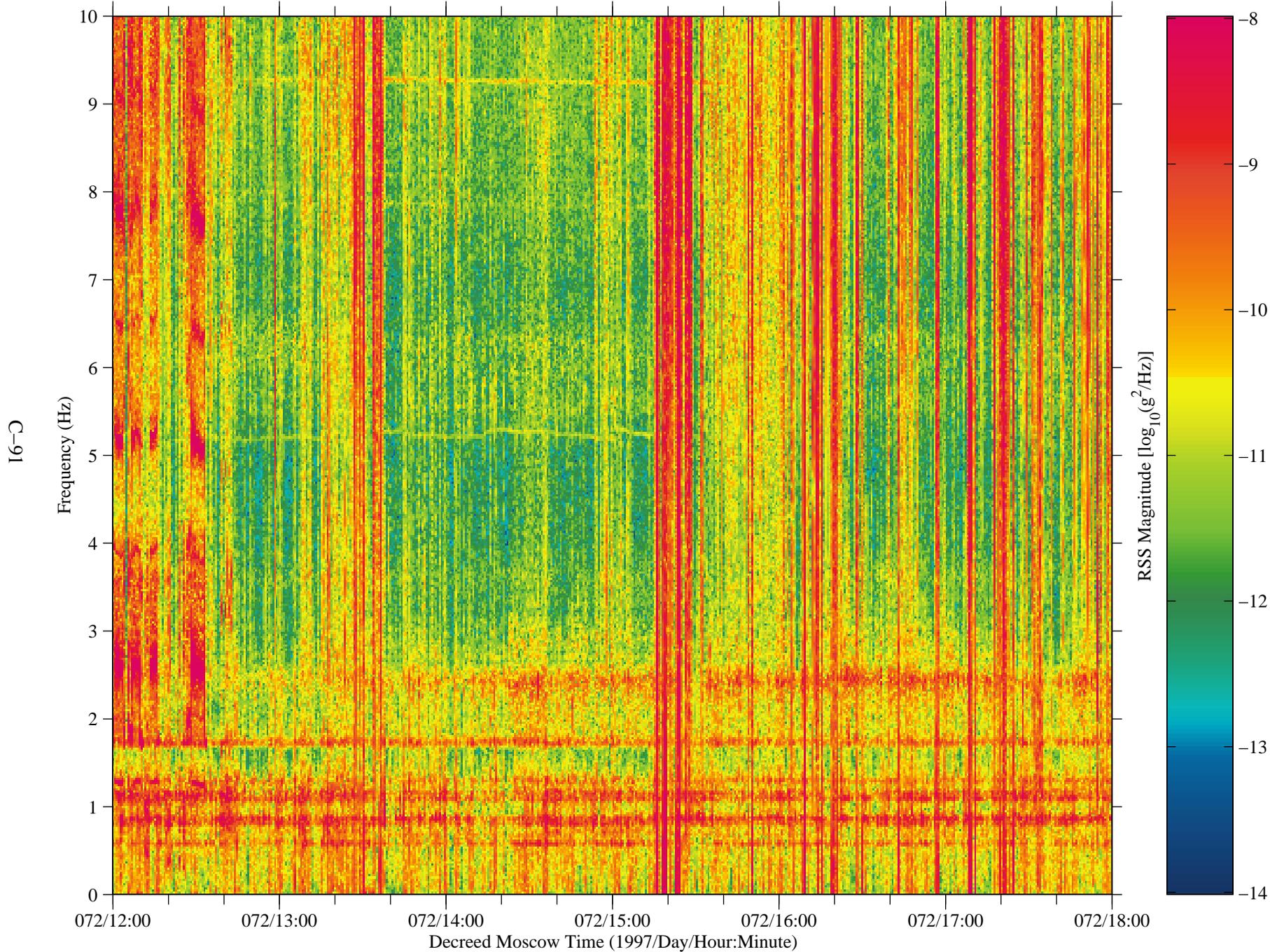
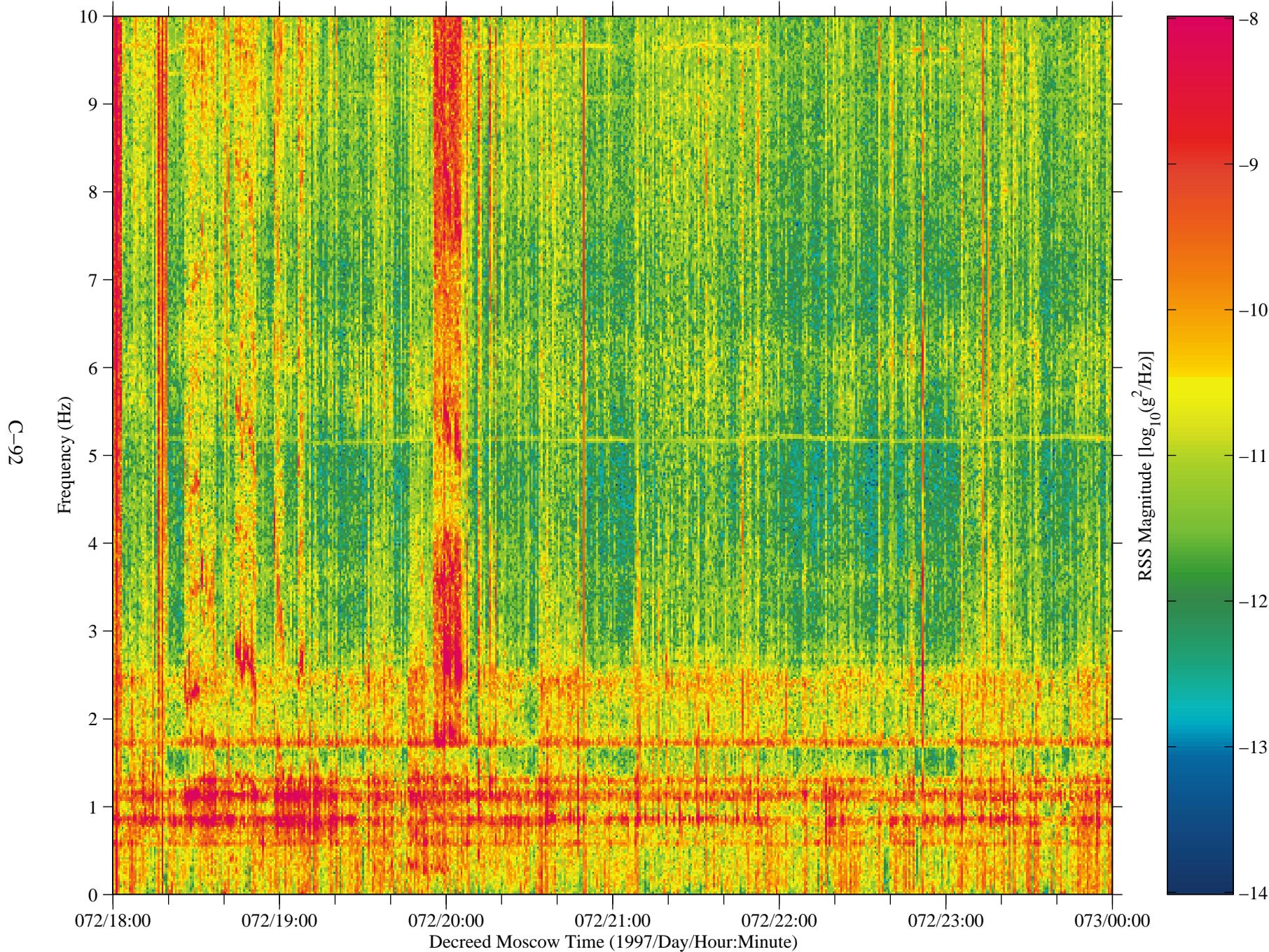
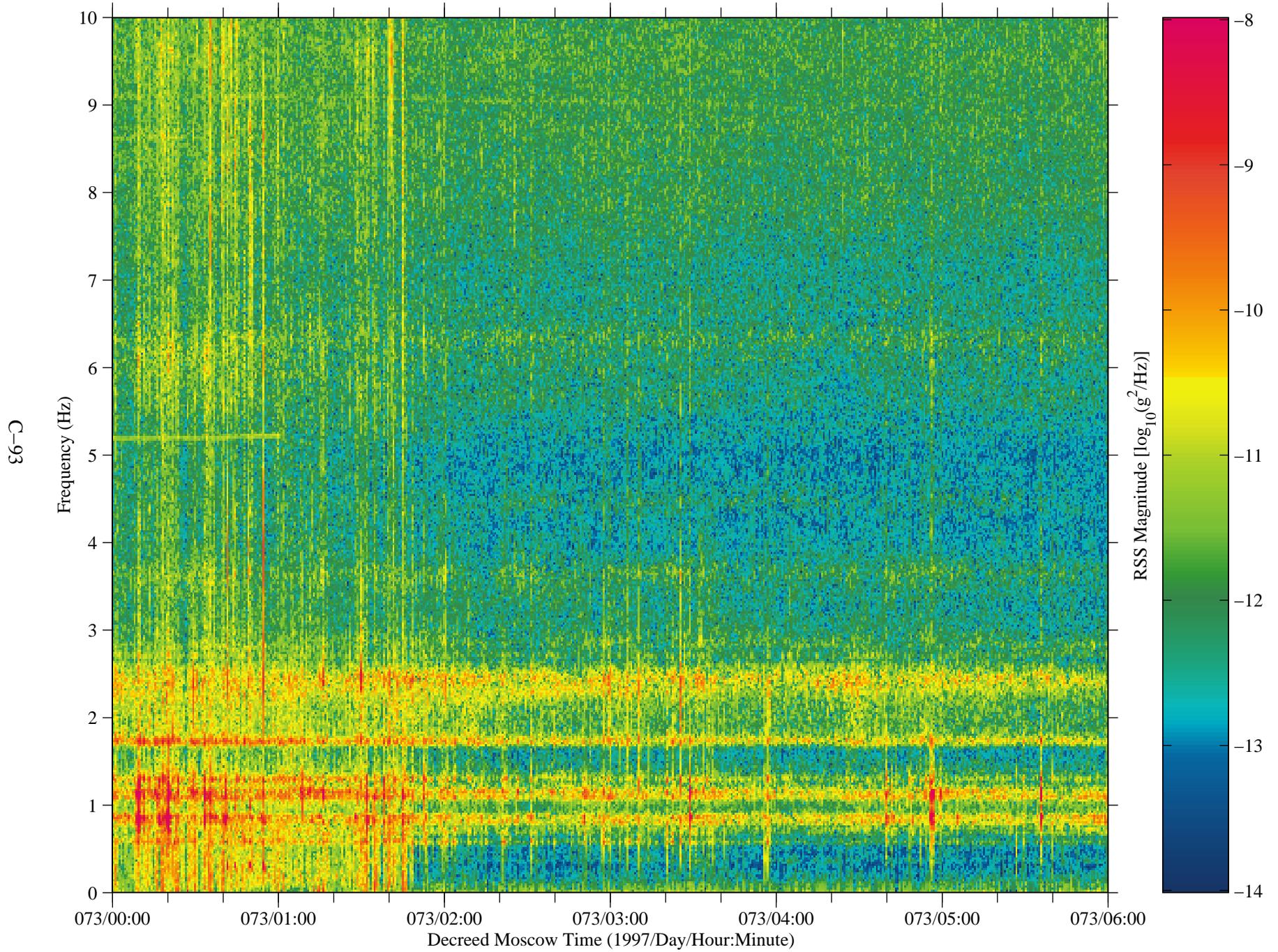


Figure 81: SAMS data from Mir, TSH B (fc=10 Hz)



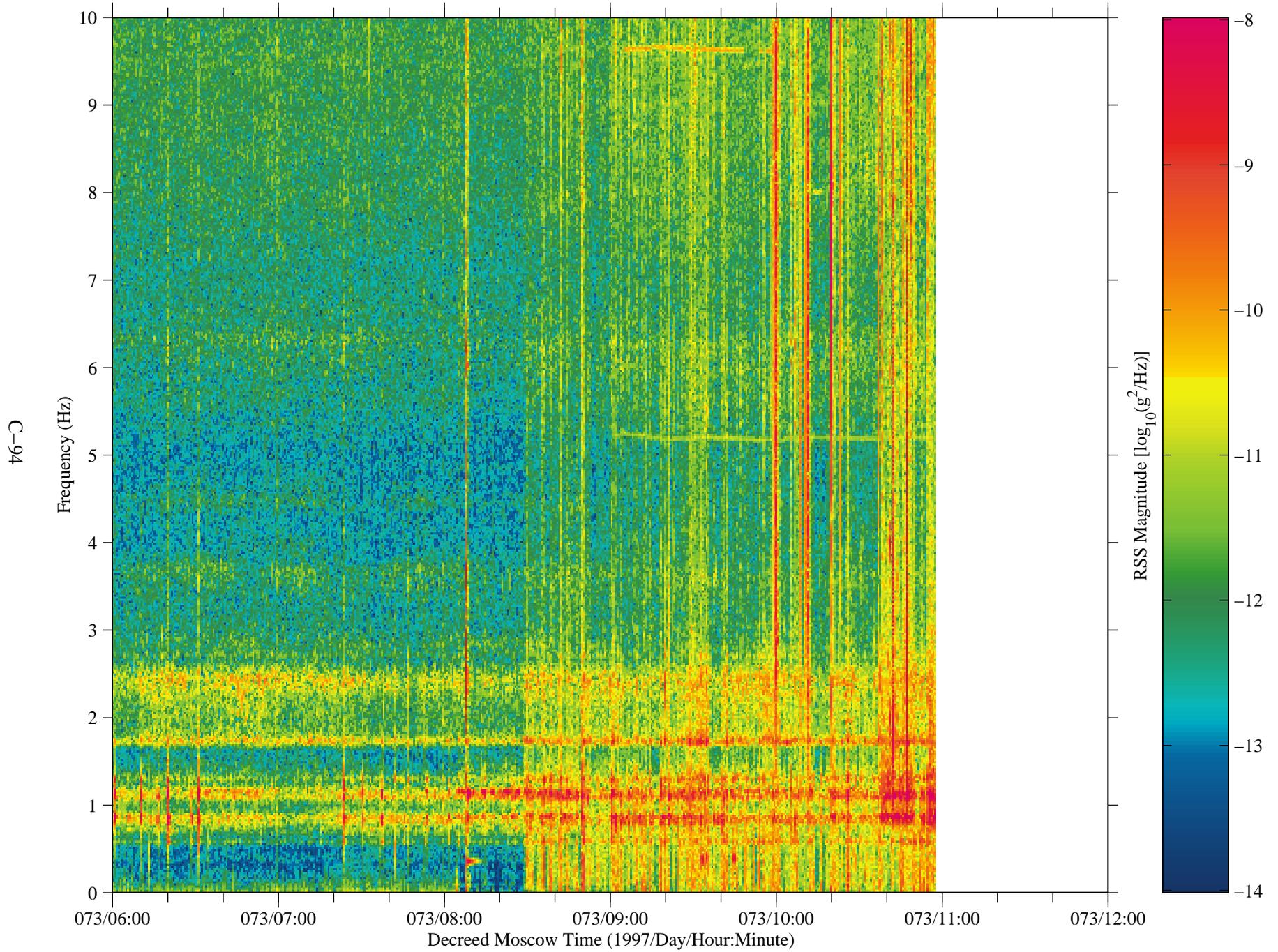
SAMS ACCELERATION MEASUREMENTS ON MIR FROM JANUARY TO MAY 1997

Figure 82: SAMS data from Mir, TSH B (fc=10 Hz)



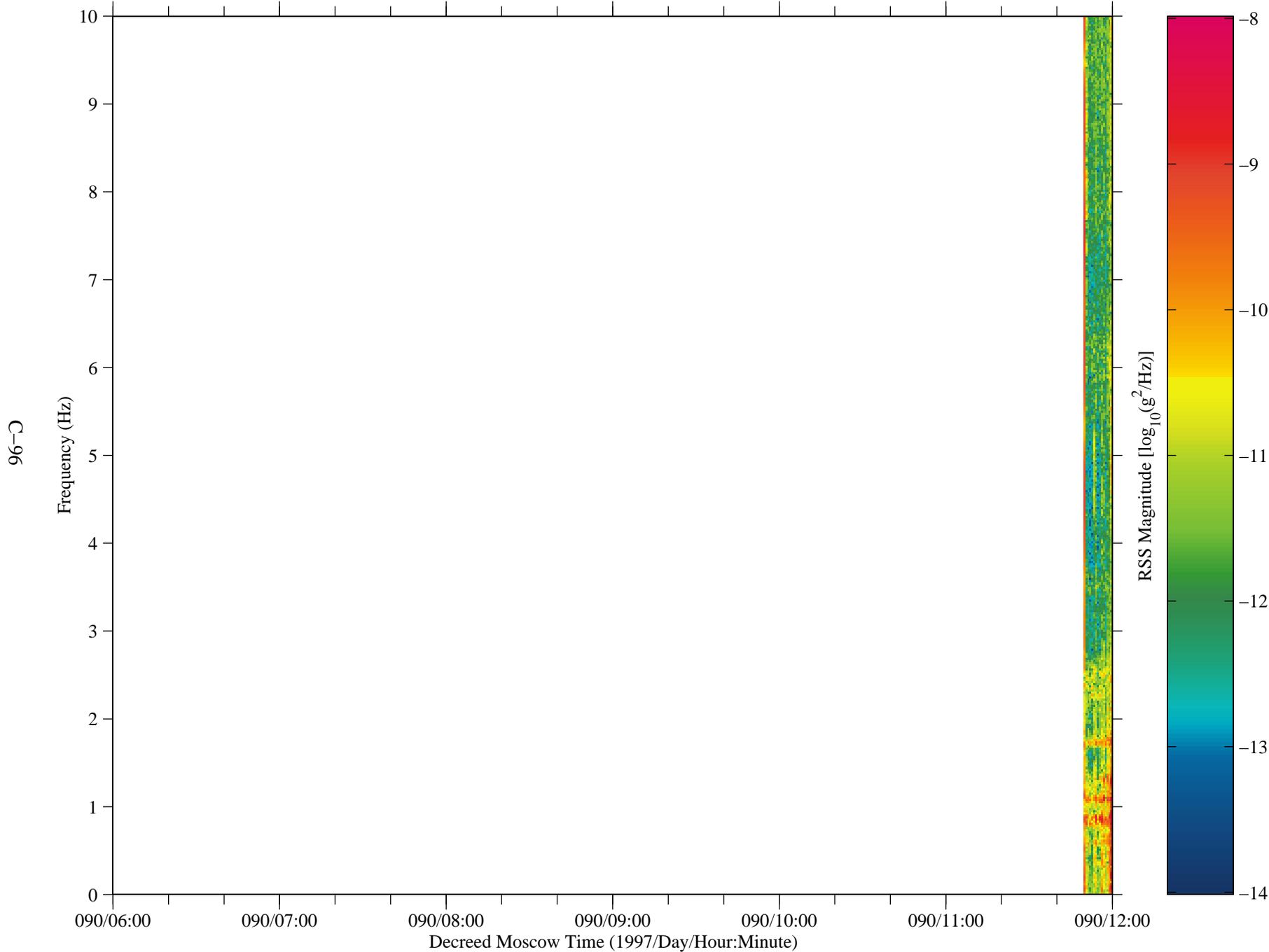
SAMS ACCELERATION MEASUREMENTS ON MIR FROM JANUARY TO MAY 1997

Figure 83: SAMS data from Mir, TSH B (fc=10 Hz)



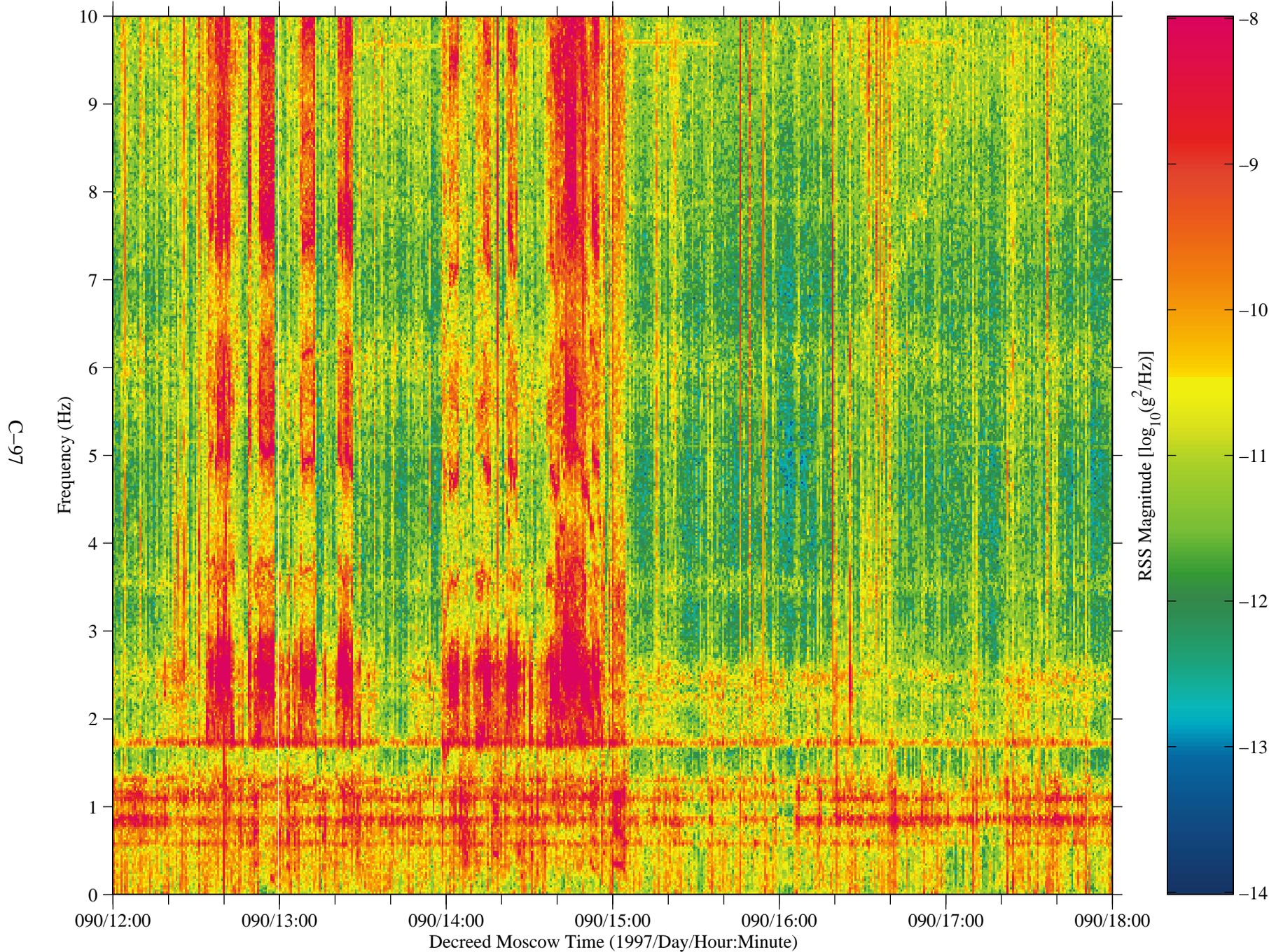
No data are available
from 073/12:00:00 – 090/06:00:00

Figure 84: SAMS data from Mir, TSH B (fc=10 Hz)



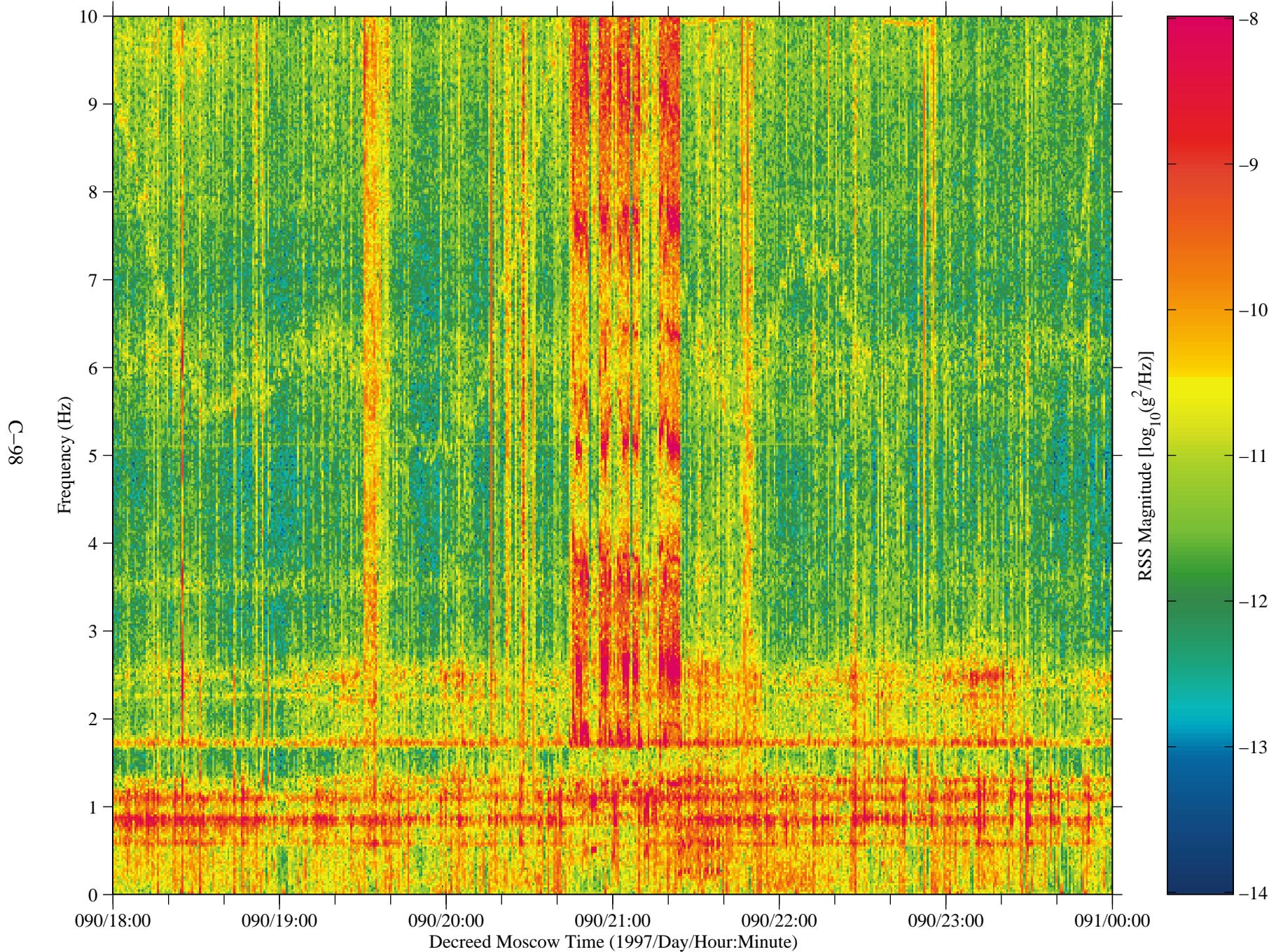
SAMS ACCELERATION MEASUREMENTS ON MIR FROM JANUARY TO MAY 1997

Figure 85: SAMS data from Mir, TSH B (fc=10 Hz)



SAMS ACCELERATION MEASUREMENTS ON MIR FROM JANUARY TO MAY 1997

Figure 86: SAMS data from Mir, TSH B (fc=10 Hz)



SAMS ACCELERATION MEASUREMENTS ON MIR FROM JANUARY TO MAY 1997

Figure 87: SAMS data from Mir, TSH B (fc=10 Hz)

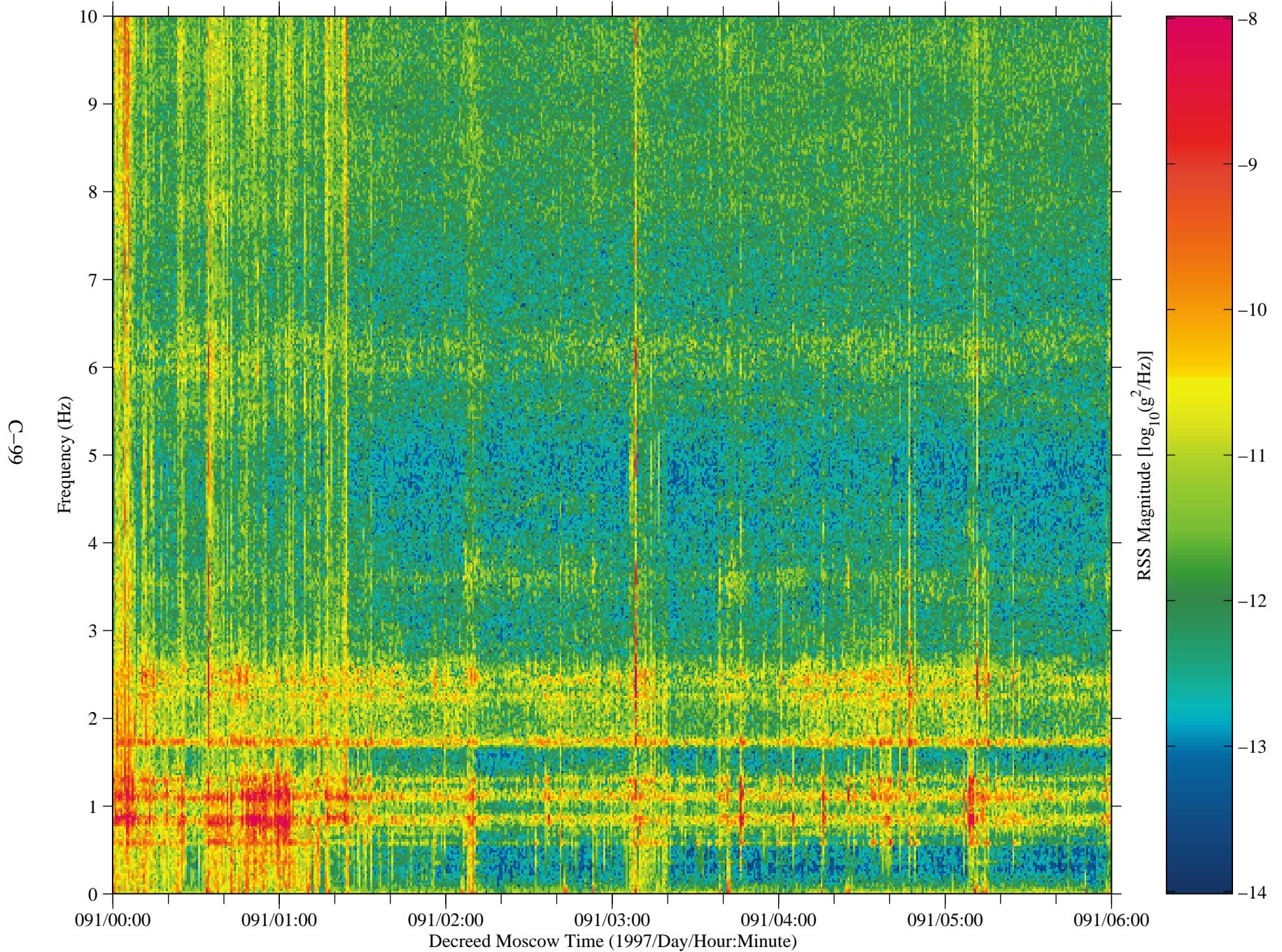
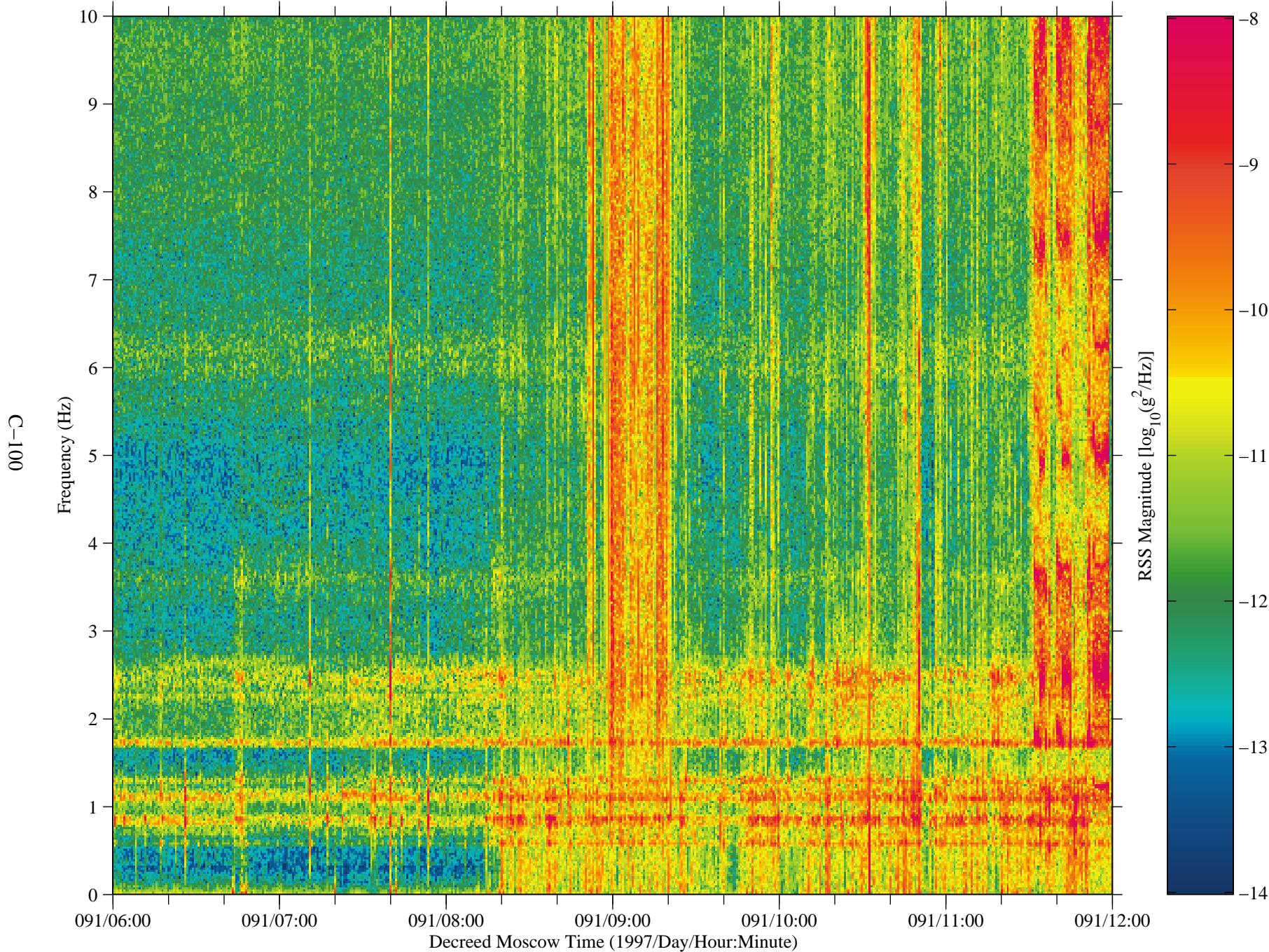
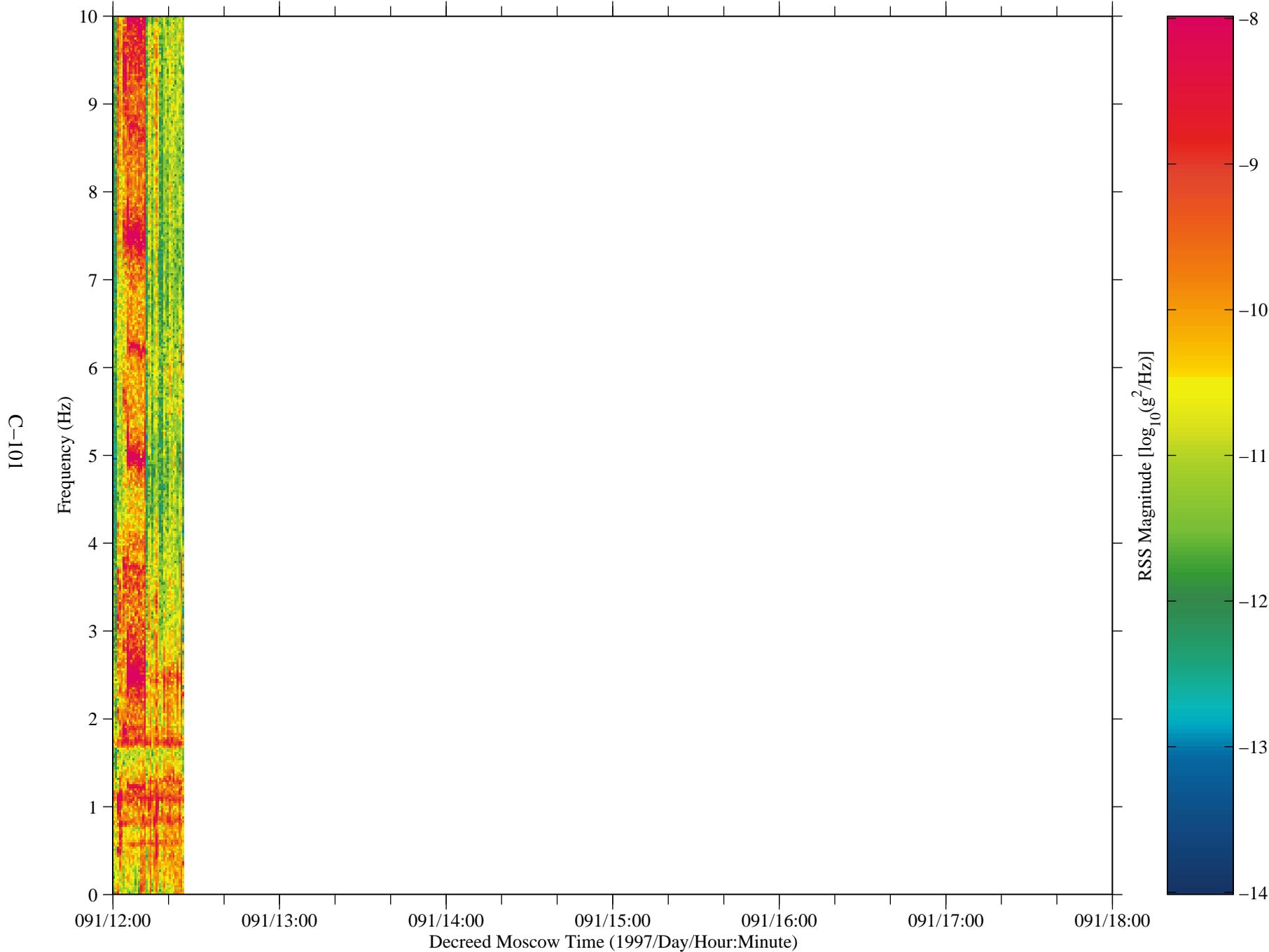


Figure 88: SAMS data from Mir, TSH B (fc=10 Hz)



SAMS ACCELERATION MEASUREMENTS ON MIR FROM JANUARY TO MAY 1997

Figure 89: SAMS data from Mir, TSH B (fc=10 Hz)

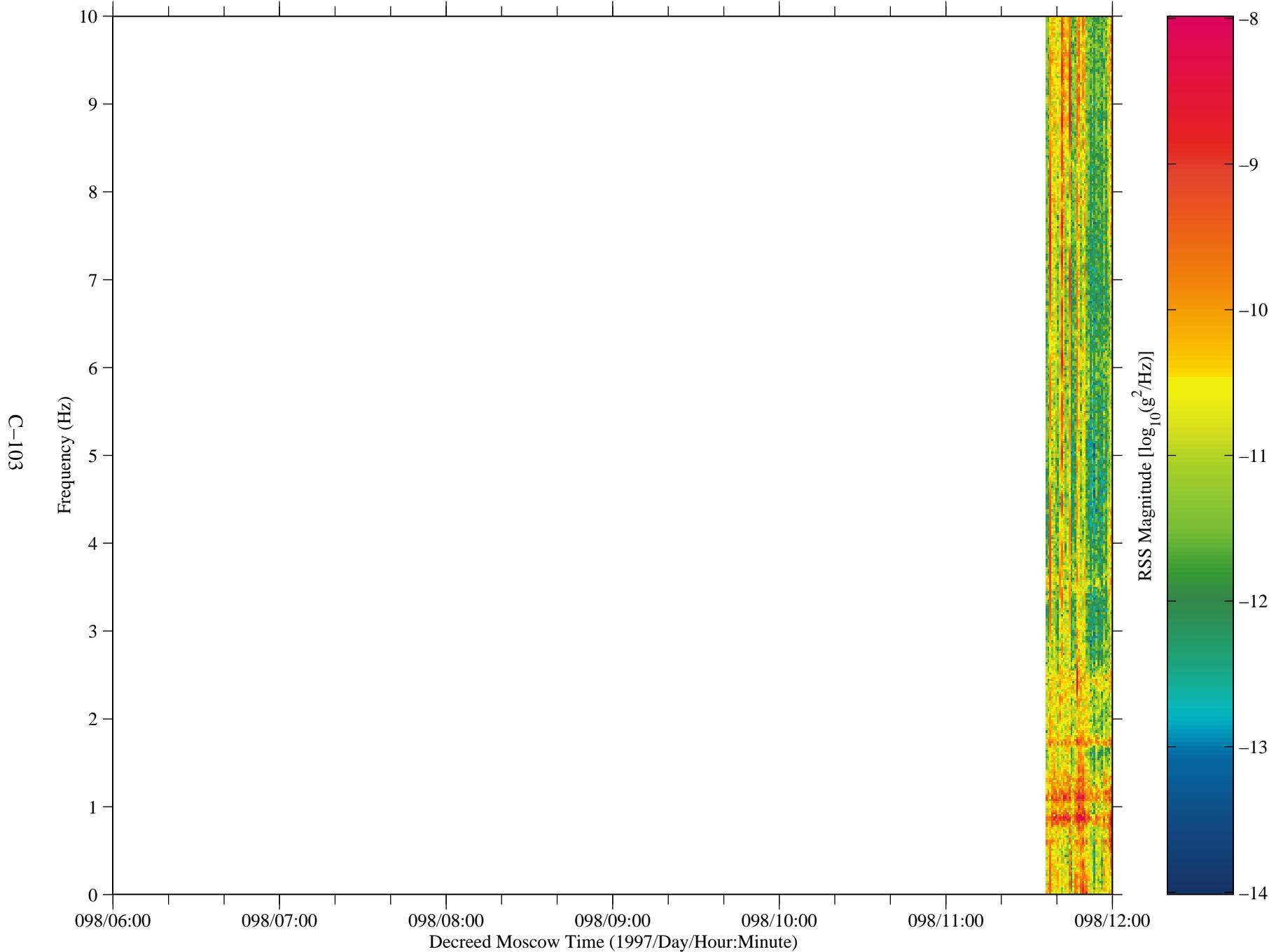


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SAMS ACCELERATION MEASUREMENTS ON MIR FROM JANUARY TO MAY 1997

No data are available
from 091/18:00:00 – 098/06:00:00

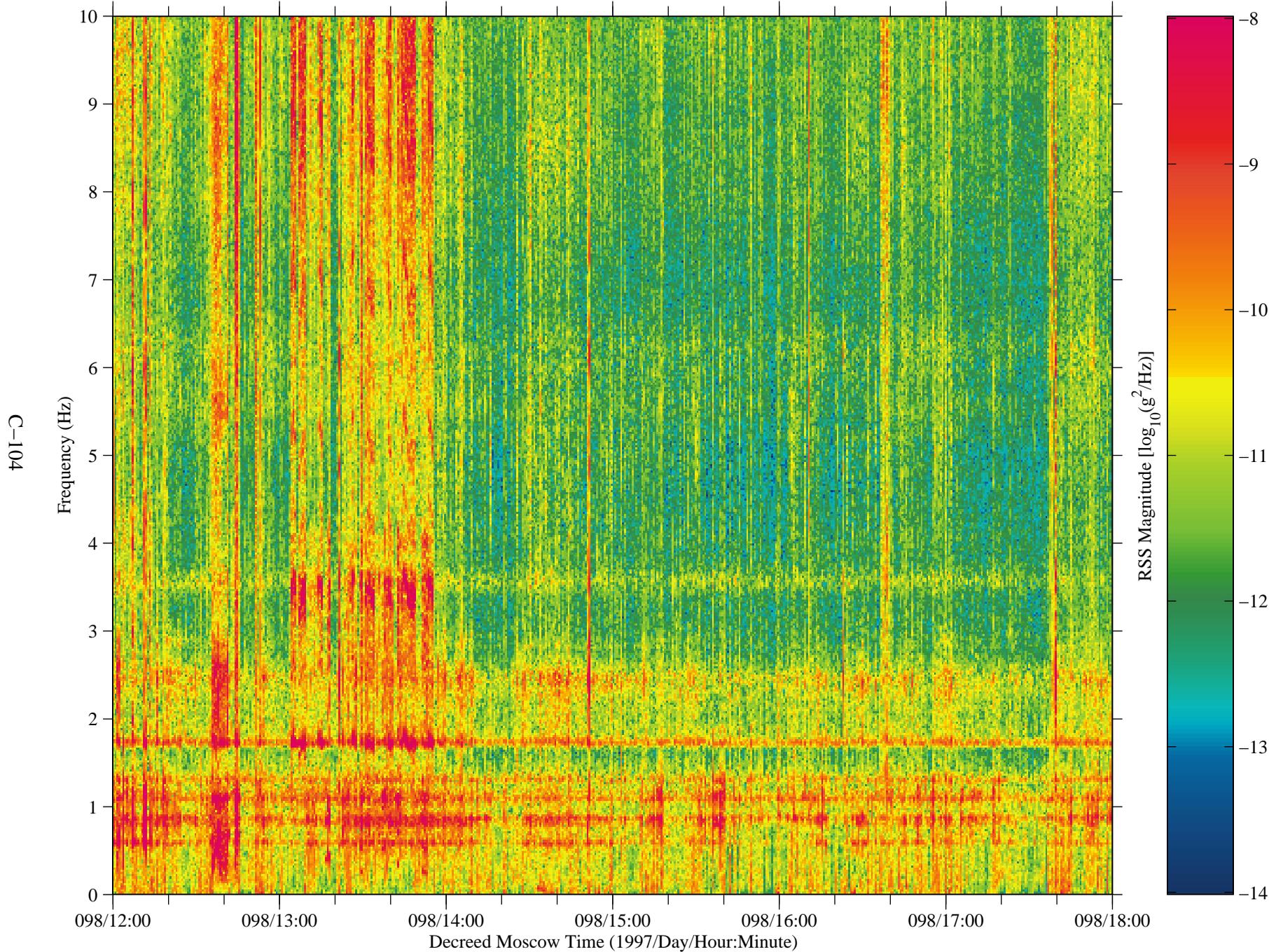
Figure 90: SAMS data from Mir, TSH B (fc=10 Hz)



SAMS ACCELERATION MEASUREMENTS ON MIR FROM JANUARY TO MAY 1997

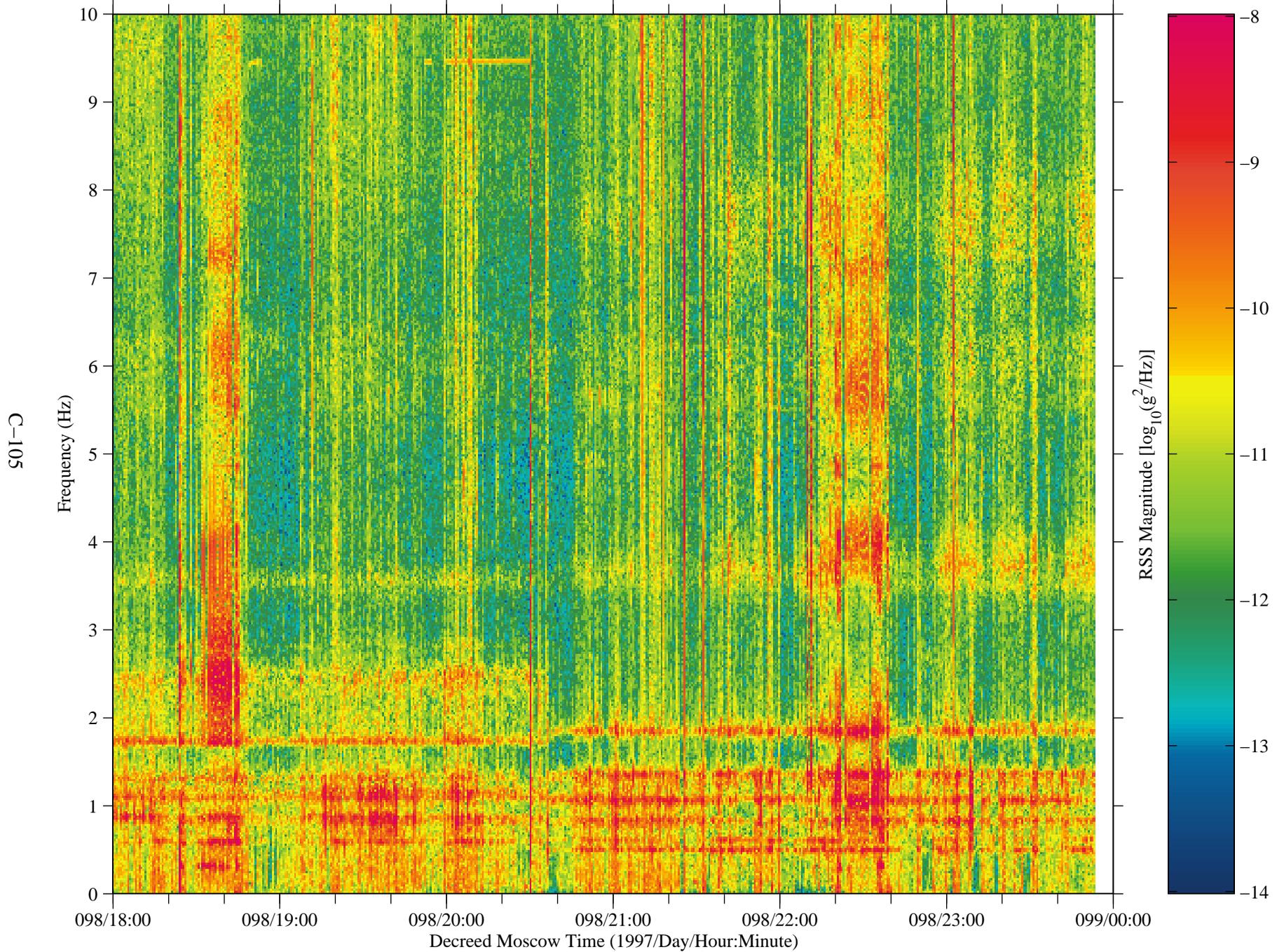
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Figure 91: SAMS data from Mir, TSH B (fc=10 Hz)



SAMS ACCELERATION MEASUREMENTS ON MIR FROM JANUARY TO MAY 1997

Figure 92: SAMS data from Mir, TSH B (fc=10 Hz)



No data are available
from 099/00:00:00 – 105/12:00:00

Figure 93: SAMS data from Mir, TSH B (fc=10 Hz)

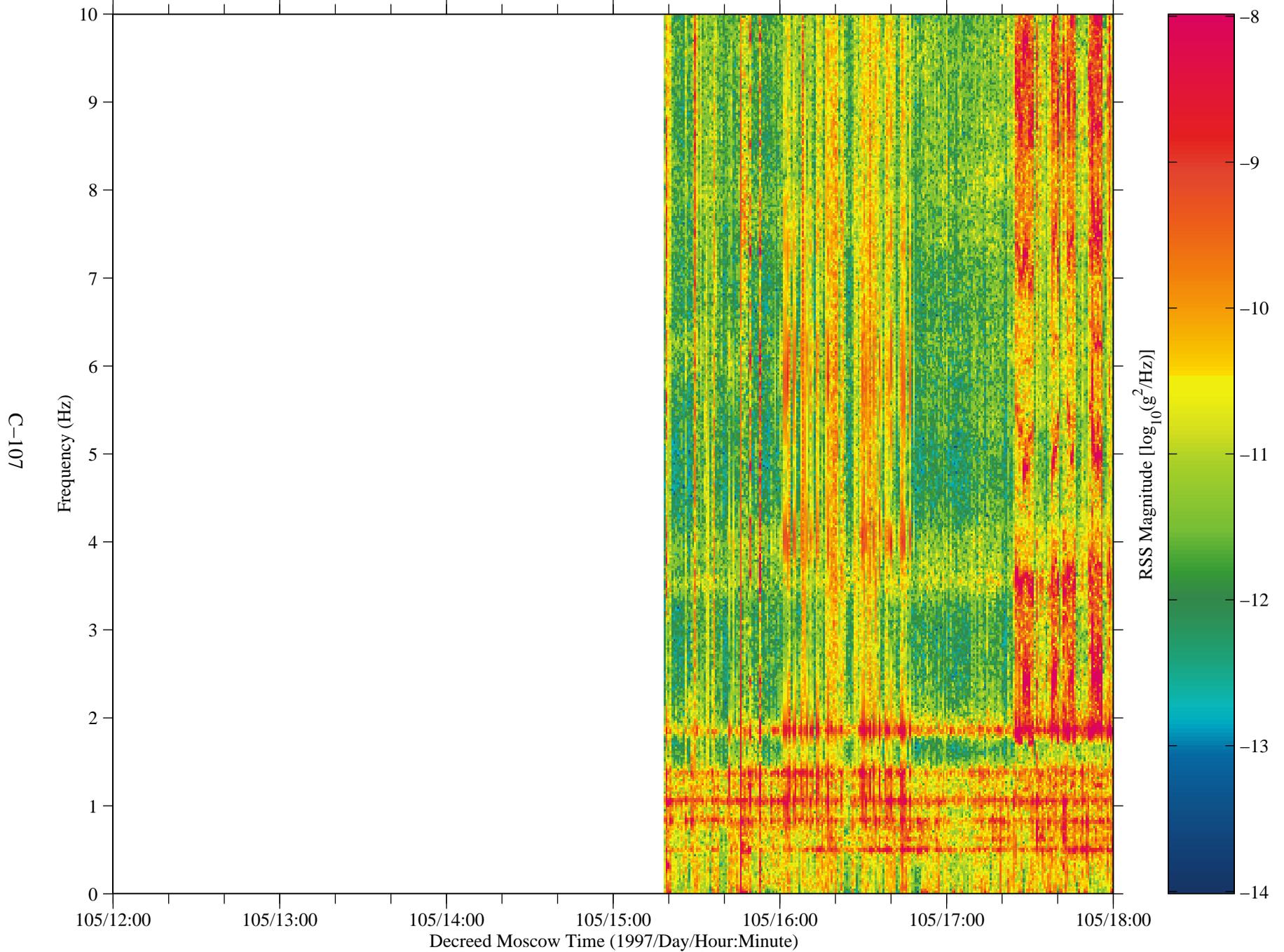
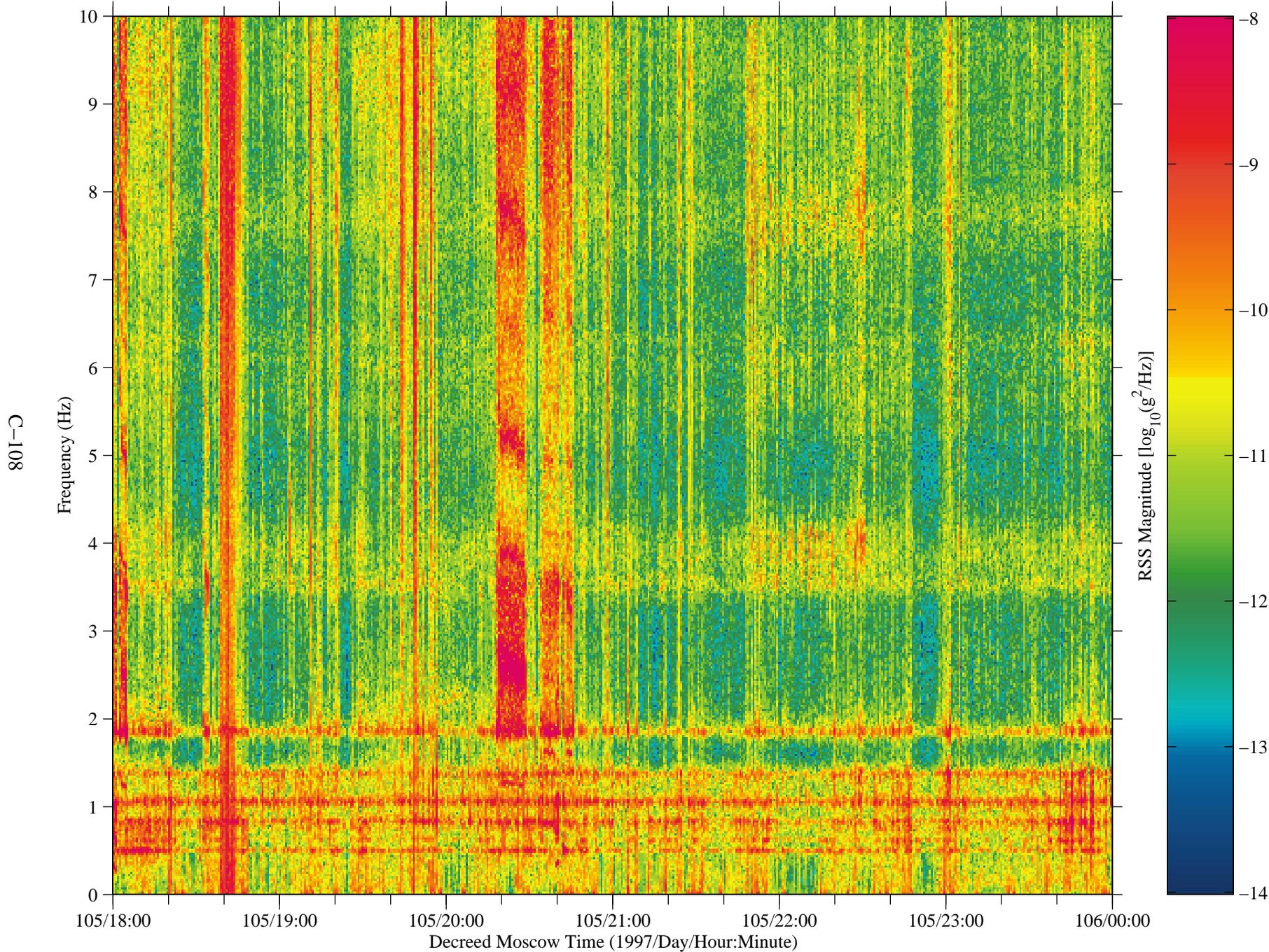
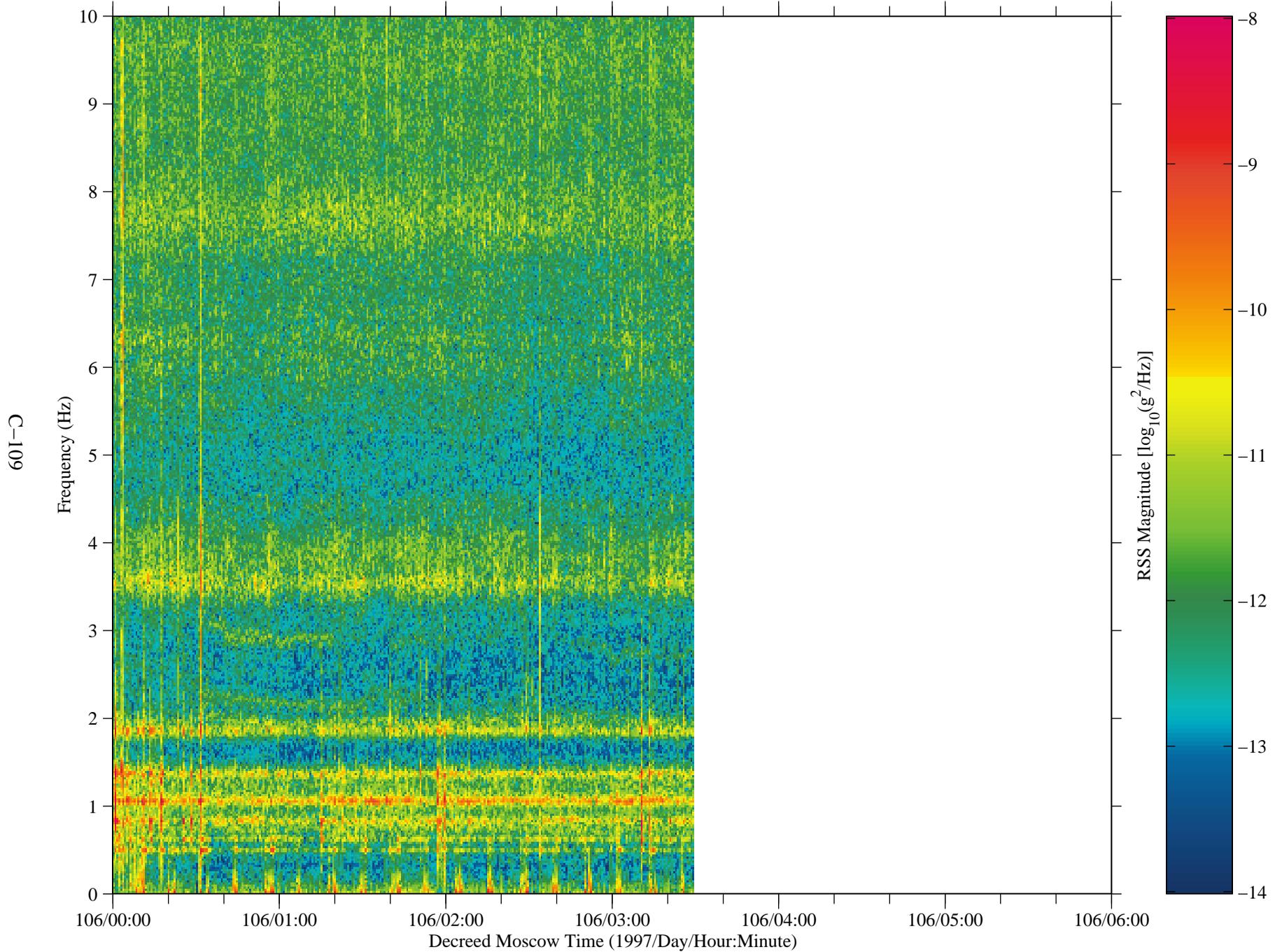


Figure 94: SAMS data from Mir, TSH B (fc=10 Hz)



SAMS ACCELERATION MEASUREMENTS ON MIR FROM JANUARY TO MAY 1997

Figure 95: SAMS data from Mir, TSH B (fc=10 Hz)

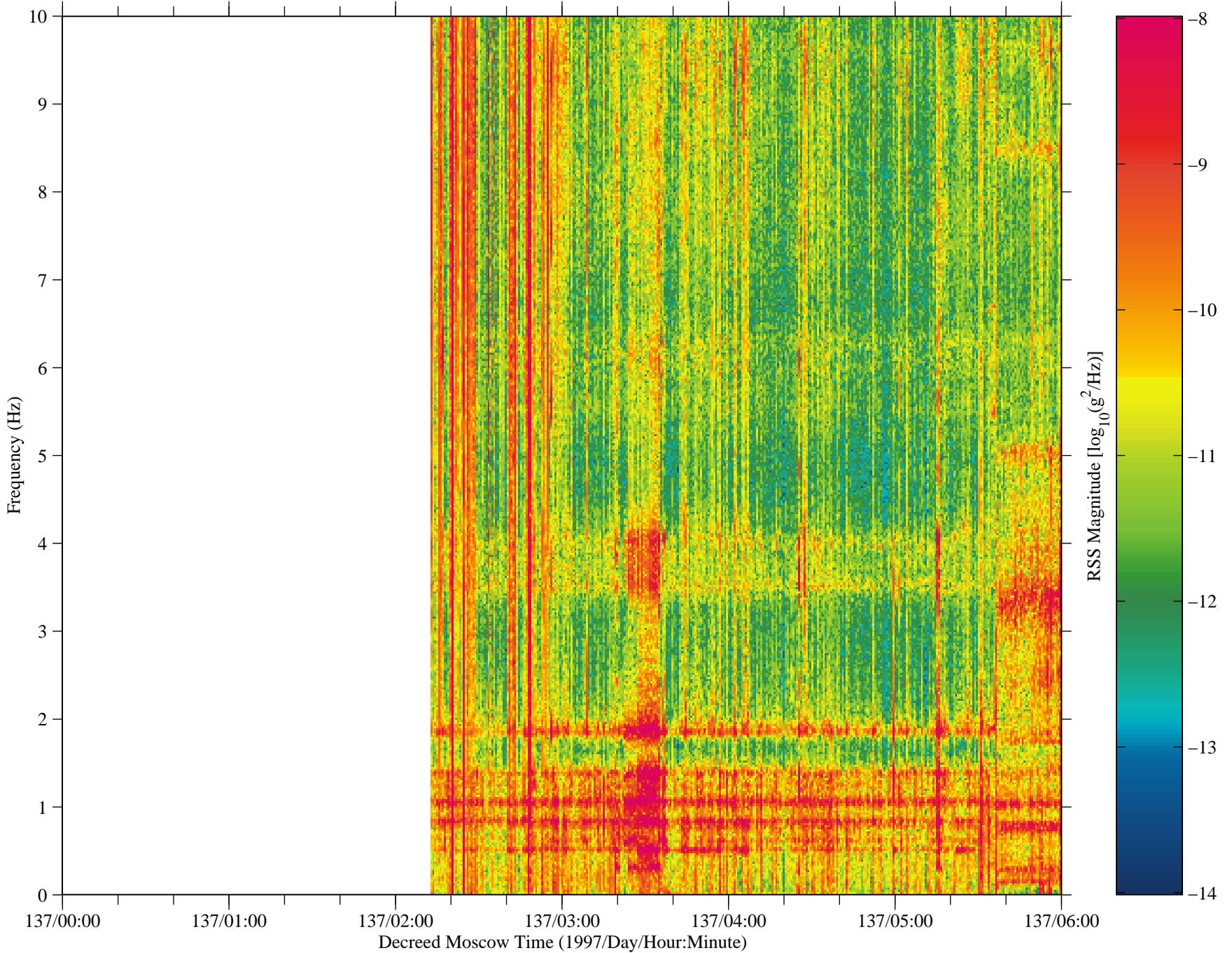


SAMS ACCELERATION MEASUREMENTS ON MIR FROM JANUARY TO MAY 1997

No data are available
from 106/06:00:00 – 137/00:00:00

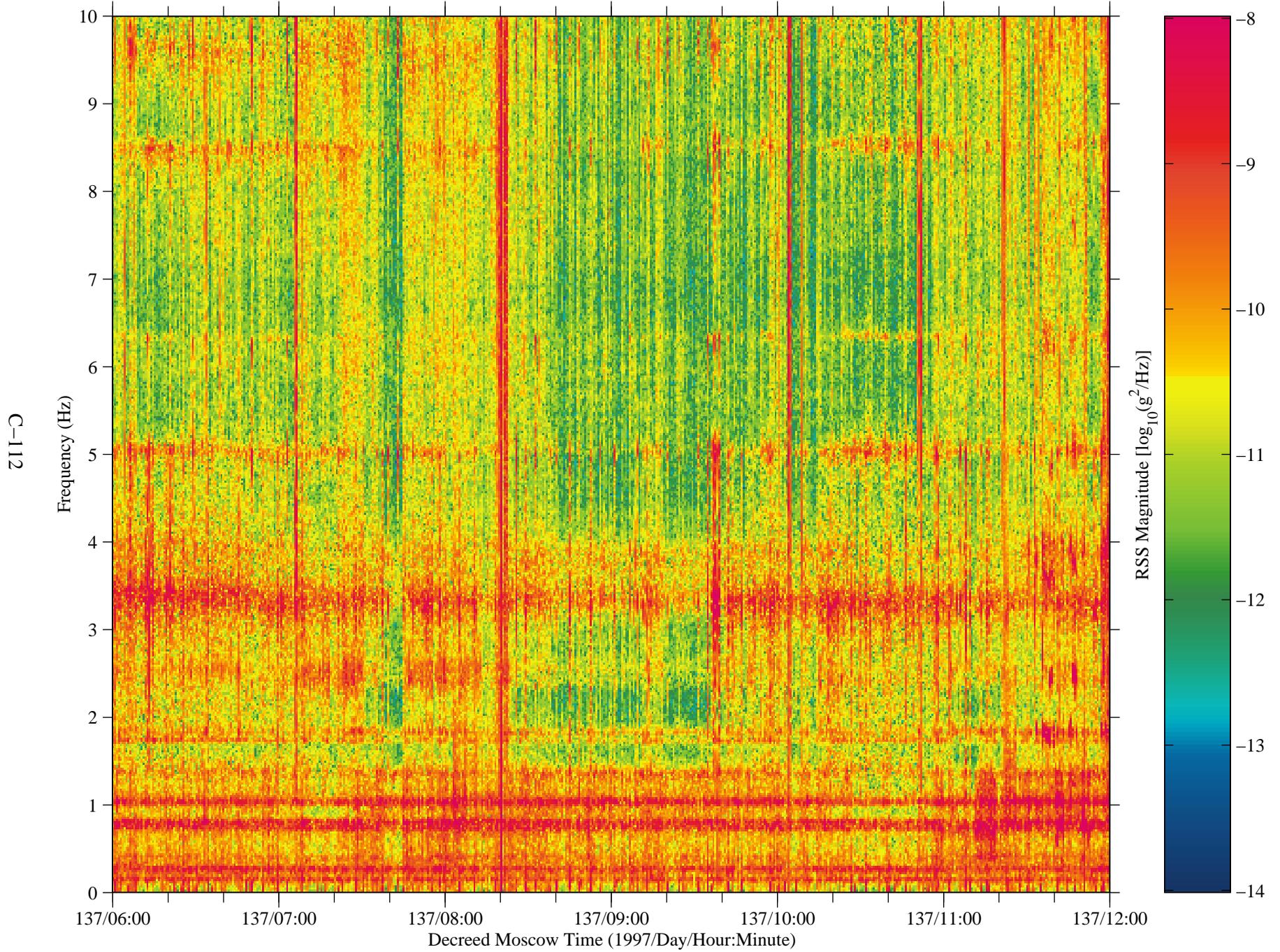
Figure 96: SAMS data from Mir, TSH B (fc=10 Hz)

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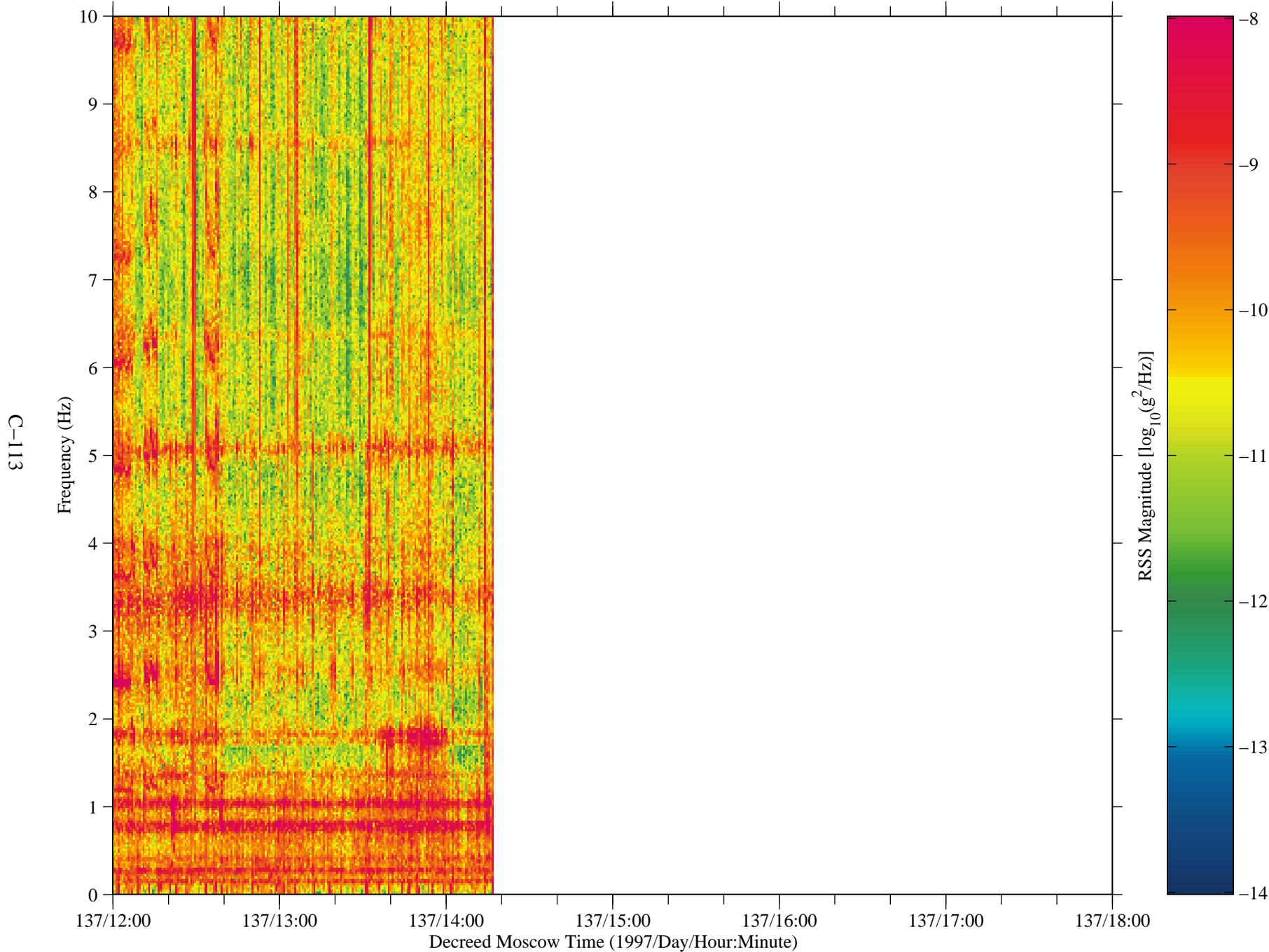
SAMS ACCELERATION MEASUREMENTS ON MIR FROM JANUARY TO MAY 1997

Figure 97: SAMS data from Mir, TSH B (fc=10 Hz)



SAMS ACCELERATION MEASUREMENTS ON MIR FROM JANUARY TO MAY 1997

Figure 98: SAMS data from Mir, TSH B (fc=10 Hz)

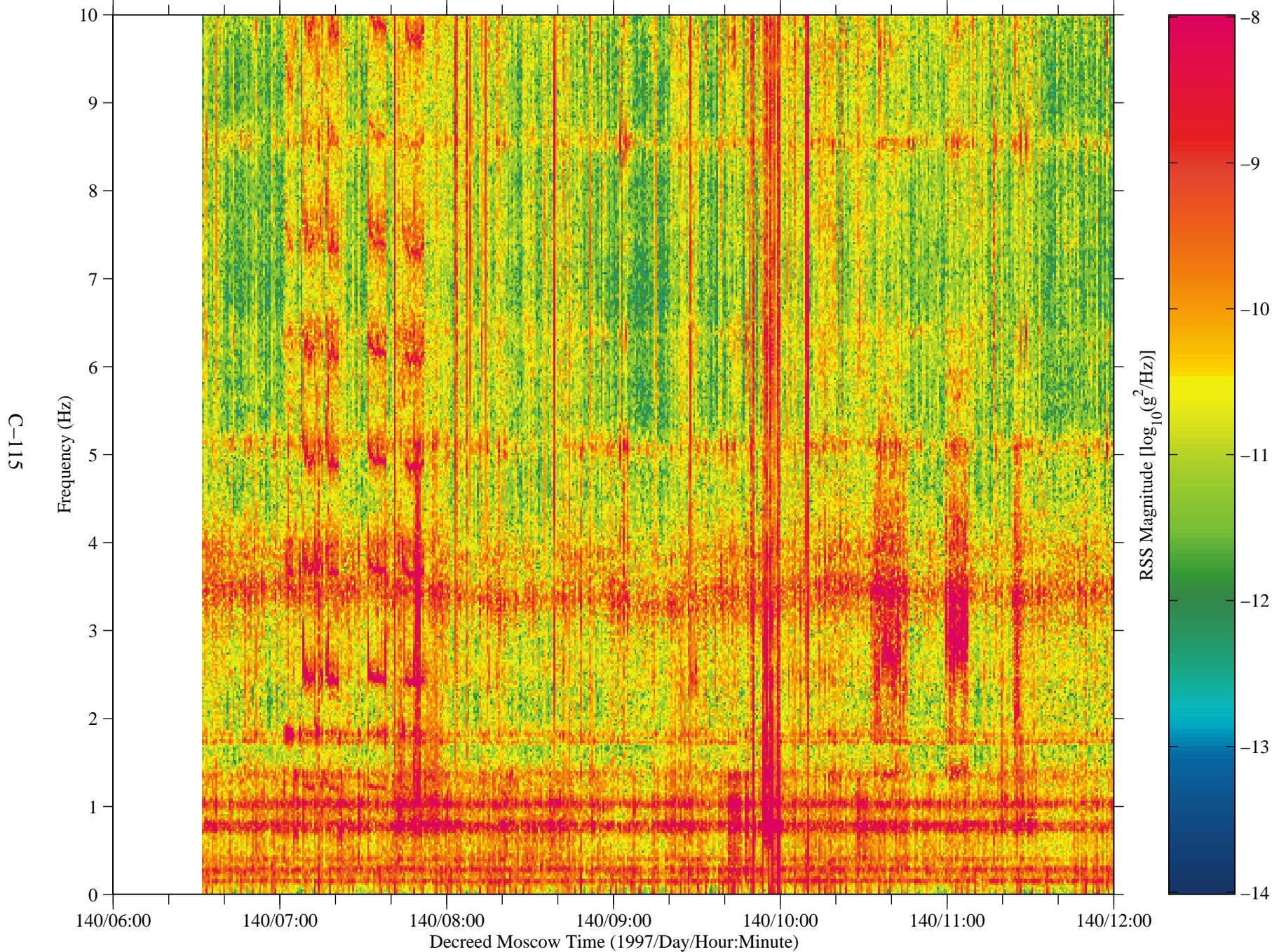


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SAMS ACCELERATION MEASUREMENTS ON MIR FROM JANUARY TO MAY 1997

No data are available
from 137/18:00:00 – 140/06:00:00

Figure 99: SAMS data from Mir, TSH B (fc=10 Hz)



SAMS ACCELERATION MEASUREMENTS ON MIR FROM JANUARY TO MAY 1997

Figure 100: SAMS data from Mir, TSH B (fc=10 Hz)

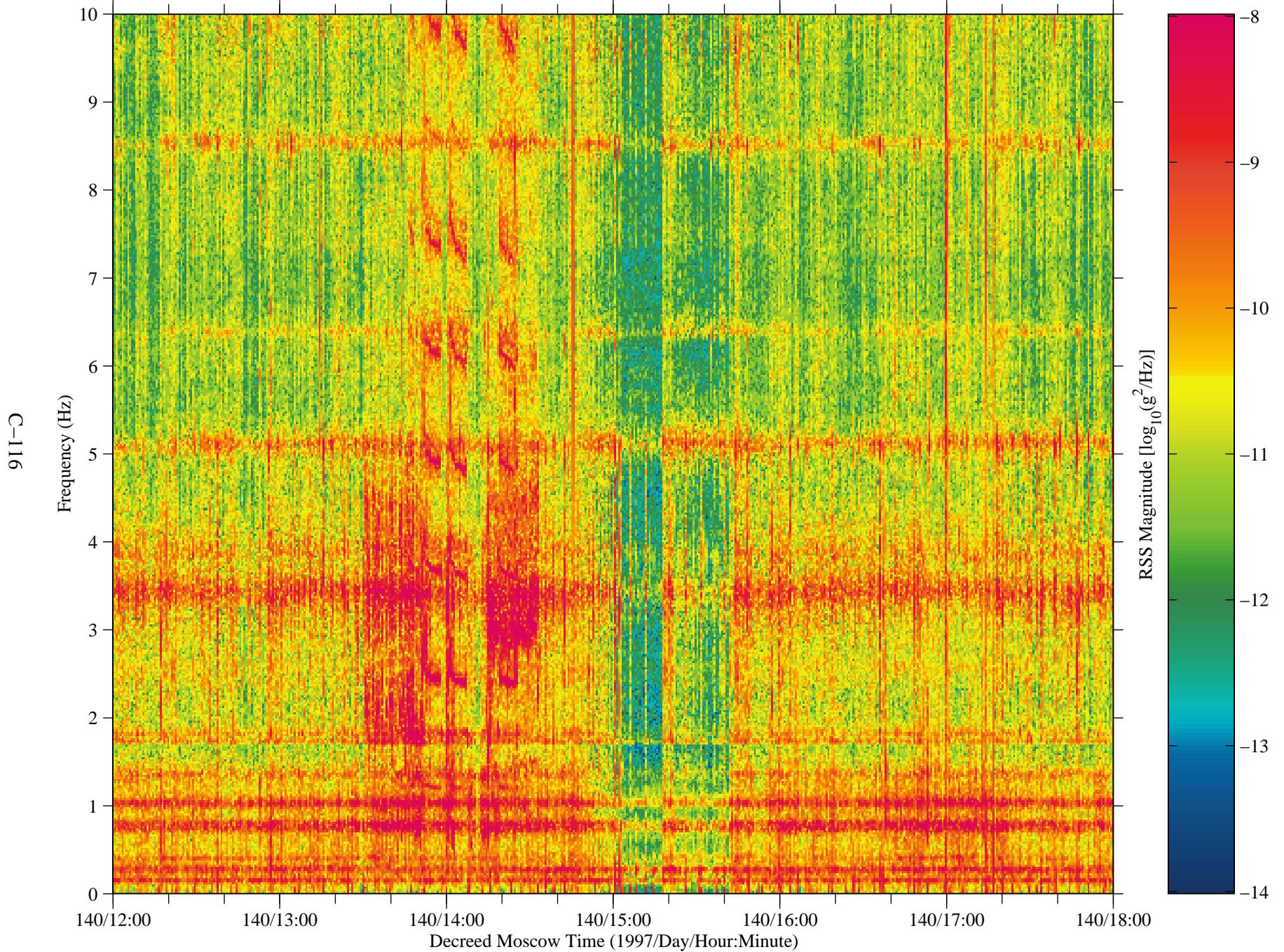
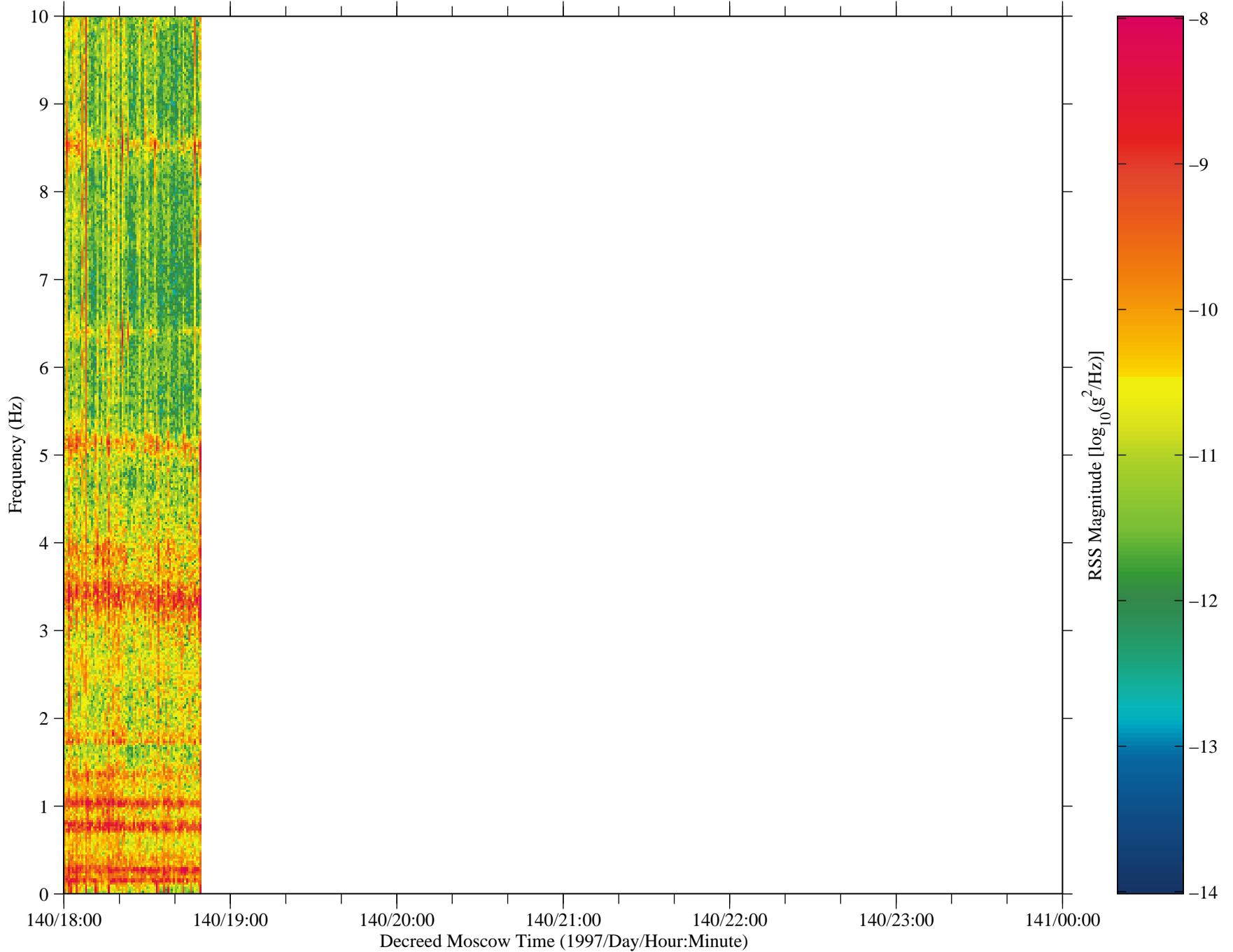


Figure 101: SAMS data from Mir, TSH B (fc=10 Hz)

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SAMS ACCELERATION MEASUREMENTS ON MIR FROM JANUARY TO MAY 1997