# R O S E T T A

# FLIGHT REPORTS of RPC–MAG

## RO–IGEP–TR–0008

**Issue: 4 Revision: 2**

**April 12, 2007**

# Report of the

# COMMISSIONING PART 2

# Time period: May 05. - 10., 2004

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## Contents


**1 Summary** **1**

**2 May 07, 2004:** **1**
- 2.1 Actions . . . 1
- 2.2 Plots of Calibrated Data using the new Temperature Model . . . 2
- 2.3 Plots of ROSETTA's Reaction Wheels Speeds . . . 7

**3 May 08, 2004:** **13**
- 3.1 Actions . . . 13
- 3.2 Plots of Calibrated Data using the new Temperature Model . . . 13
- 3.3 Plots of ROSETTA's Reaction Wheels Speeds . . . 37

**4 May 09, 2004:** **46**
- 4.1 Actions . . . 46
- 4.2 Plots of Calibrated Data using the new Temperature Model . . . 46
- 4.3 Plots of ROSETTA's Reaction Wheels Speeds . . . 61

**5 May 10, 2004:** **67**
- 5.1 Actions . . . 67
- 5.2 Plots of Calibrated Data using the new Temperature Model . . . 67
- 5.3 Plots of ROSETTA's Reaction Wheels Speeds . . . 78

# 1 Summary


The second commissioning phase for RPC–MAG was executed in the time period May 05. – 10., 2004. All the performed steps were successful. MAG worked as expected.

Both, the OB and the IB sensor were checked as primary sensor. All voltages were stable and in the expected range.
The sensor temperatures varied in a range of ($-115°C$ – $-80°C$), because the sensors were obviously in the shadow.

In summary MAG is operating well and we are looking forward for the first scientific relevant measurements.

The next sections give a brief description of the executed activities and show the obtained data. Housekeeping data ( Temperature of the OB & IB sensor, Filter Stages A & B, Filter configuration register, Reference voltage, negative and positive 5V supply voltage, and the coarse HK sampled magnetic field data of the OB sensor ) are presented as well as magnetic field science data of the OB and IB sensor in the activated modes. Magnetic field data are plotted in instrument coordinates if not otherwise stated. They are calibrated according to the results of the ground calibration and the new generated temperature model using flight data from March until September 2004. Sensitivity, Misalignment, and Temperature effects are taken into account. The s/c residual field is not subtracted.

The dynamic spectra show some clear lines which are varying with the time. A detailed investigation showed, that these lines have their origin in the reaction wheels of the ROSETTA S/C. As they are rotating with different speeds they generate different disturbance frequencies. The signatures of the reaction wheels are folded down in the measurement range of the magnetometers. A detailed investigation of this phenomenon is given in RO–IGEP–TR0012.


# 2 May 07, 2004:

## 2.1 Actions

MAG was switched on immediately after PIU via OBCP and set to HK mode and later at 23:38 to SID 5. All commands passed smoothly and the instrument followed in the expected way.

### 2.2 Plots of Calibrated Data using the new Temperature Model

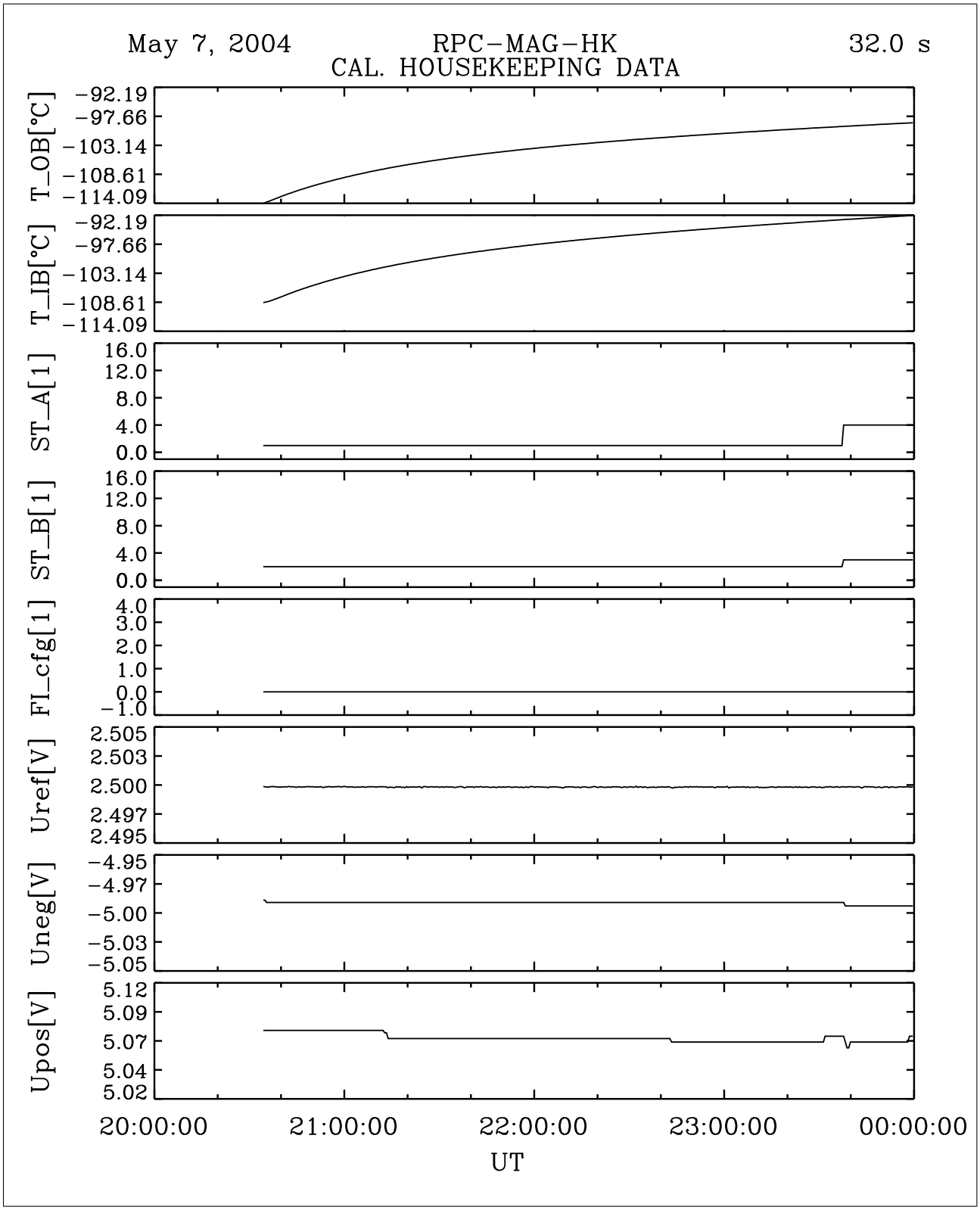


Figure 1: File: RPCMAG040507T2033_CLA_HK_P2000_2400

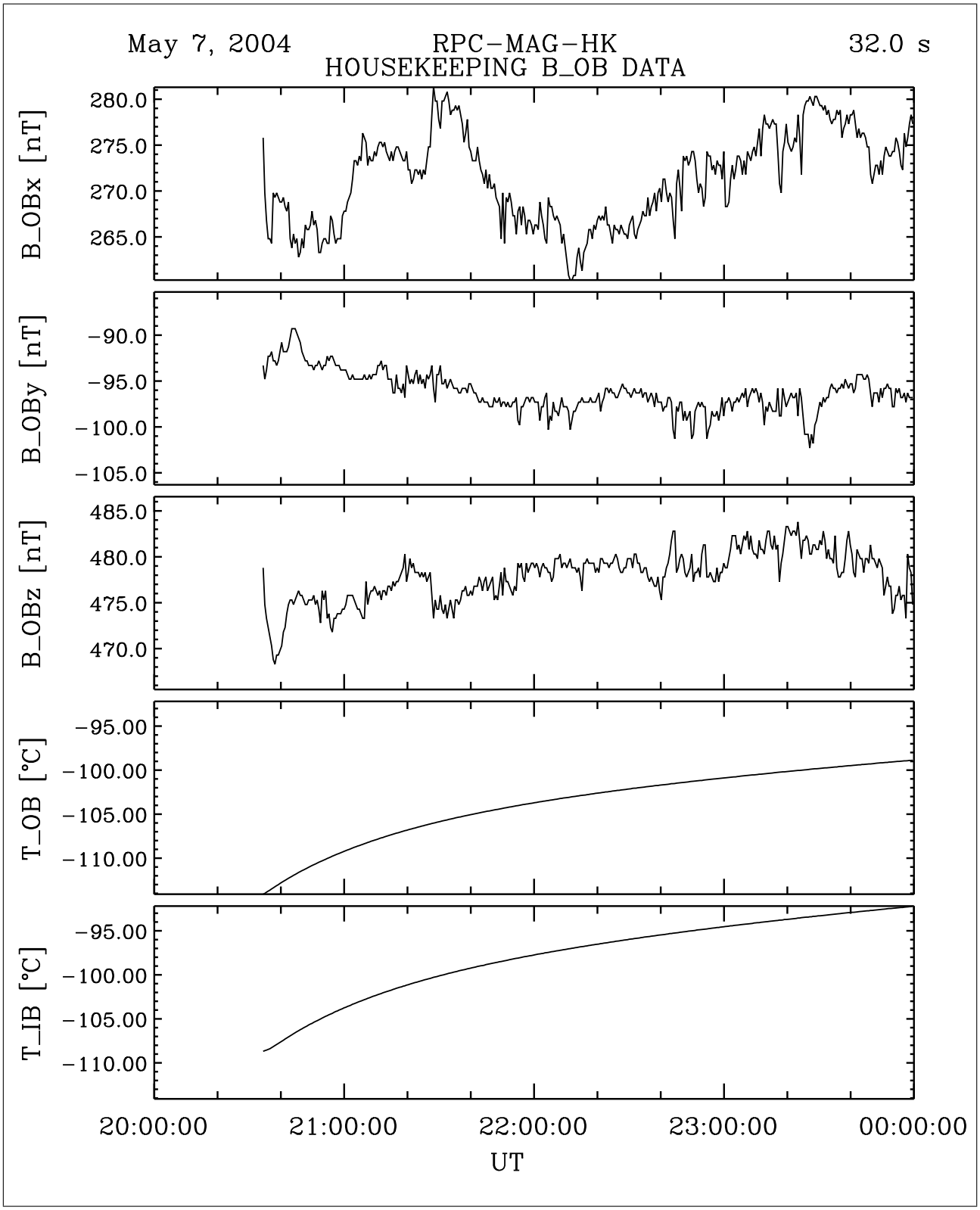


Figure 2: File: RPCMAG040507T2033_CLA_HK_B_P2000_2400

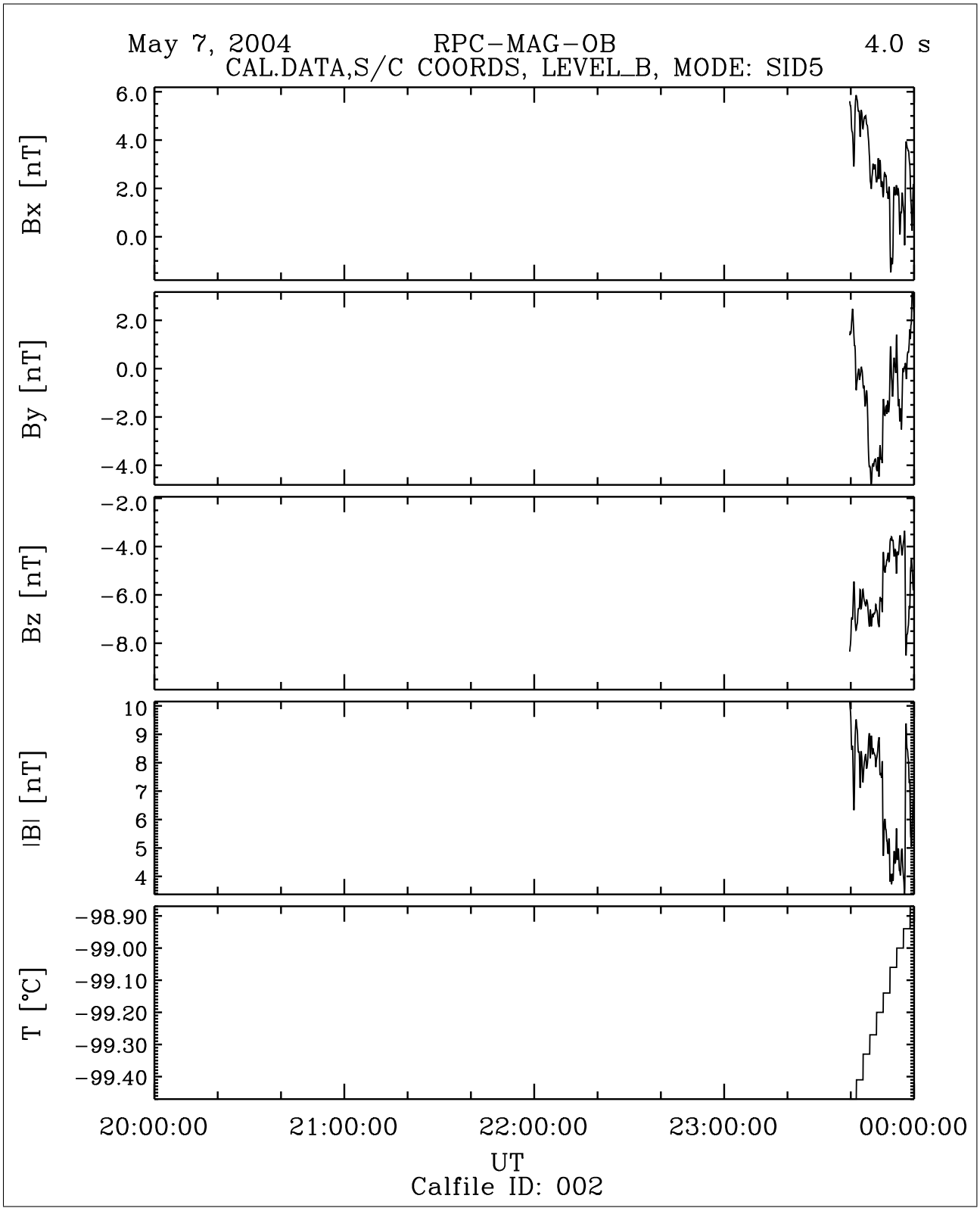


Figure 3: File: RPCMAG040507T2339_CLB_OB_M5_T2000_2400_002

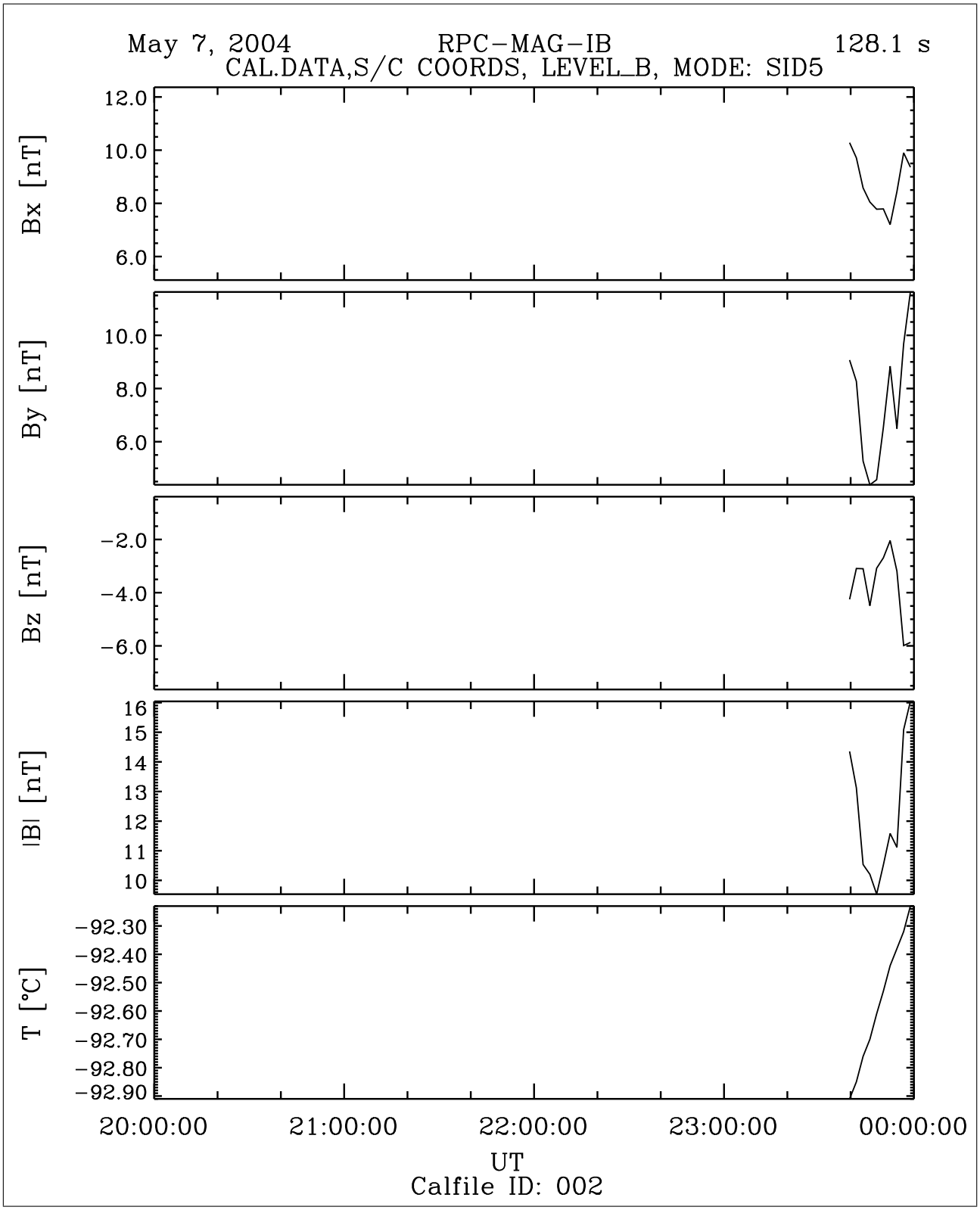


Figure 4: File: RPCMAG040507T2339_CLB_IB_M5_T2000_2400_002

### 2.3 Plots of ROSETTA's Reaction Wheels Speeds

The following plots show the time series of the revolutions of the 4 reaction wheels. Two kinds of data are shown:

- The original reaction wheel data as they are stored in the DDS.
- The theoretical response of the wheels impact seen by an instrument sampling with different frequencies. Here the response in the at 20 Hz, 1 Hz and 0.25 Hz sampling frequency is plotted.

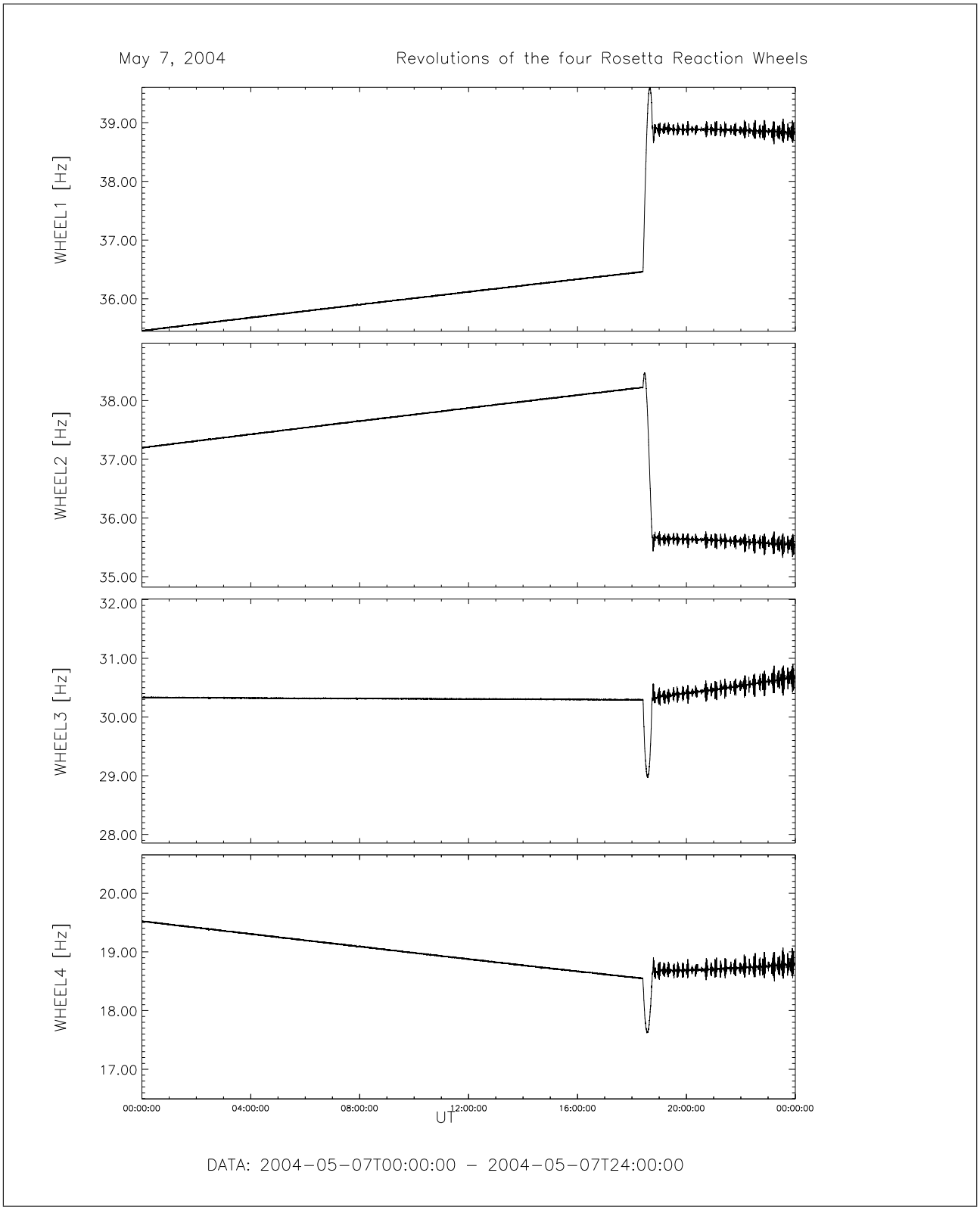


Figure 5: File: wheels_Hz2004-05-07T00-00

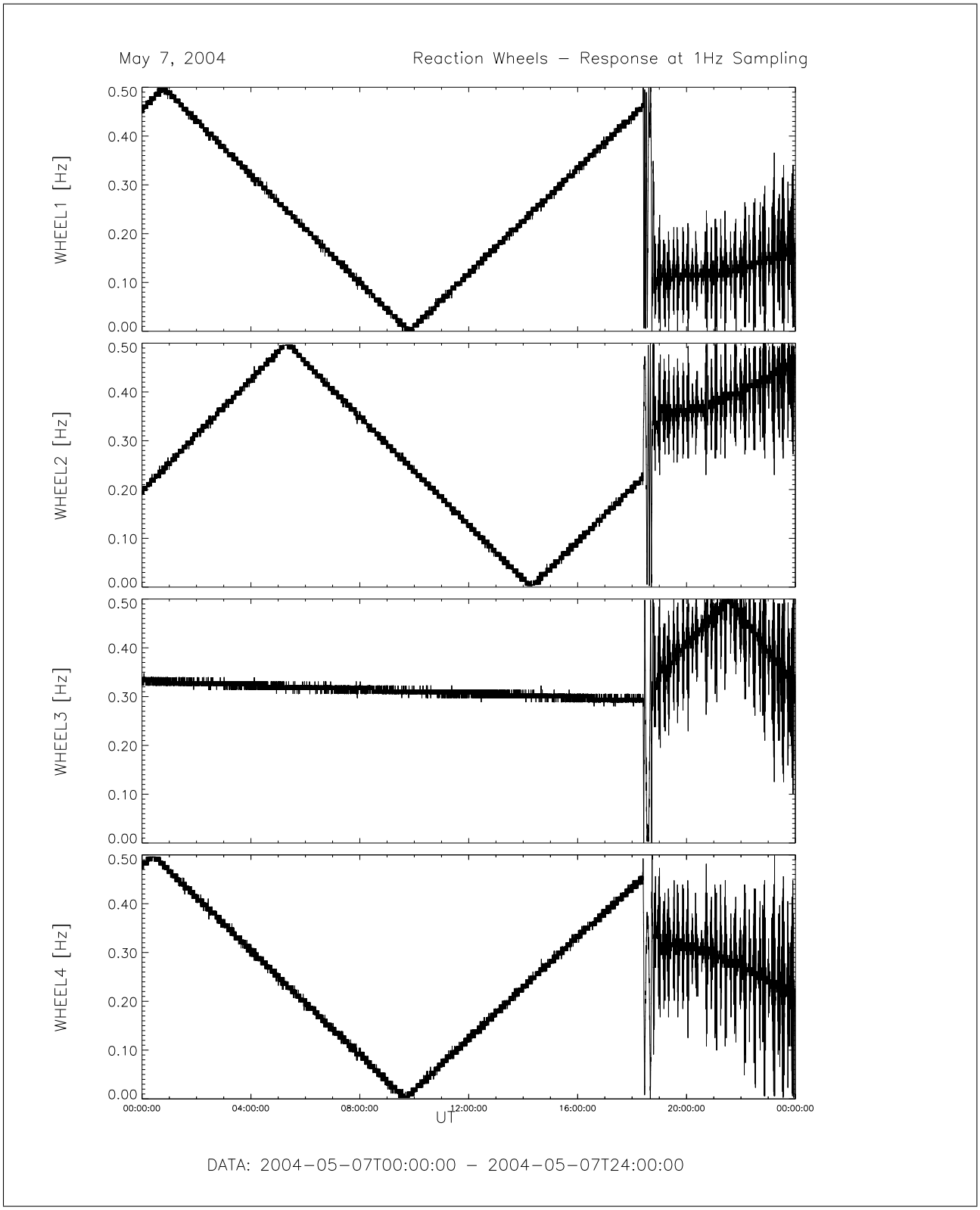


Figure 6: File: wheels_1Hz_Sampling2004-05-07T00-00

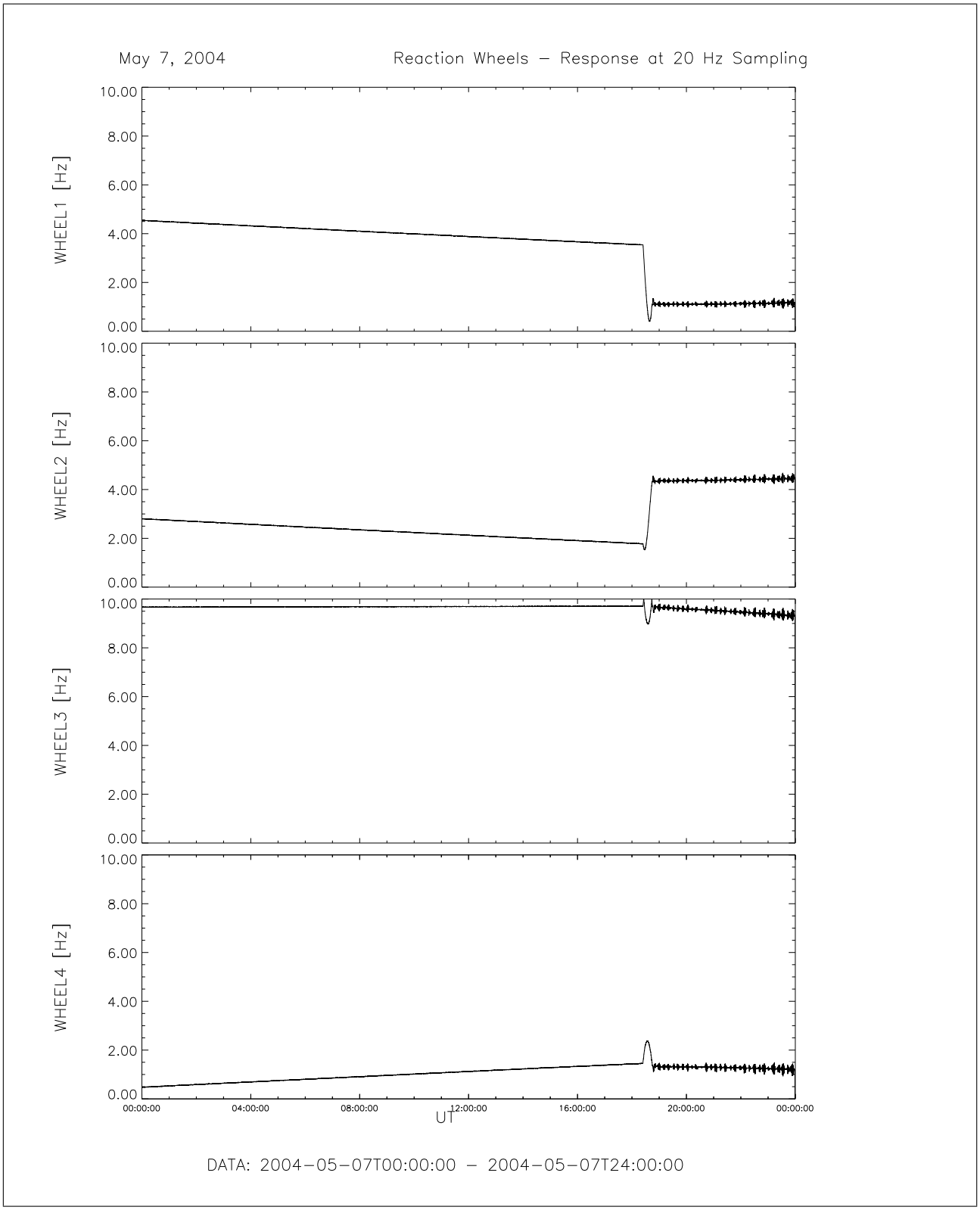


Figure 7: File: wheels_20Hz_Sampling2004-05-07T00-00

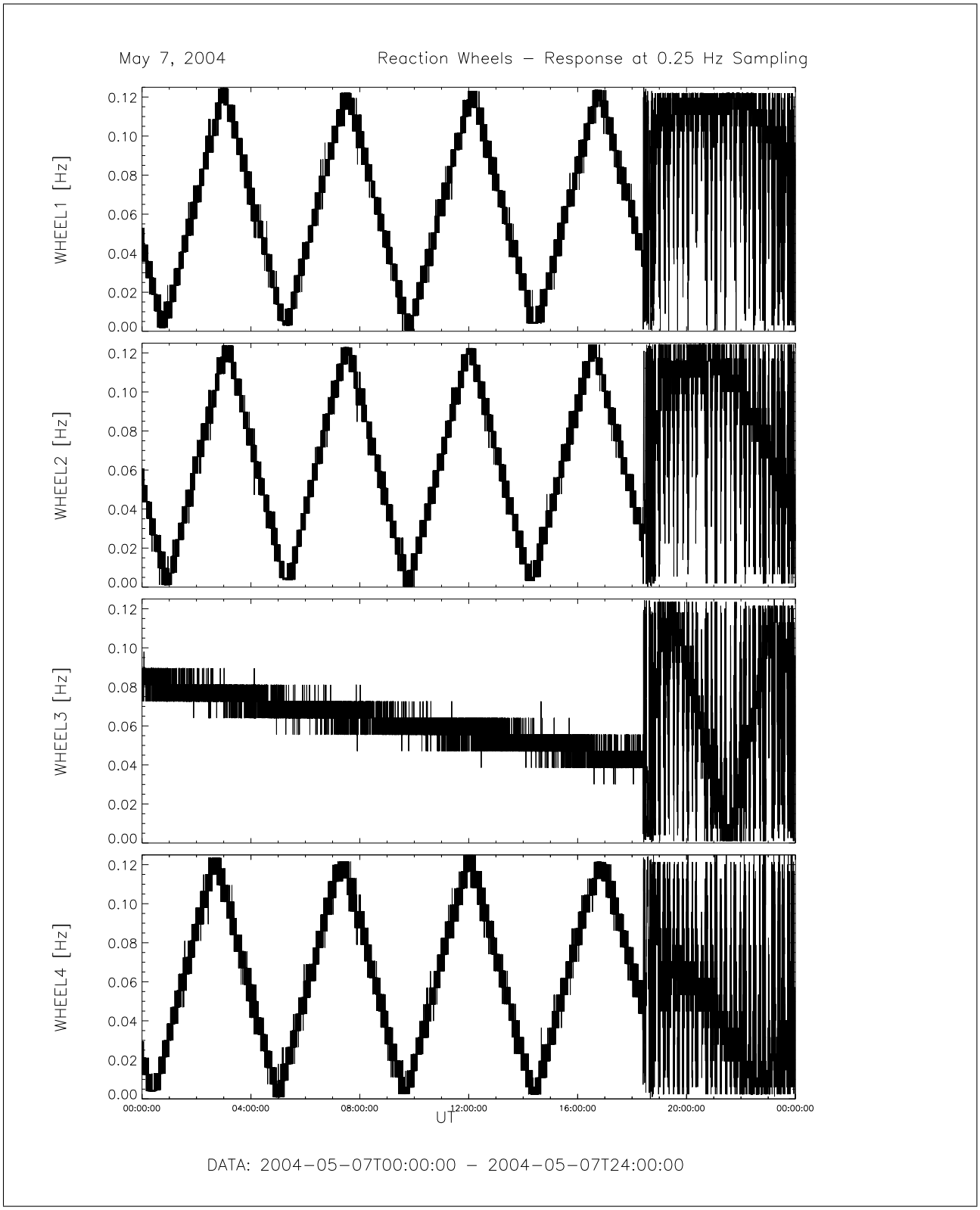


Figure 8: File: wheels_025Hz_Sampling2004-05-07T00-00

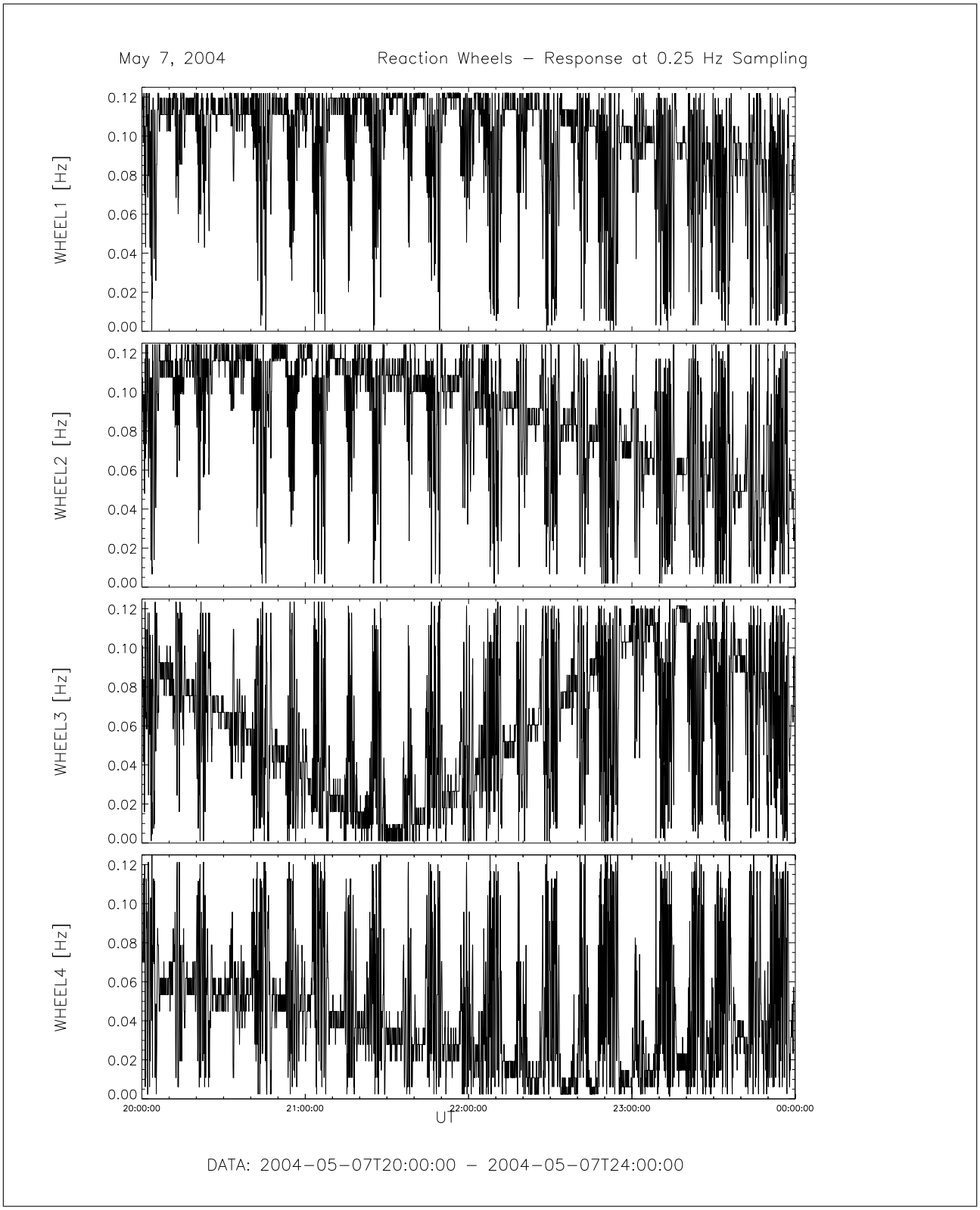


Figure 9: File: wheels_025Hz_Sampling2004-05-07T20-00

# 3 May 08, 2004:

## 3.1 Actions

MAG was successfully set to SID4 at 01:50. Data were sent until 02:15 (LOS). These data show variations of maximum 4 nT in the modulus. The temperature was stable at 95° C. The other data were stored in SSMM and downlinked later.

All the day the instrument gathered data during the Out of path period. During the day the Instrument was switched successfully to to all SIDs.

| Time | Stage A, Stage B,Filter cfg | Stage 1, Stage 2, Stage3 | Mode |
| --- | --- | --- | --- |
| 00:00 – 01:50 | 4 3 0 | 4 3 0 | SID5 |
| – 08:49 | 2 0 0 | 2 0 0 | SID4 |
| – 11:18 | 0 0 0 | 0 0 0 | SID3 |
| – 13:47 | 1 2 0 | 1 2 0 | SID2 |
| – 18:23 | 4 3 1 | 4 3 3 | SID1 |
| – 21:34 | 0 0 0 | 0 0 0 | SID3 |
| – 22:03 | 4 3 1 | 4 3 3 | SID1 |
| – 22:05 | 1 2 0 | 1 2 0 | SID2 |
| – 22:31 | 4 3 1 | 4 3 3 | SID1 |
| – 24:00 | 0 0 0 | 0 0 0 | SID3 |

The spectral investigation of the data reveals a peak at about 1 Hz (ref. Figure **??** and Figure **??**. This frequency peak occurs e.g. in the time interval 09:00 – 10:00 and at 02:00, but disappears in the interval 19:00 – 21:00. However, in this time interval a peak at 3 Hz appears.

## 3.2 Plots of Calibrated Data using the new Temperature Model

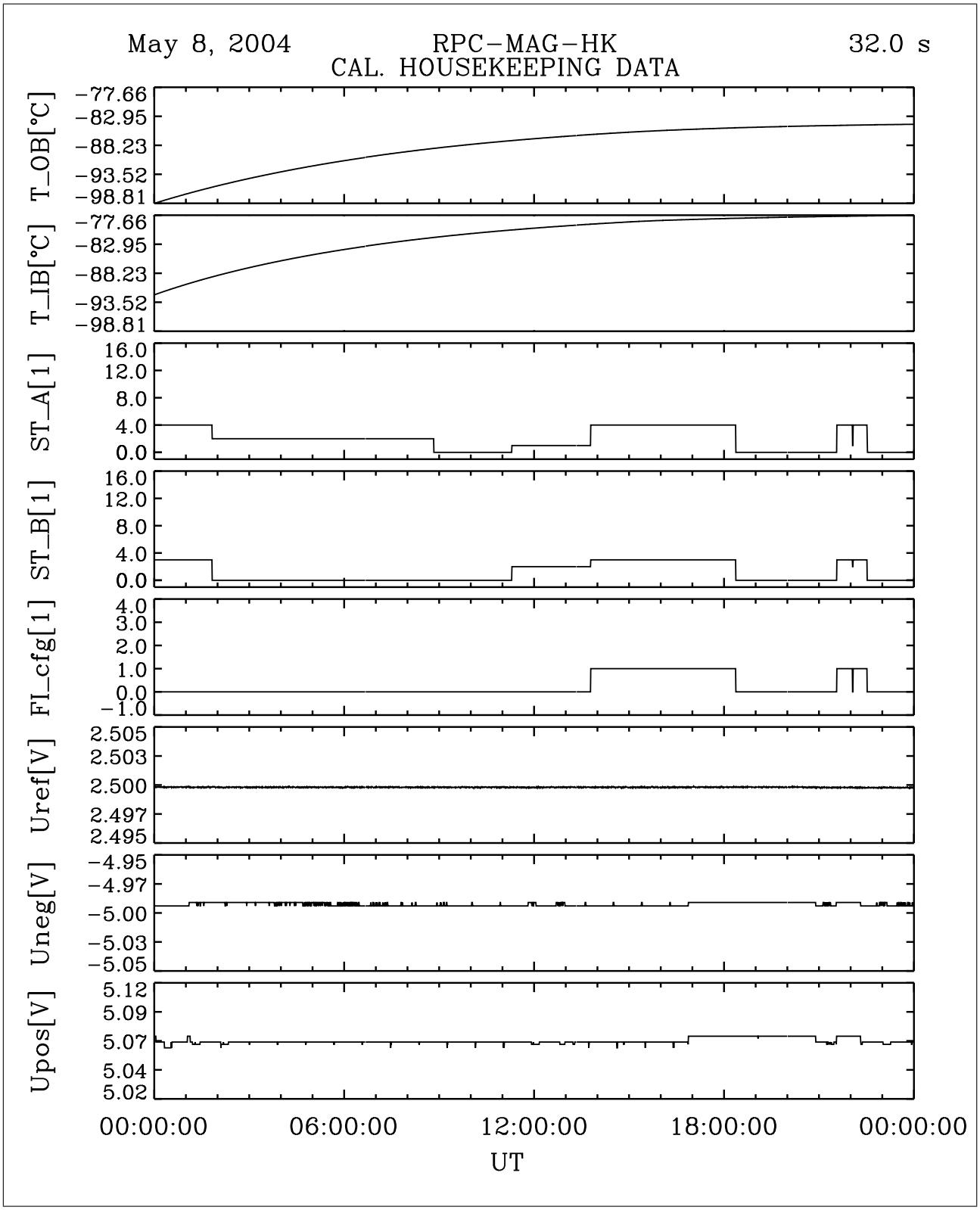


Figure 10: File: RPCMAG040508T0000_CLA_HK_P0000_2400

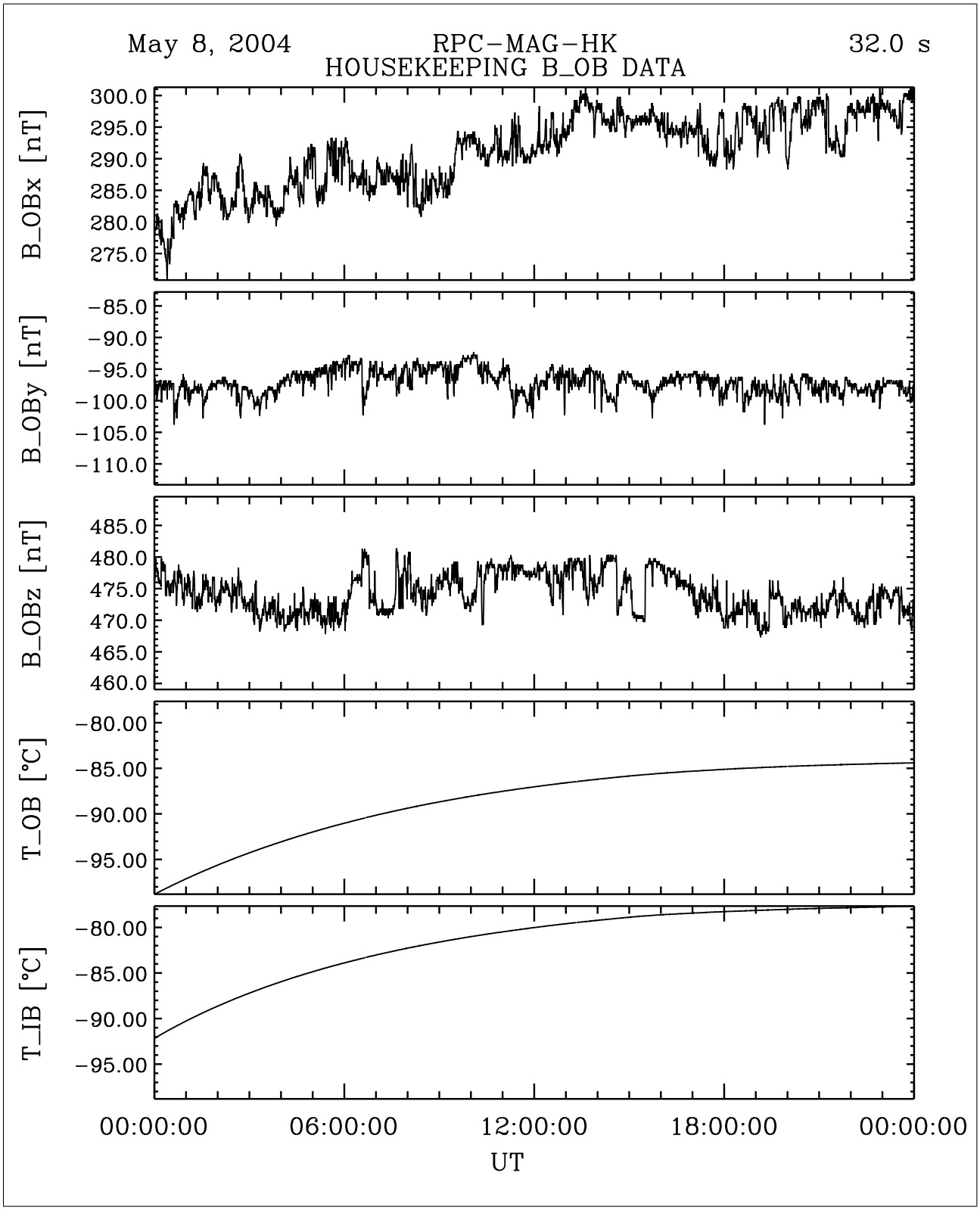


Figure 11: File: RPCMAG040508T0000_CLA_HK_B_P0000_2400

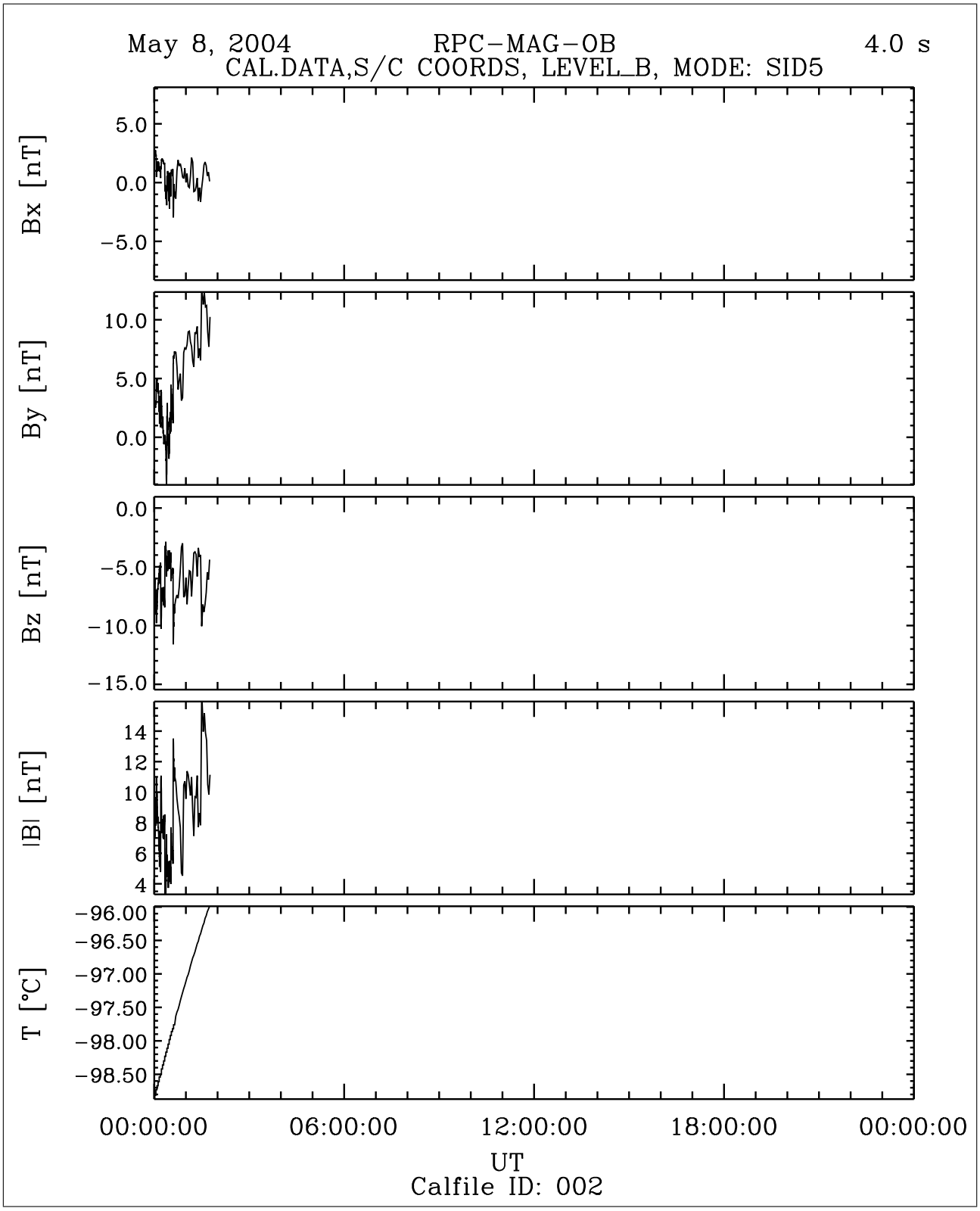


Figure 12: File: RPCMAG040508T0000_CLB_OB_M5_T0000_2400_002

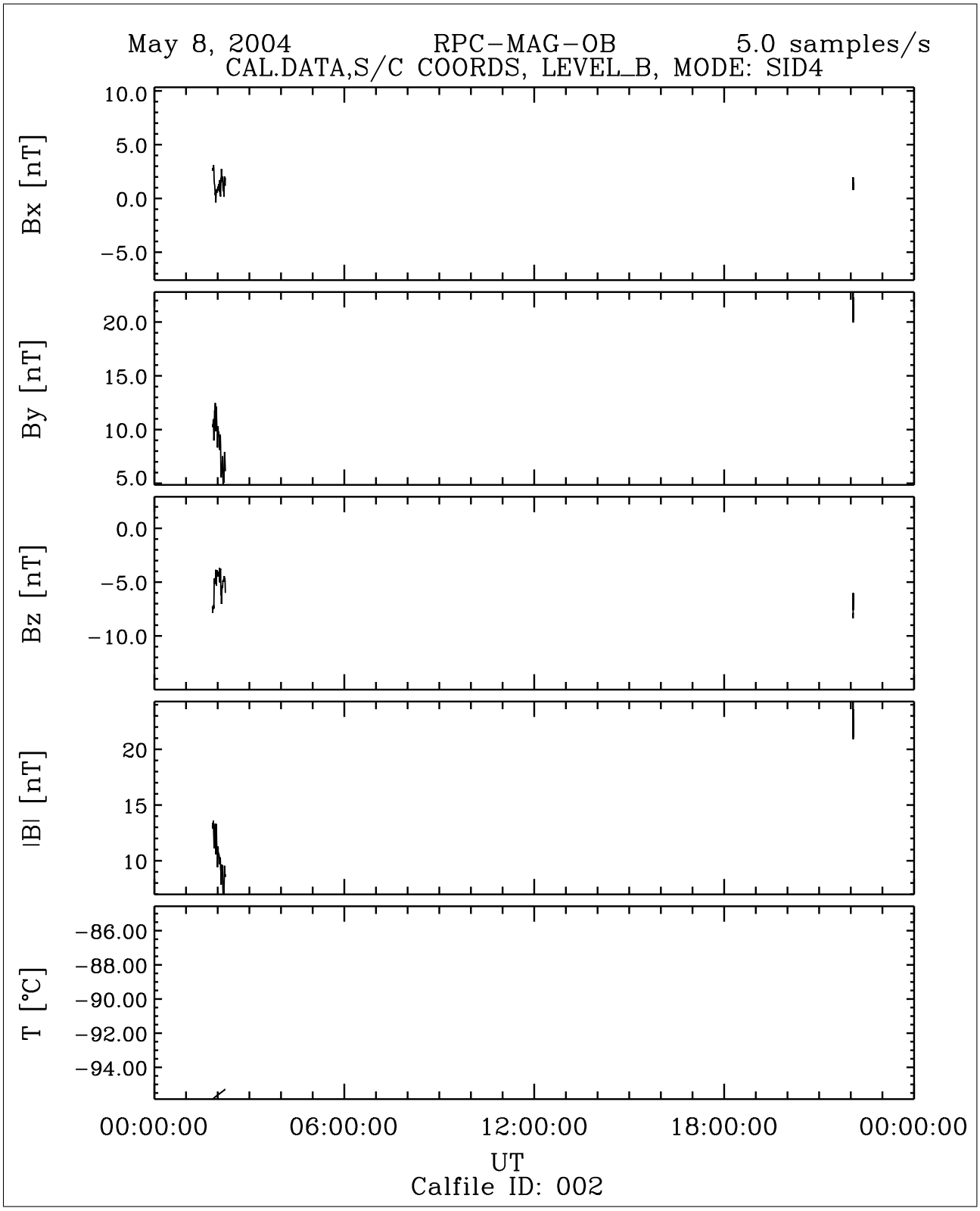


Figure 13: File: RPCMAG040508T0150_CLB_OB_M4_T0000_2400_002

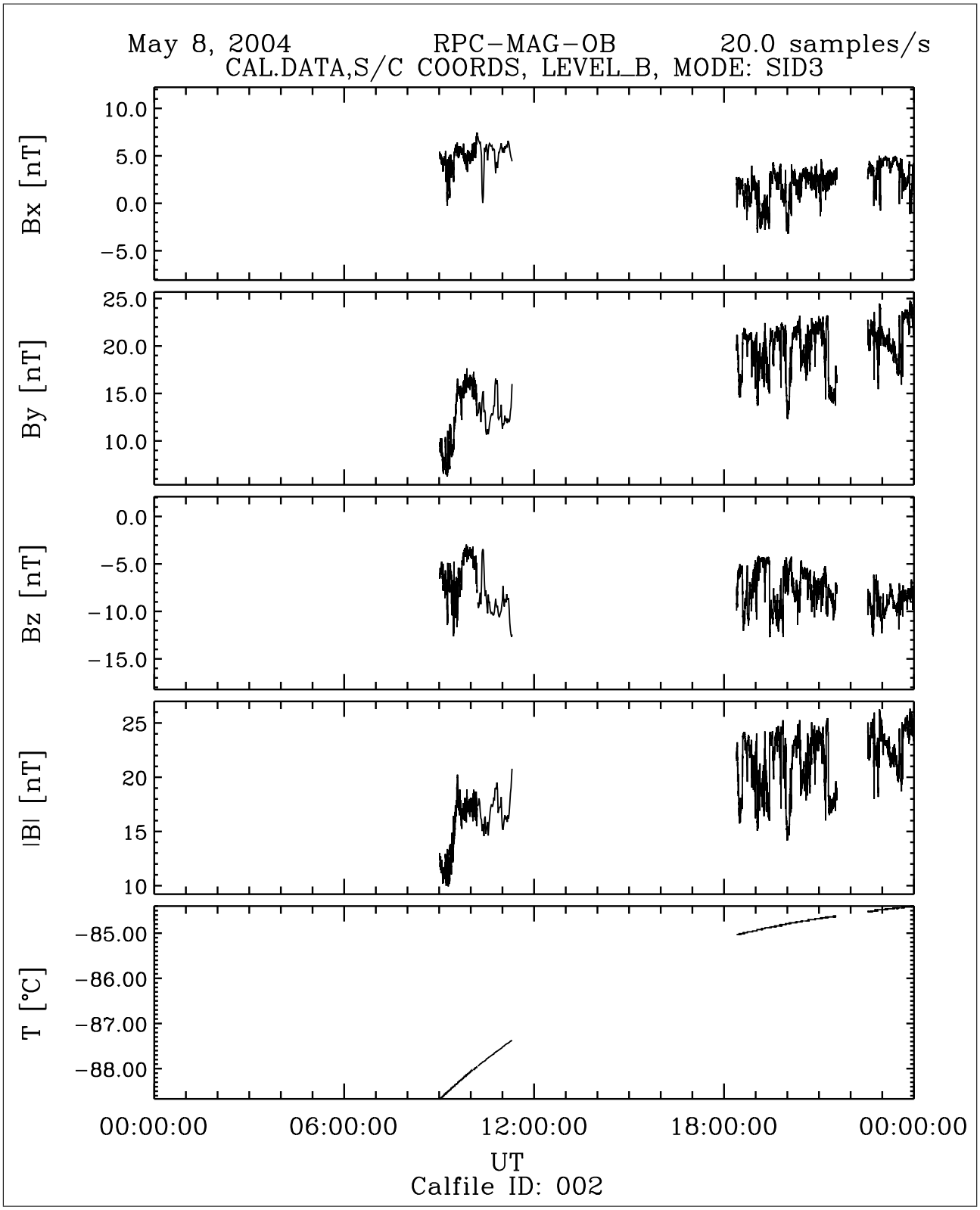


Figure 14: File: RPCMAG040508T0900_CLB_OB_M3_T0000_2400_002

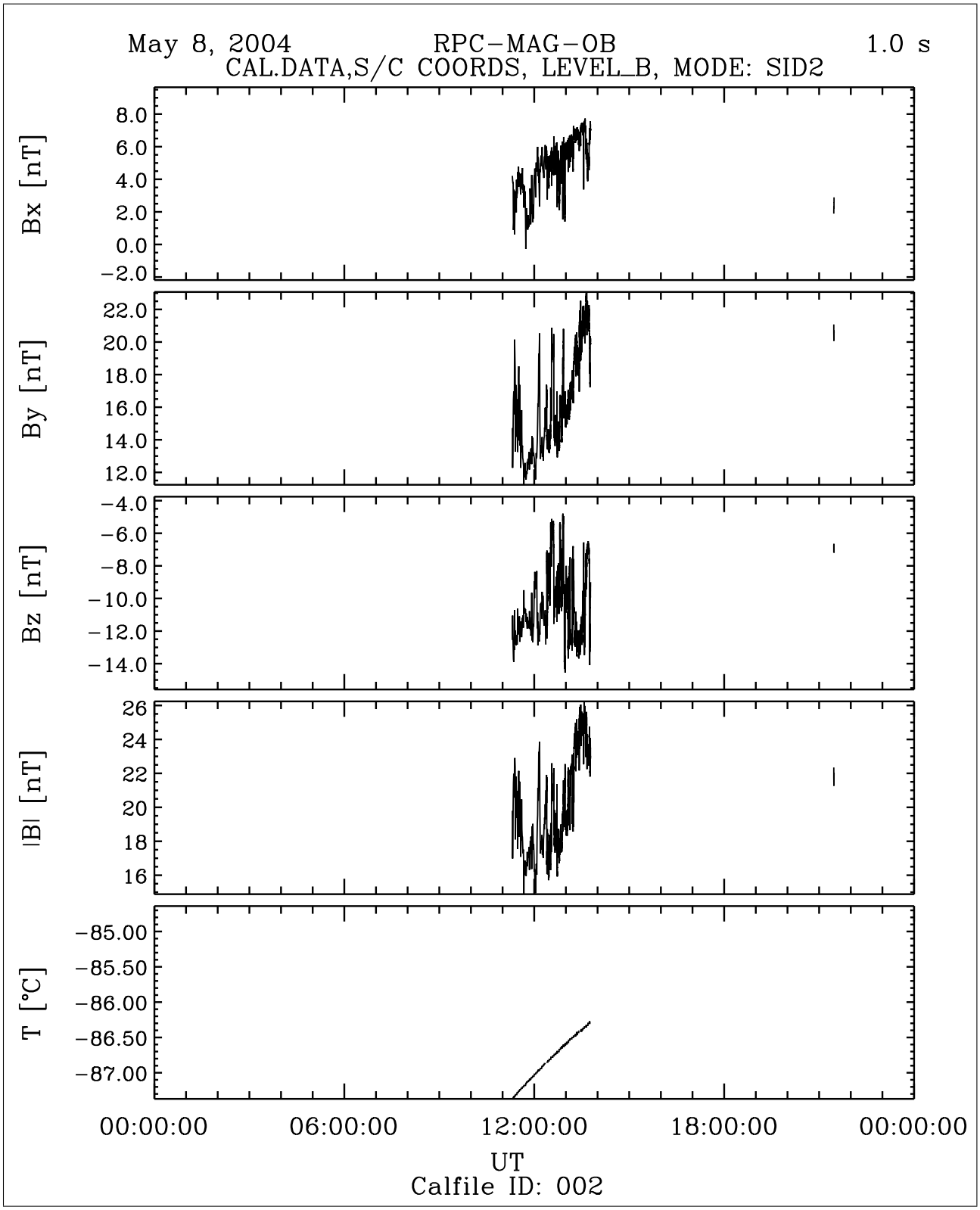


Figure 15: File: RPCMAG040508T1118_CLB_OB_M2_T0000_2400_002

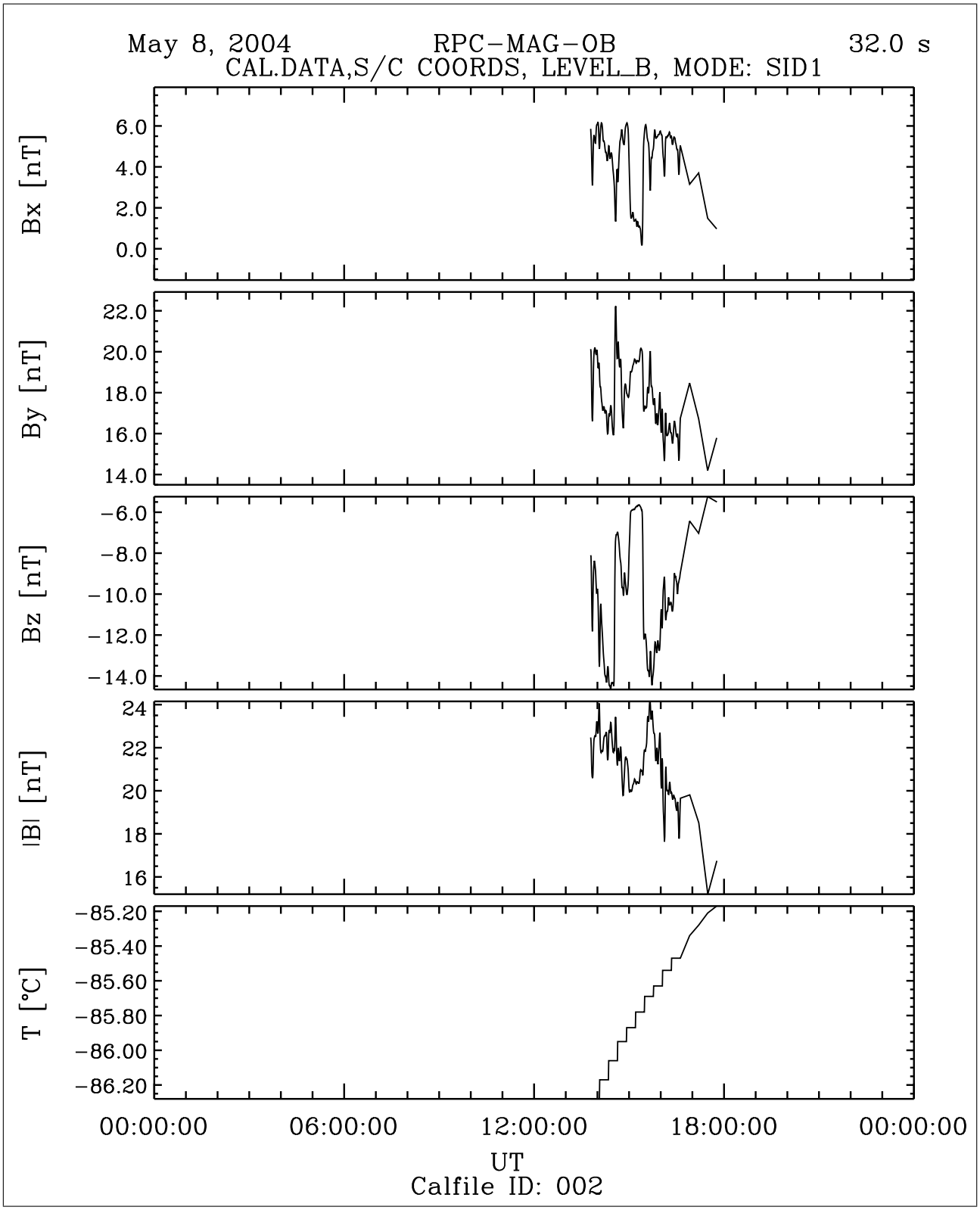


Figure 16: File: RPCMAG040508T1347_CLB_OB_M1_T0000_2400_002

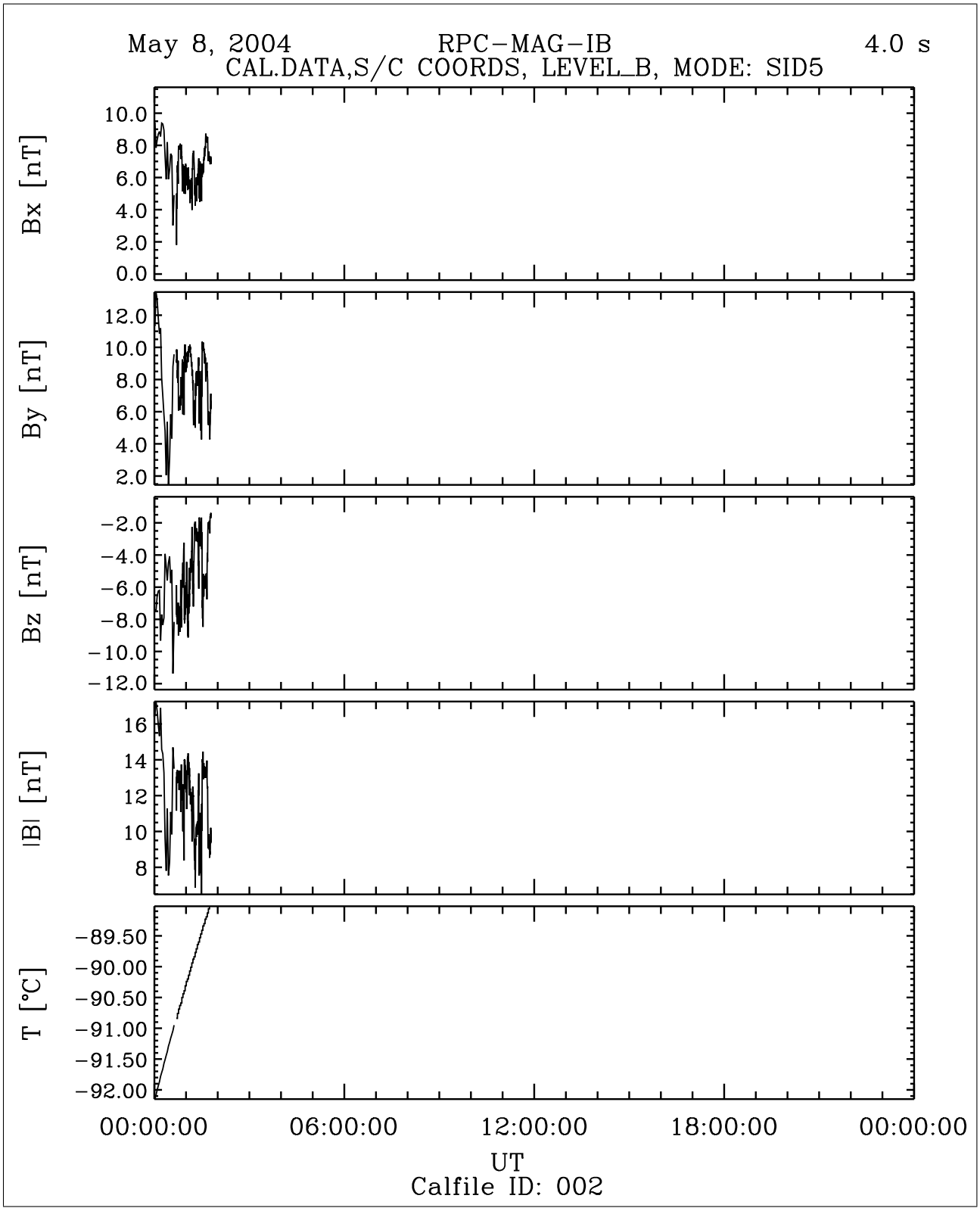


Figure 17: File: RPCMAG040508T0001_CLB_IB_M5_T0000_2400_002

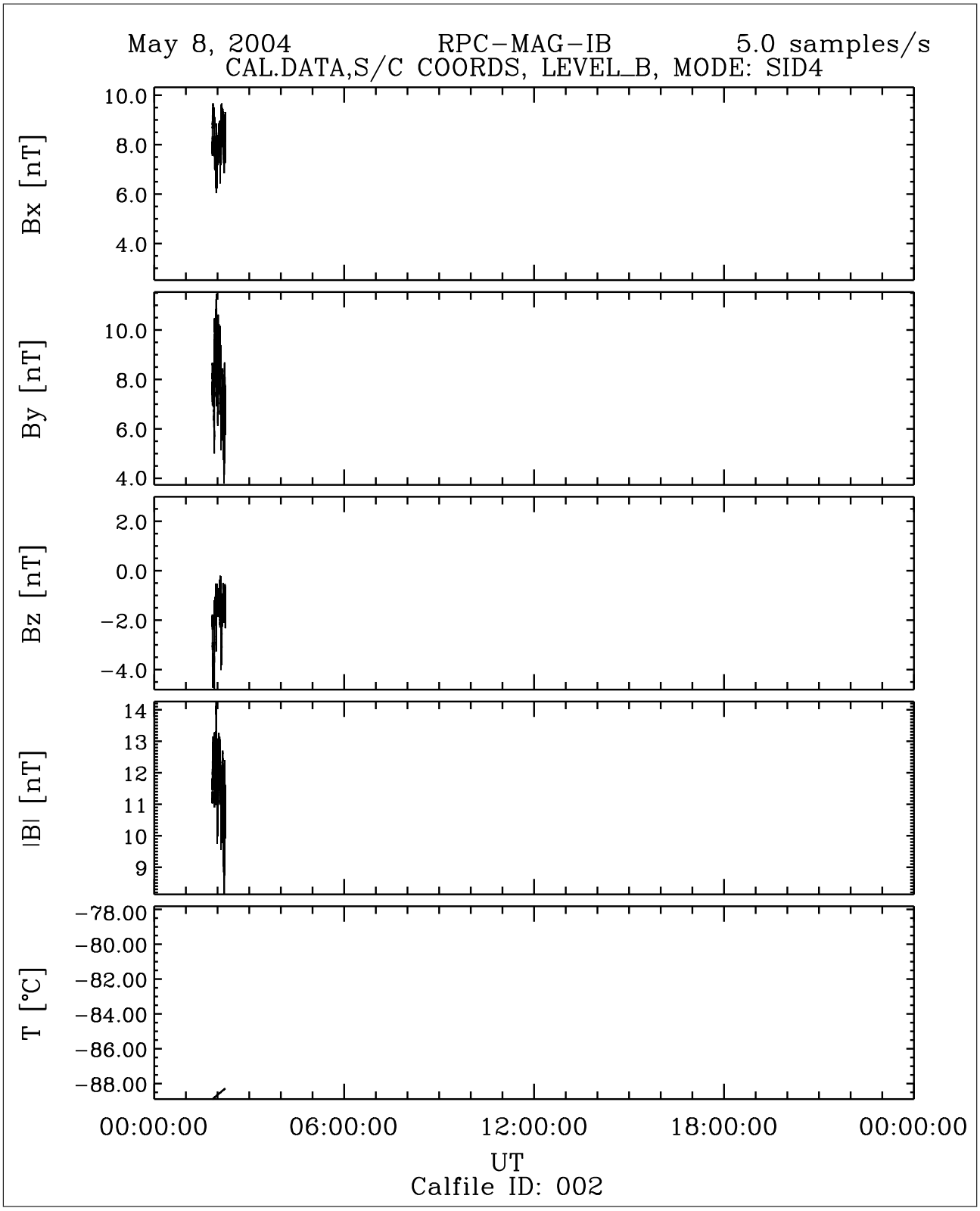


Figure 18: File: RPCMAG040508T0150_CLB_IB_M4_T0000_2400_002

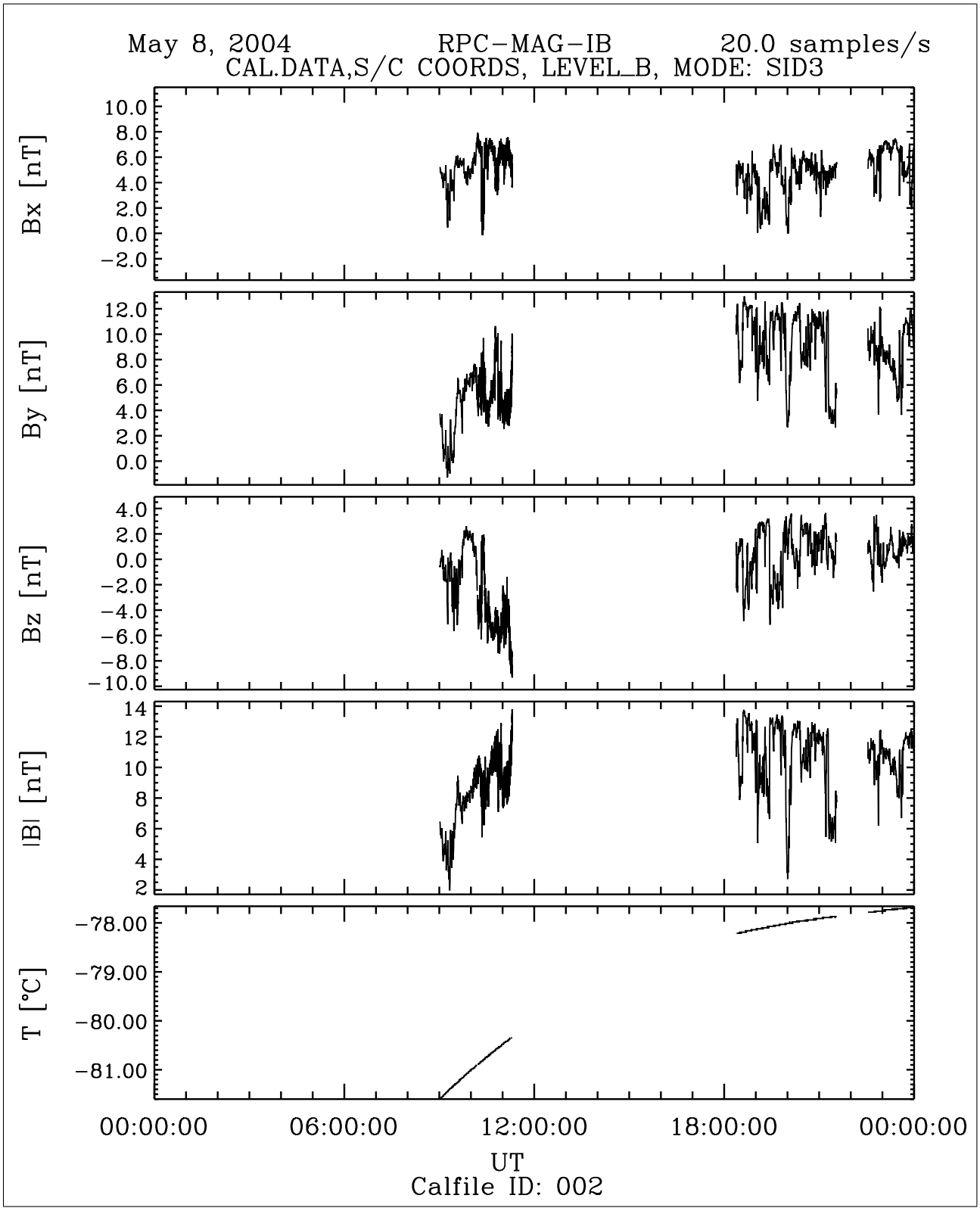


Figure 19: File: RPCMAG040508T0900_CLB_IB_M3_T0000_2400_002

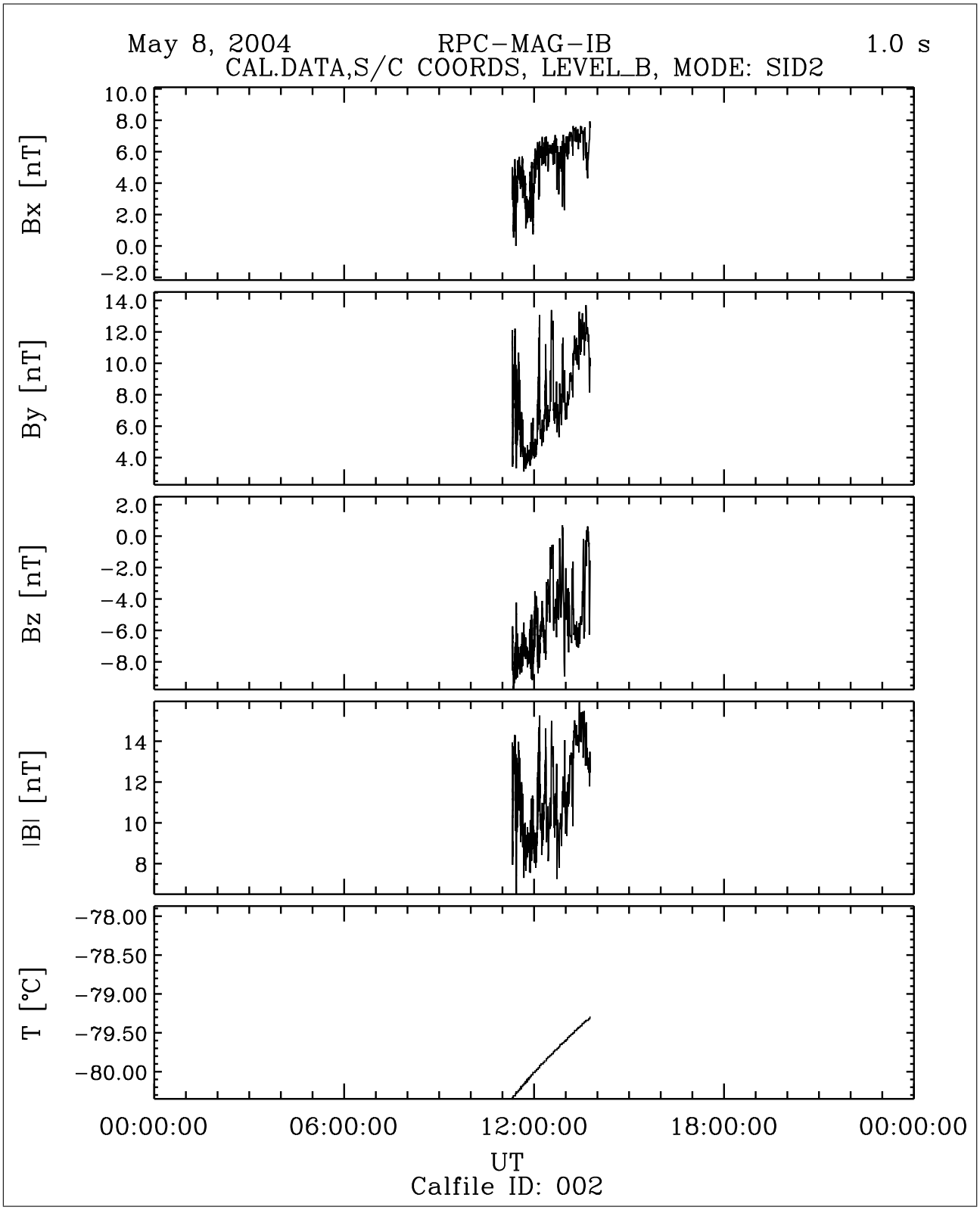


Figure 20: File: RPCMAG040508T1118_CLB_IB_M2_T0000_2400_002

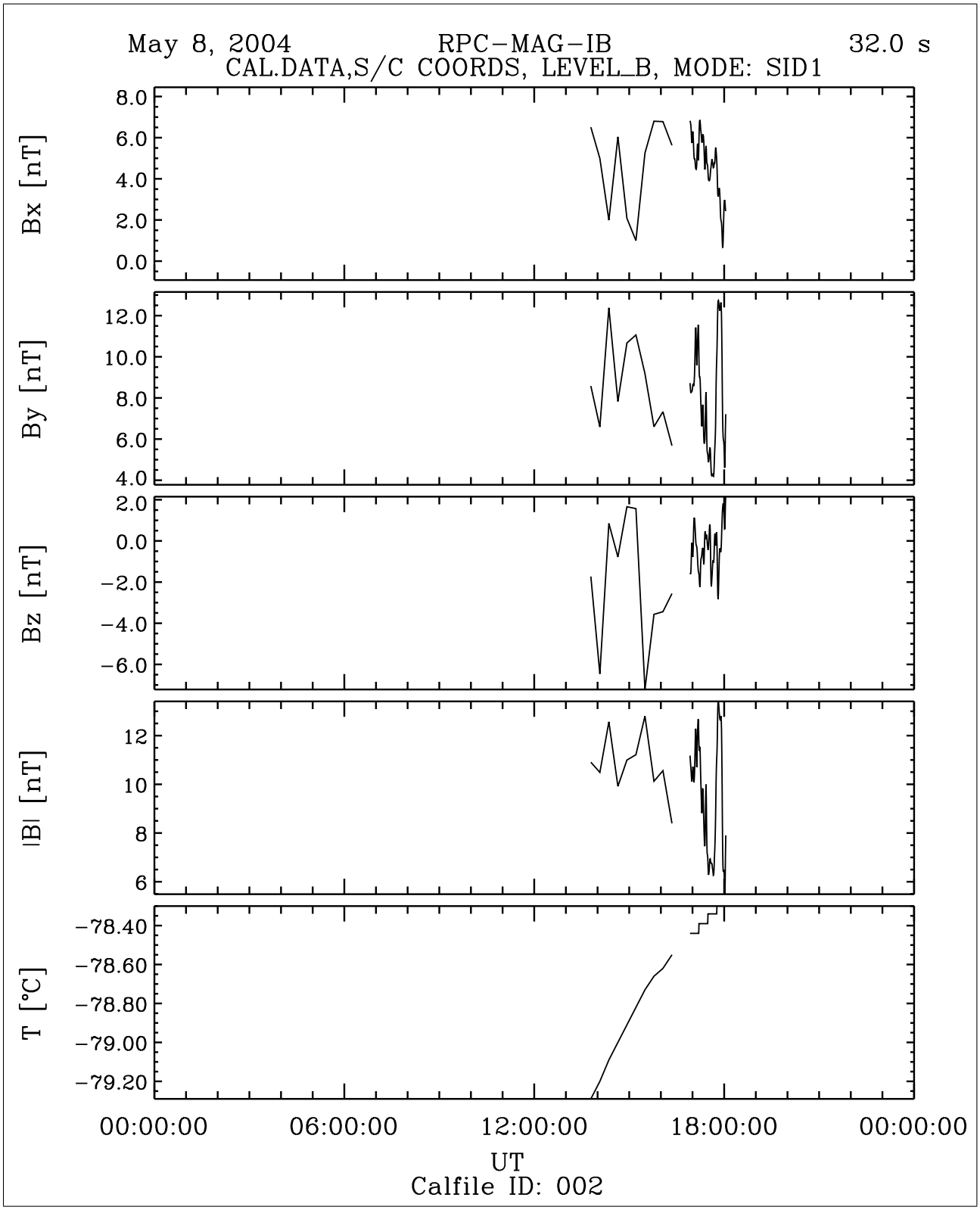


Figure 21: File: RPCMAG040508T1347_CLB_IB_M1_T0000_2400_002

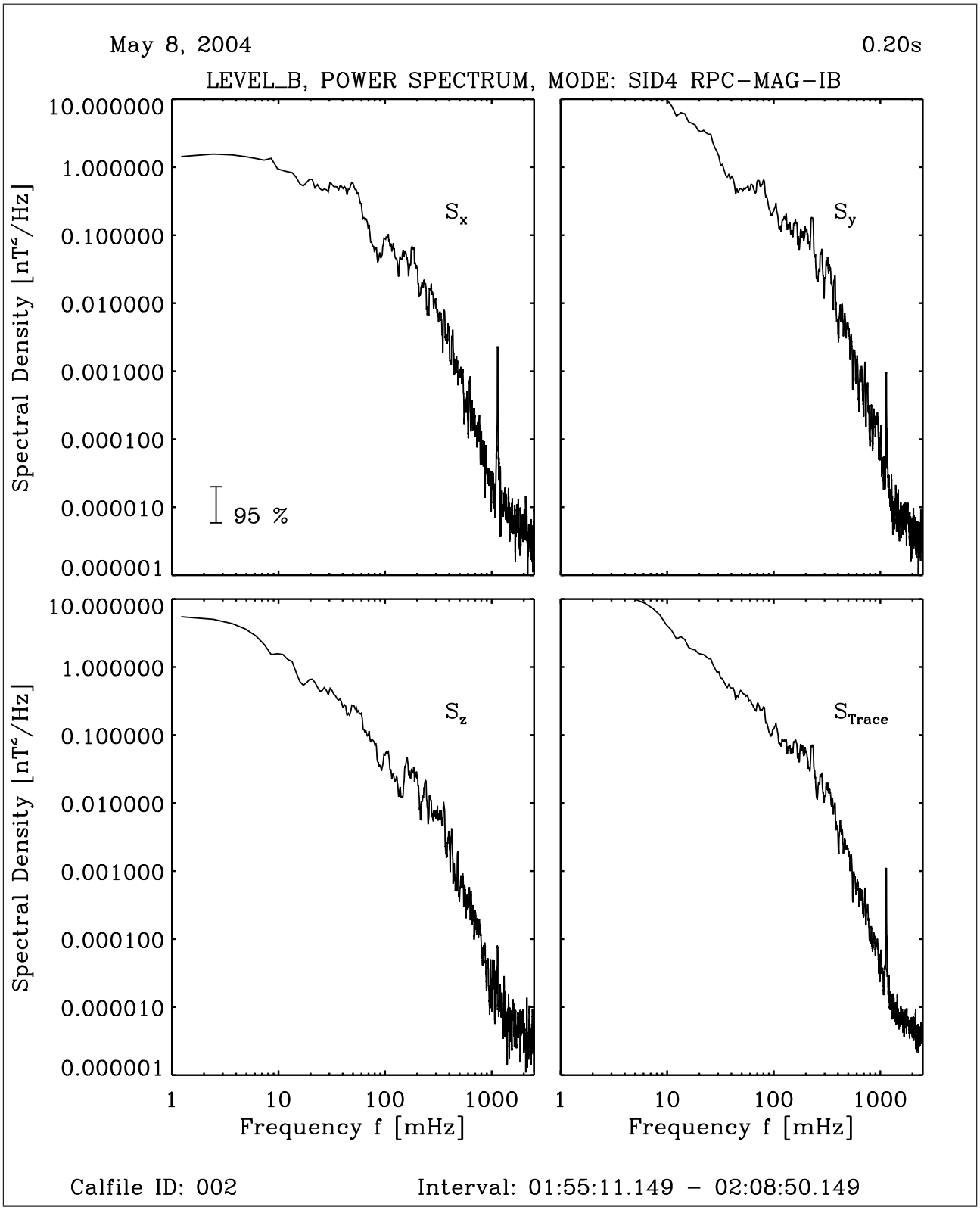


Figure 22: File: RPCMAG040508T0150_CLB_IB_M4_PS1_10000_002

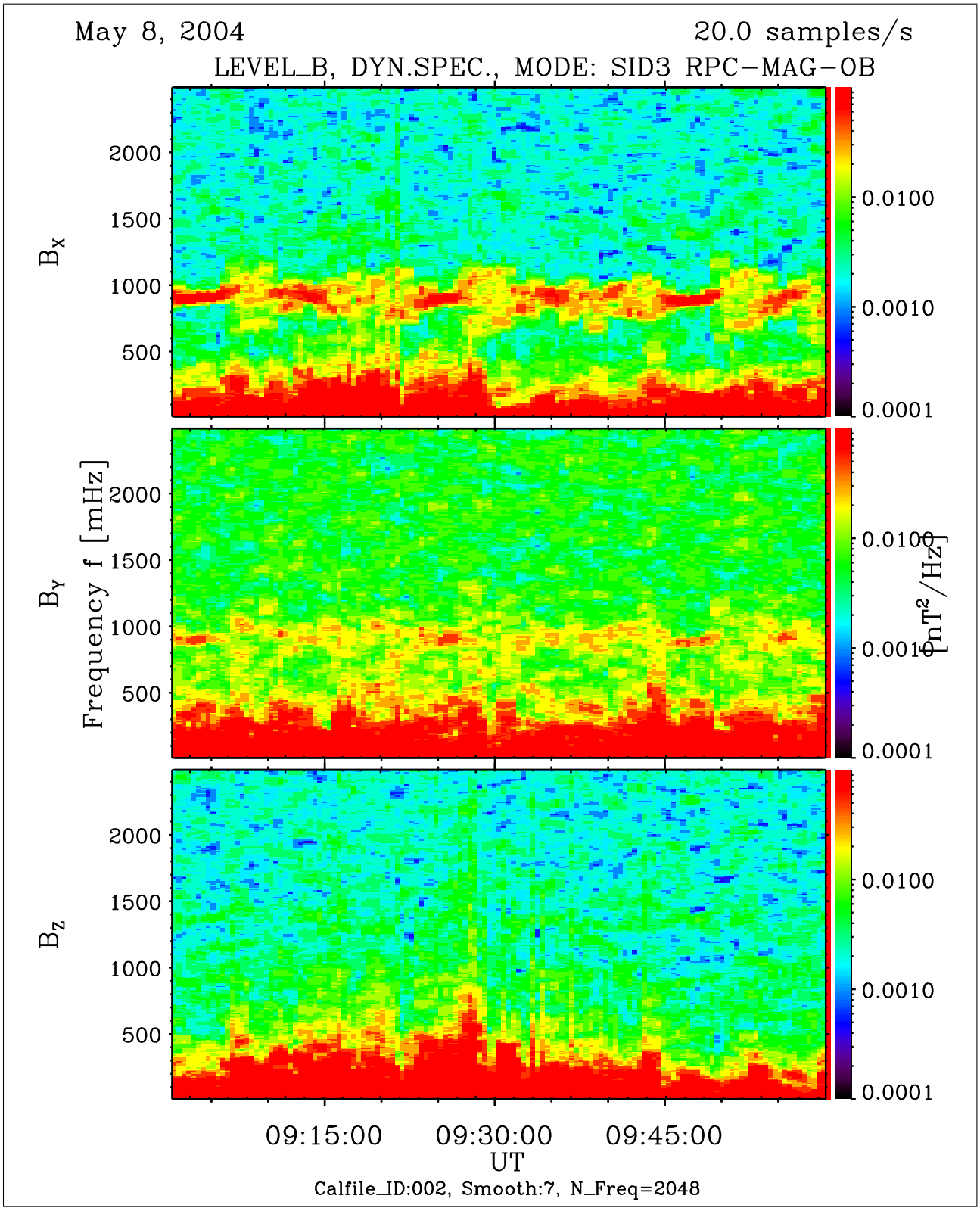


Figure 23: File: RPCMAG040508T0900_CLB_OB_M3_DS1e-2_2500_002

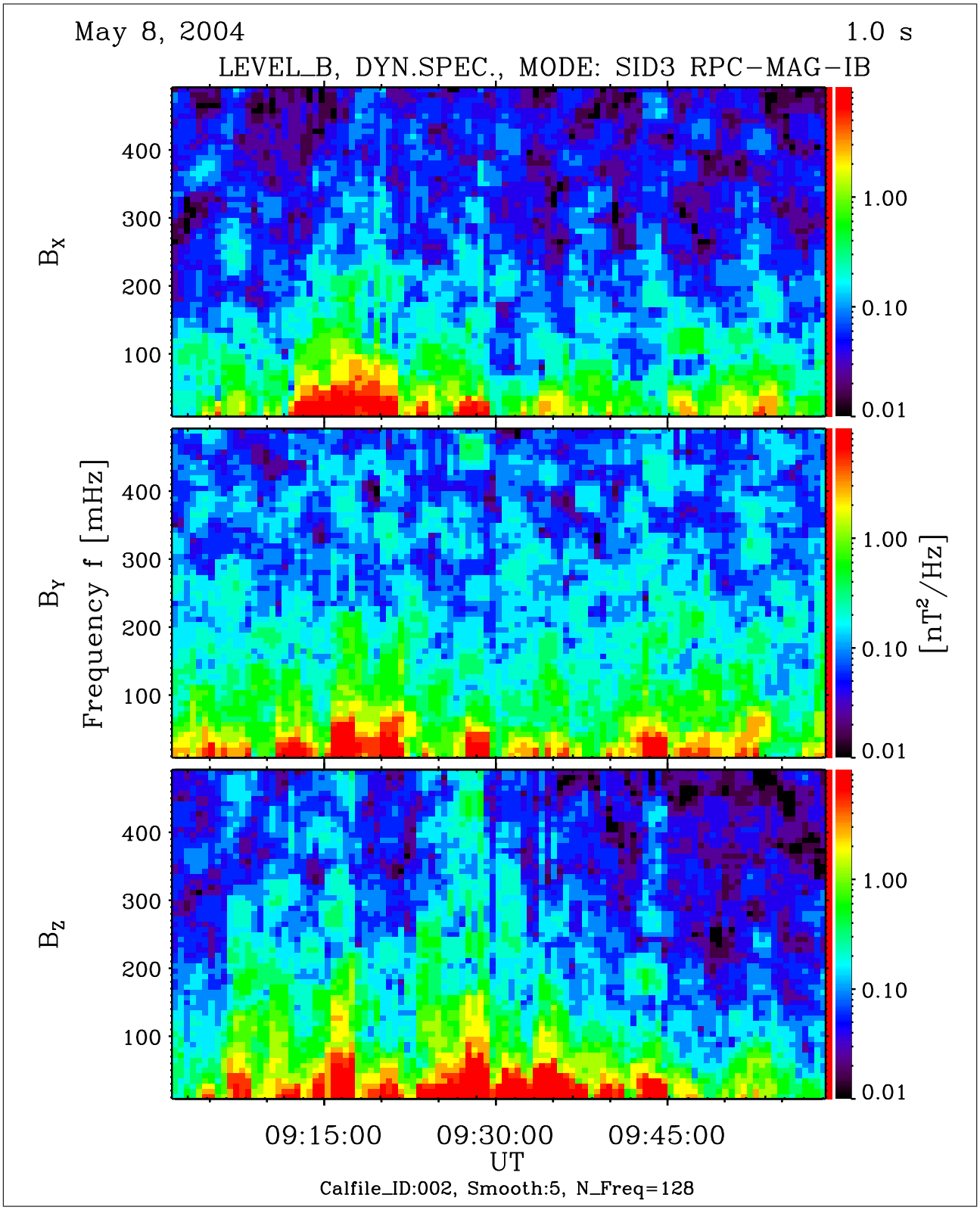


Figure 24: File: RPCMAG040508T0900_CLB_IB_M3_DS1e-2_500_002

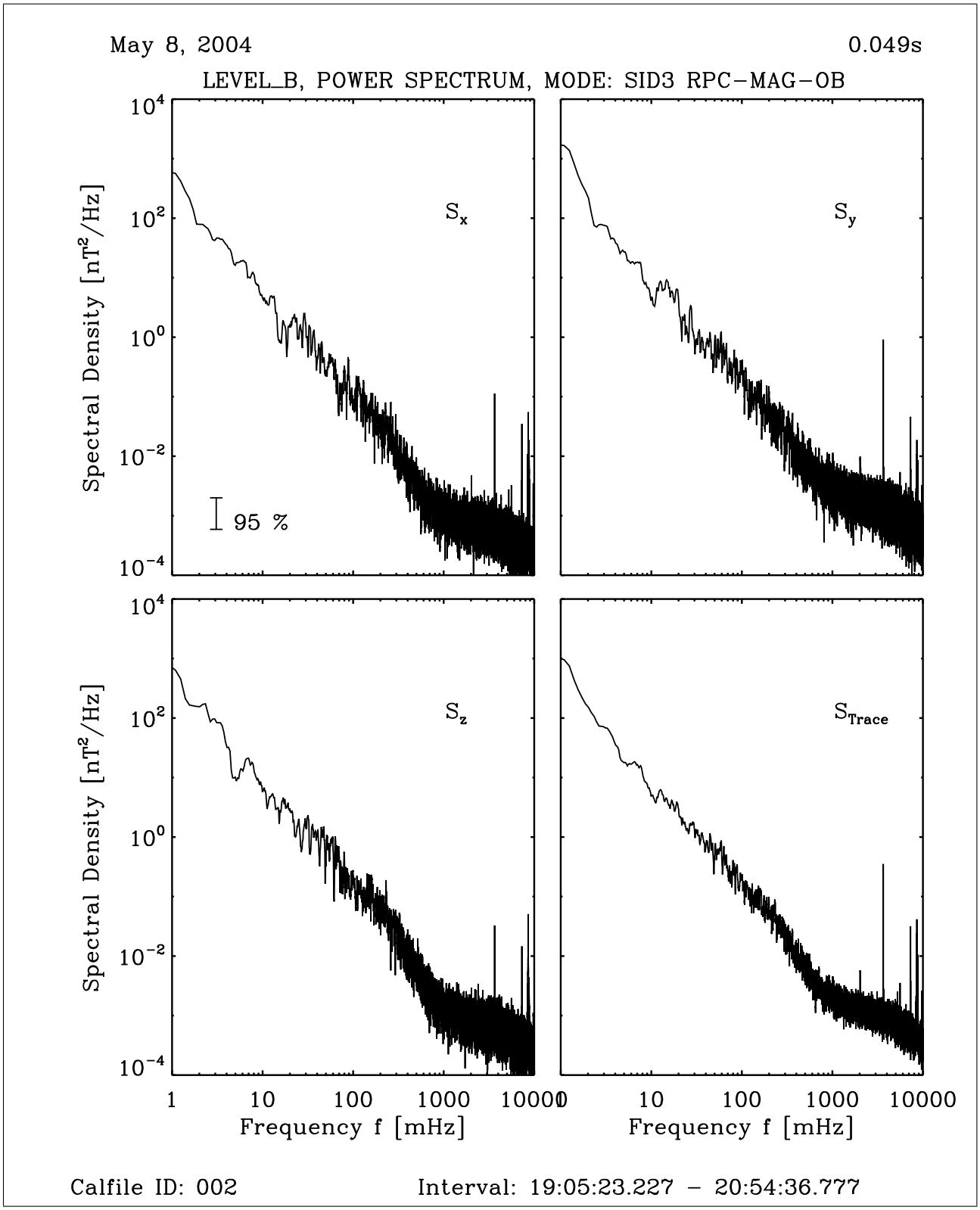


Figure 25: File: RPCMAG040508T0900_CLB_OB_M3_PS1_10000_002

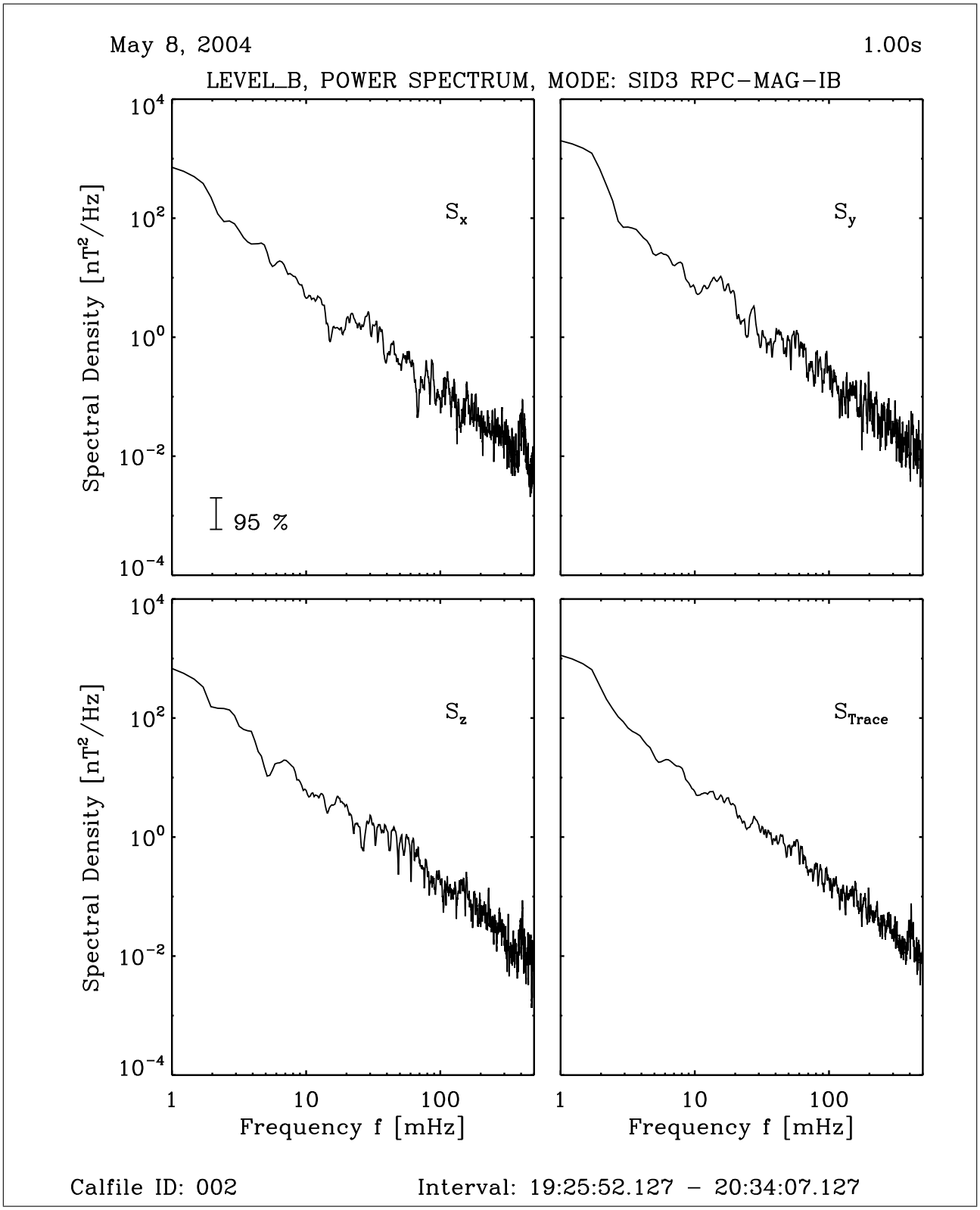


Figure 26: File: RPCMAG040508T0900_CLB_IB_M3_PS1_10000_002

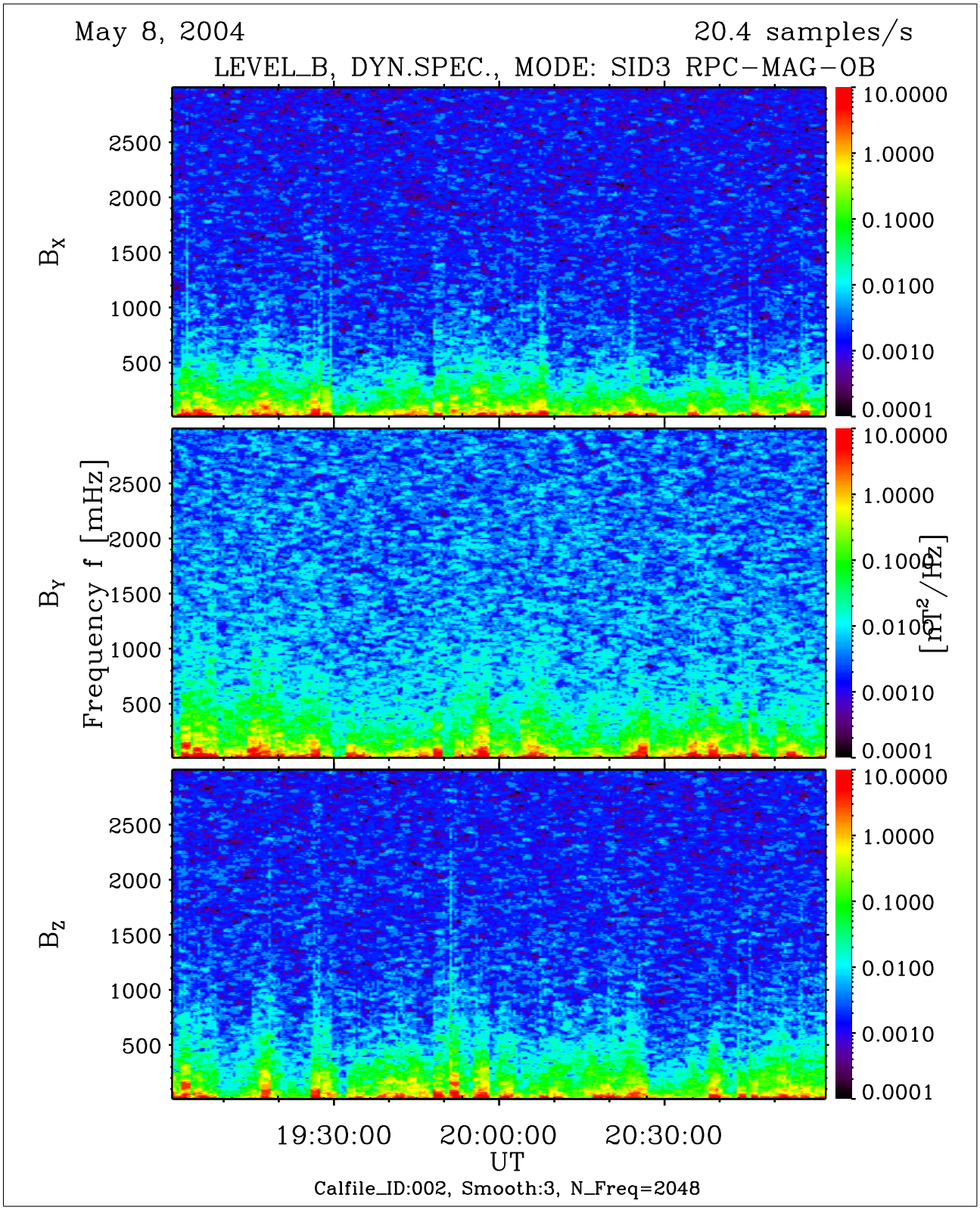


Figure 27: File: RPCMAG040508T0900_CLB_OB_M3_DS1e-2_3000_002

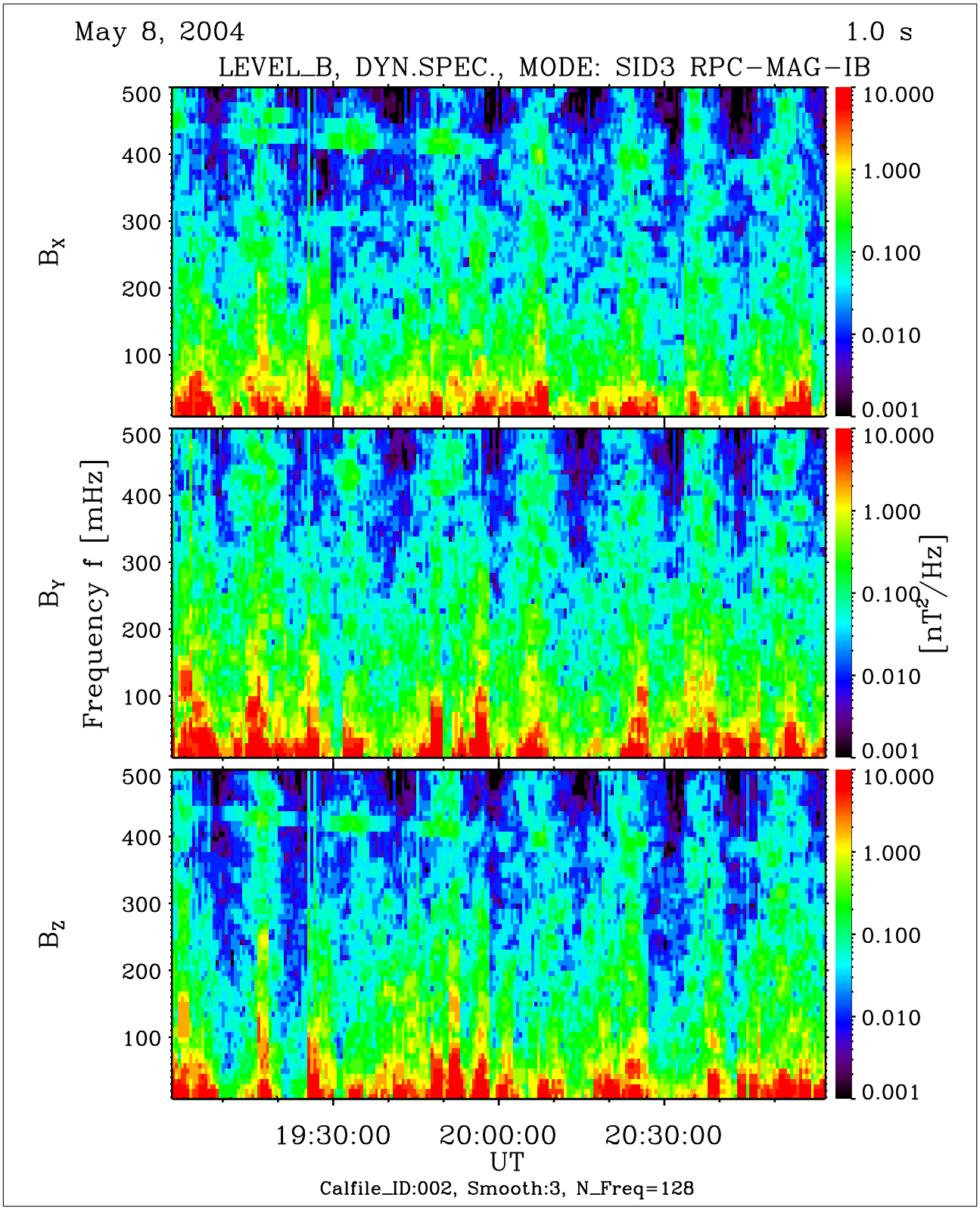


Figure 28: File: RPCMAG040508T0900_CLB_IB_M3_DS1e-2_3000_002

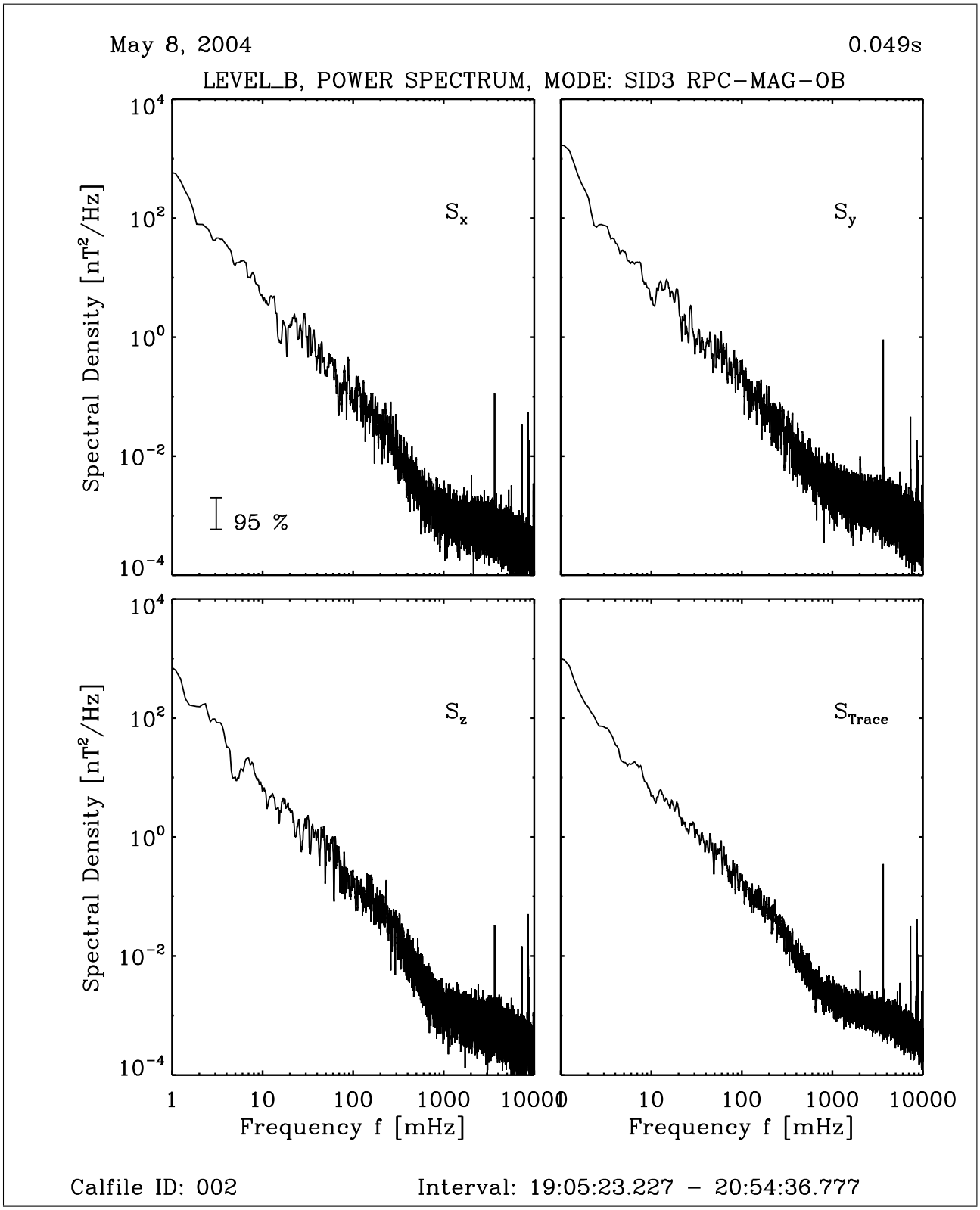


Figure 29: File: RPCMAG040508T0900_CLB_OB_M3_PS1_10000_002

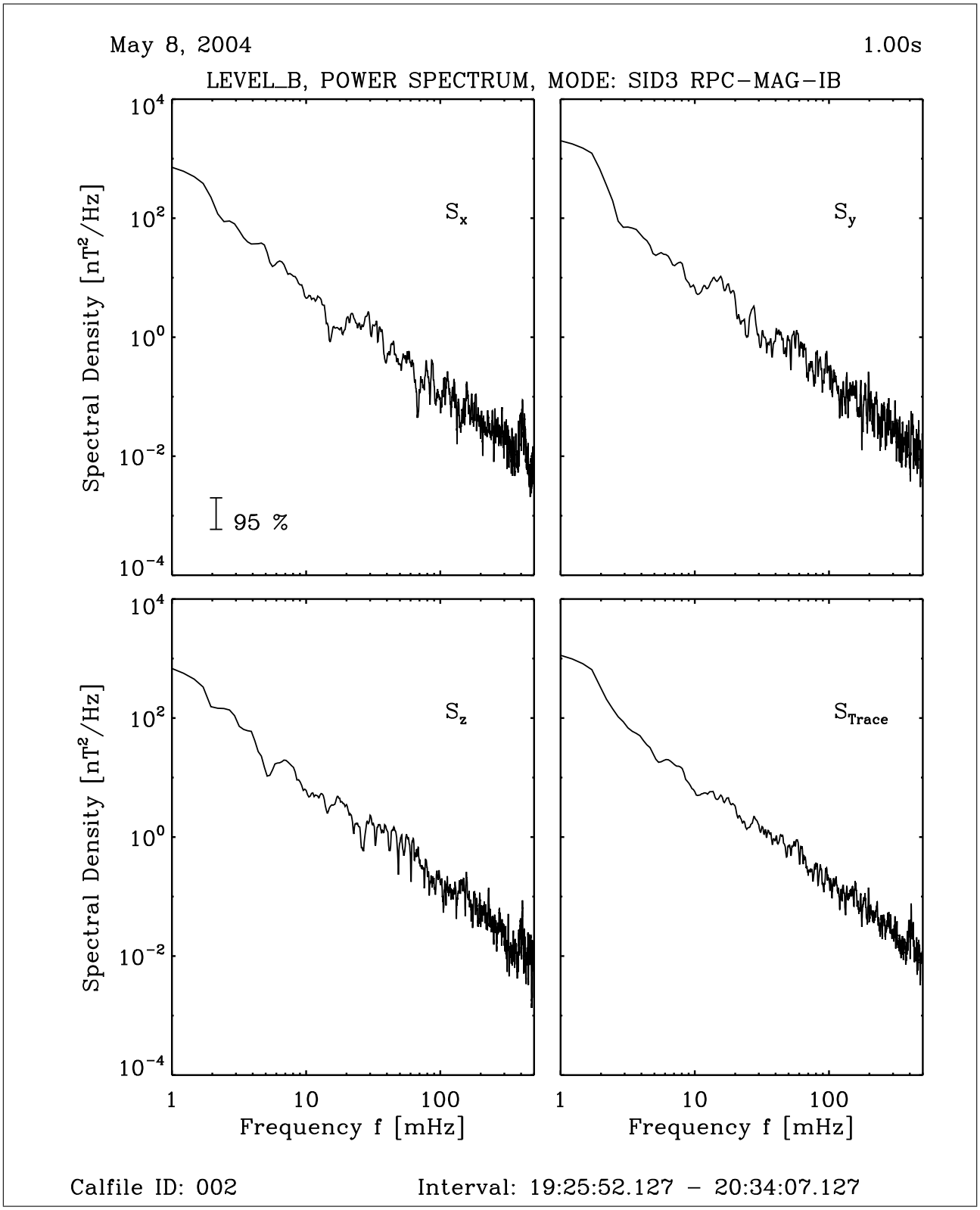


Figure 30: File: RPCMAG040508T0900_CLB_IB_M3_PS1_10000_002

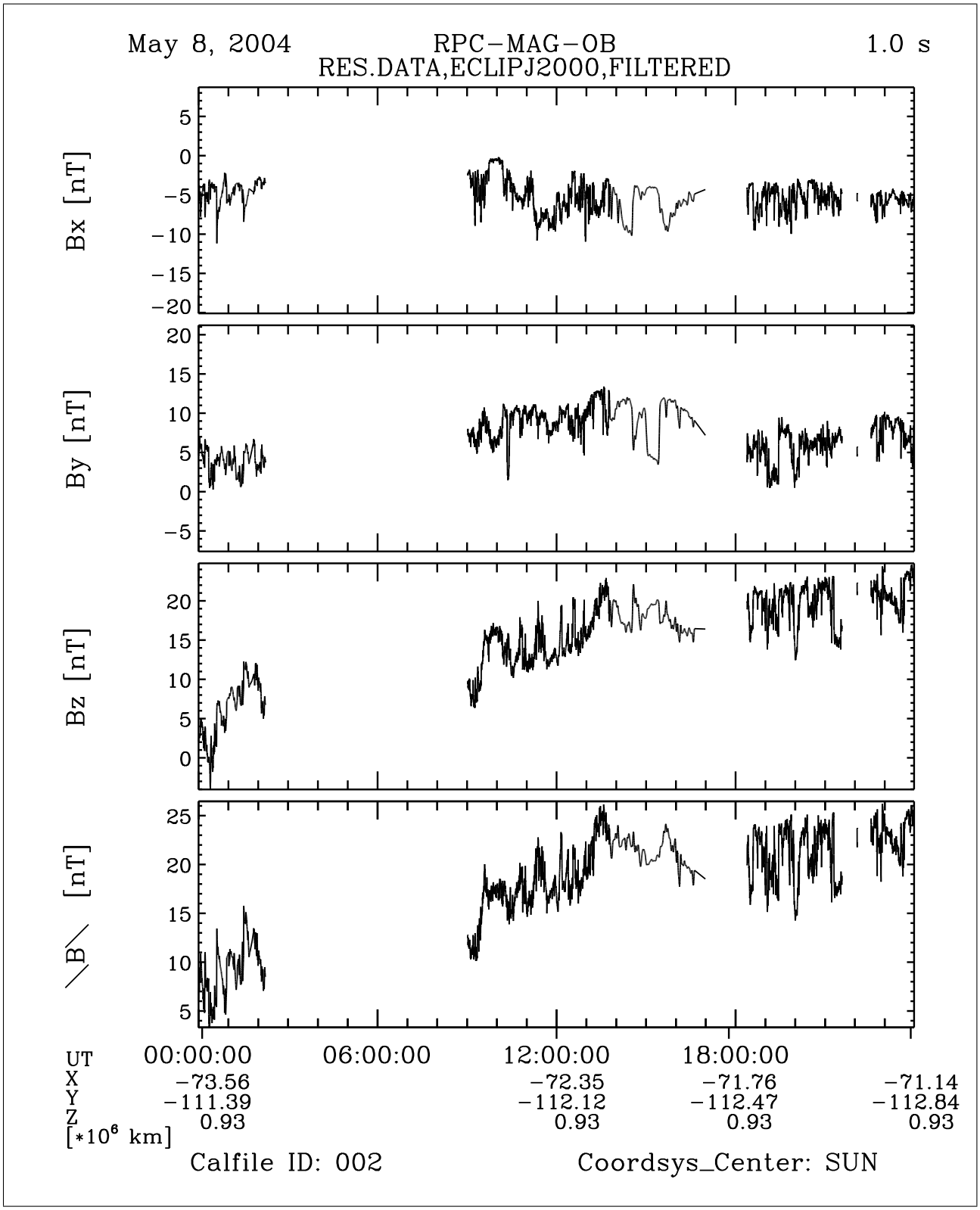


Figure 31: File: RPCMAG040508_CLG_OB_A1_T0000_2359_002

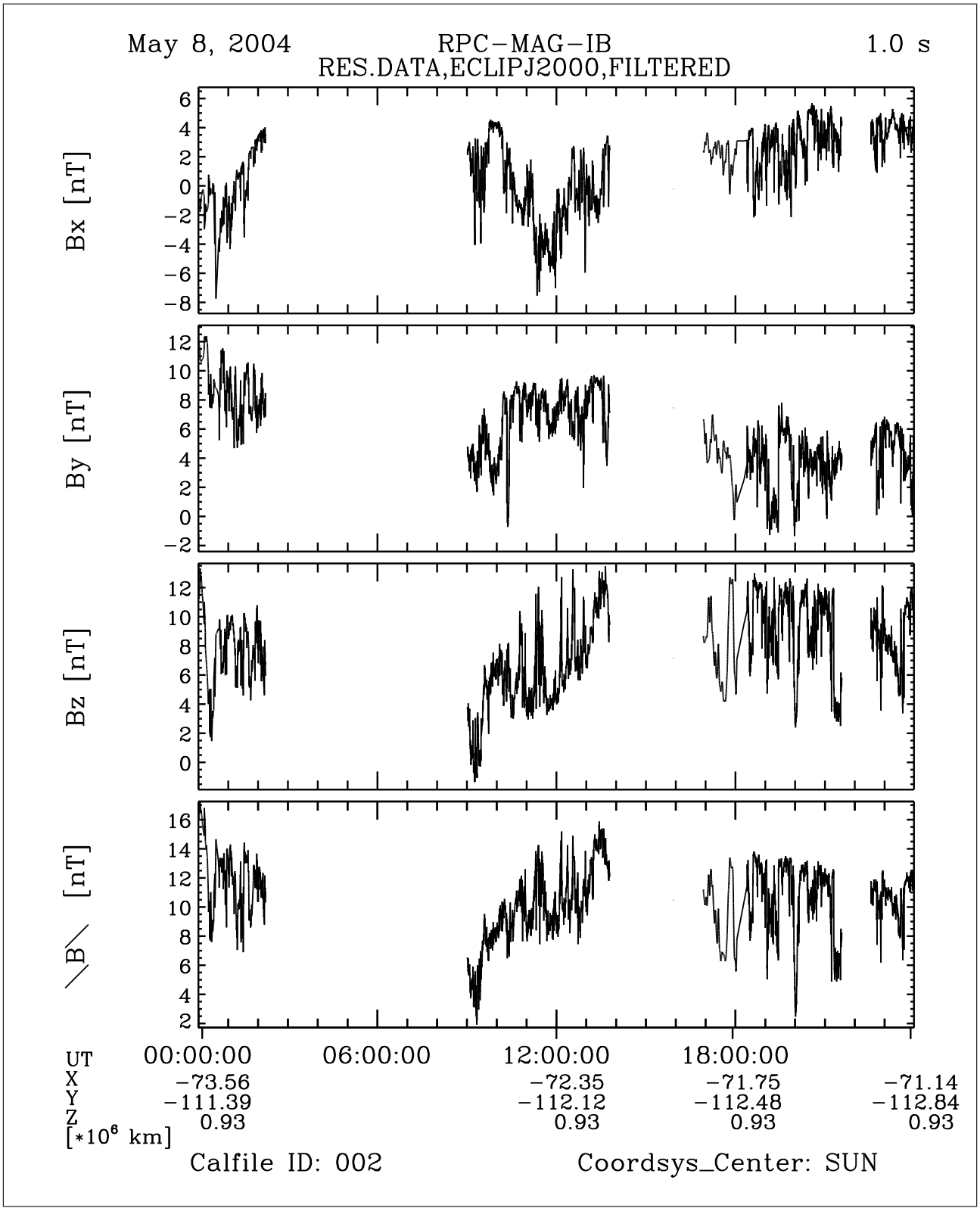


Figure 32: File: RPCMAG040508_CLG_IB_A1_T0000_2359_002

### 3.3 Plots of ROSETTA's Reaction Wheels Speeds

The following plots show the time series of the revolutions of the 4 reaction wheels. Two kinds of data are shown:

- The original reaction wheel data as they are stored in the DDS.
- The theoretical response of the wheels impact seen by an instrument sampling with different frequencies. Here the response in the at 20 Hz,1 Hz and 0.25 Hz sampling frequency is plotted.

A comparison with the dynamic spectra of the MAG data gives an impressive accordance between the reaction wheel frequencies and the spectral lines observed in the dynamic MAG spectra.

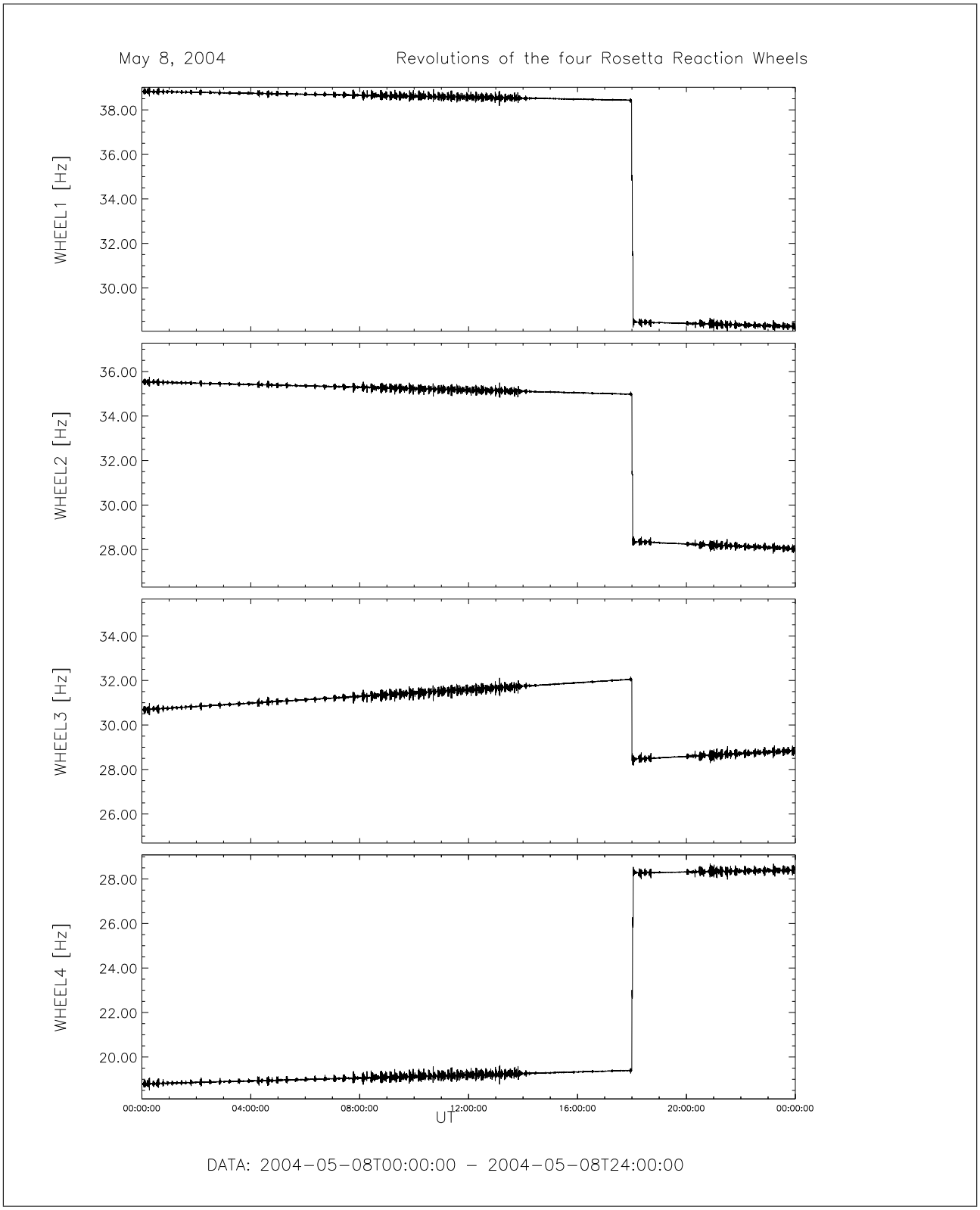


Figure 33: File: wheels_Hz2004-05-08T00-00

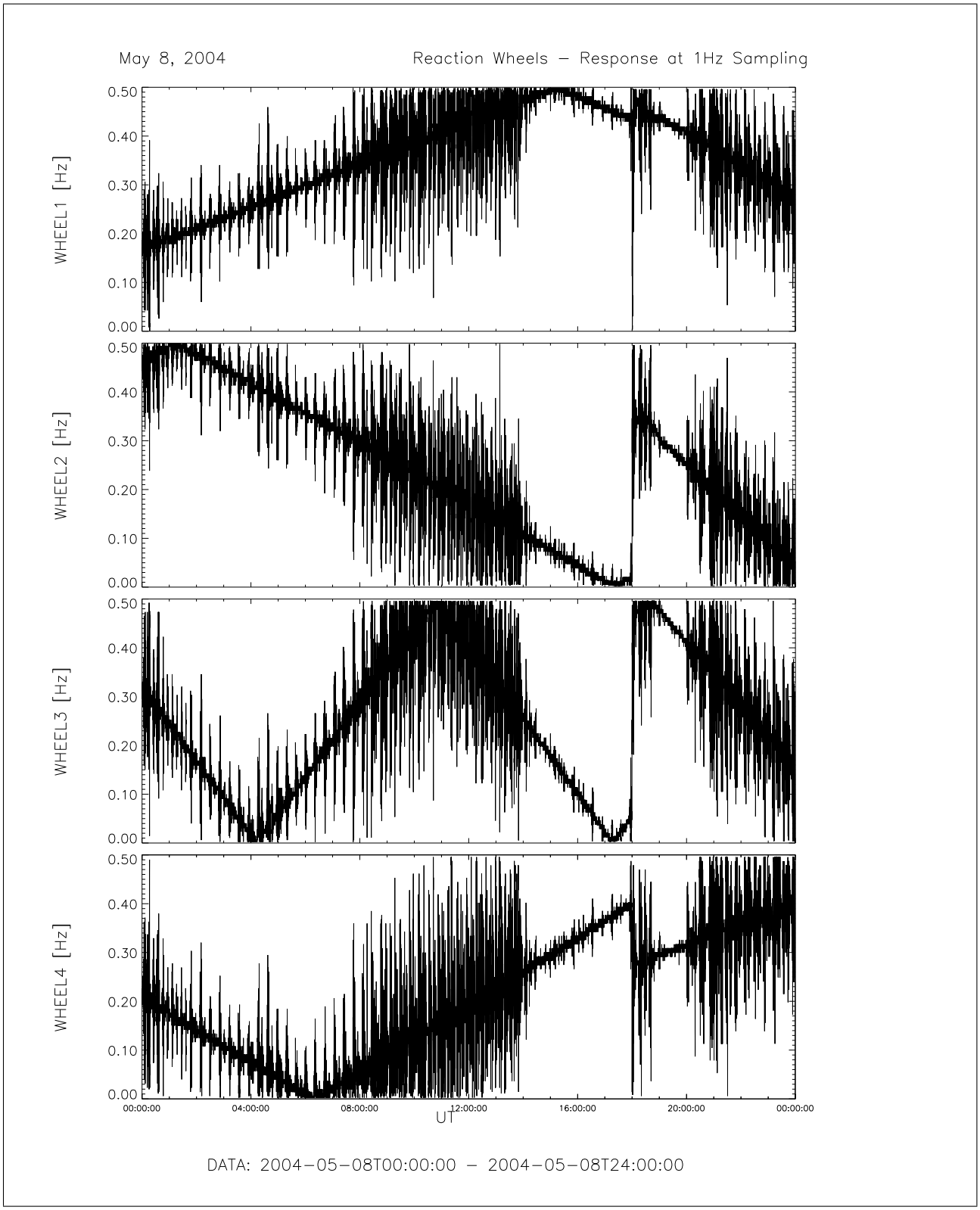


Figure 34: File: wheels_1Hz_Sampling2004-05-08T00-00

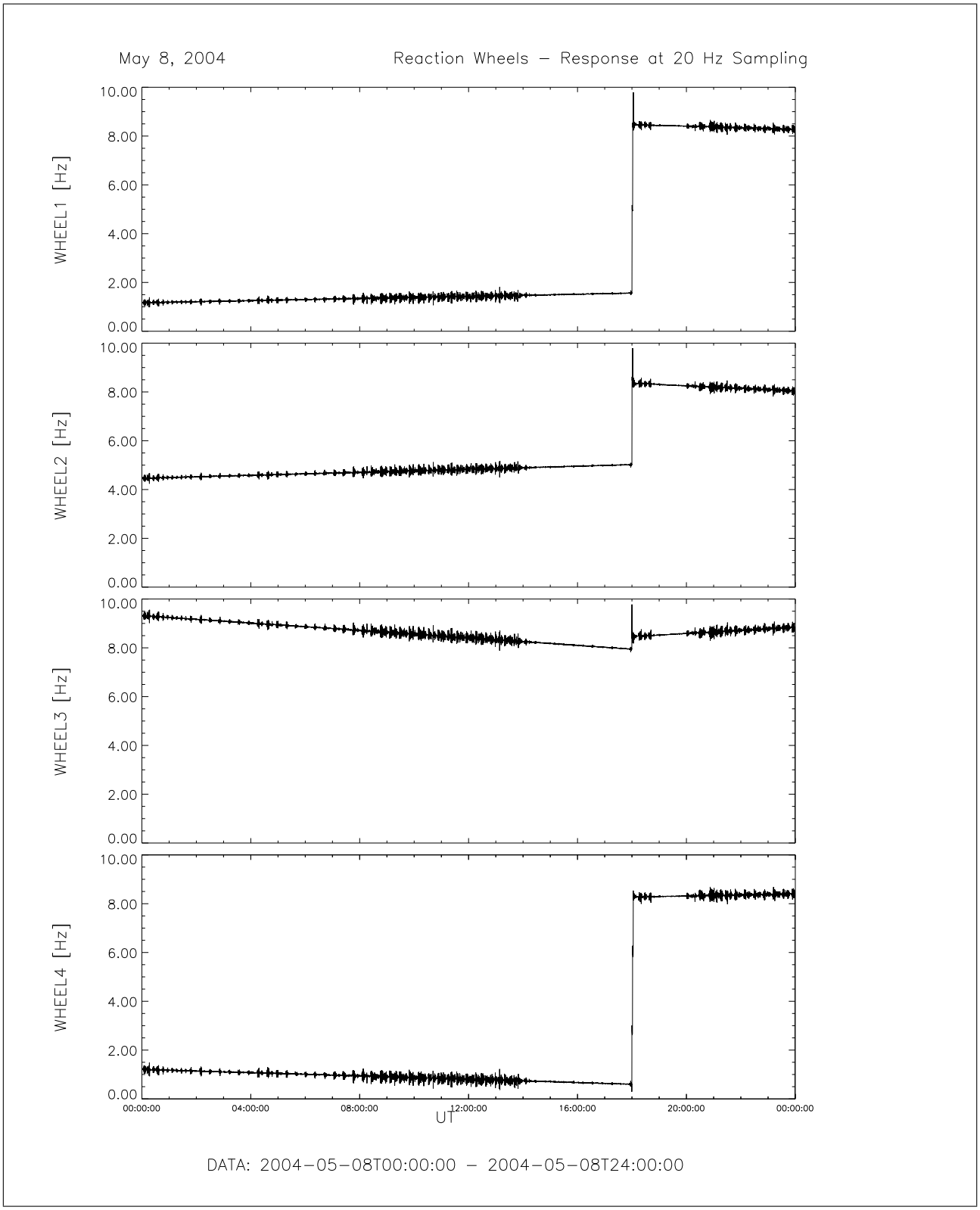


Figure 35: File: wheels_20Hz_Sampling2004-05-08T00-00

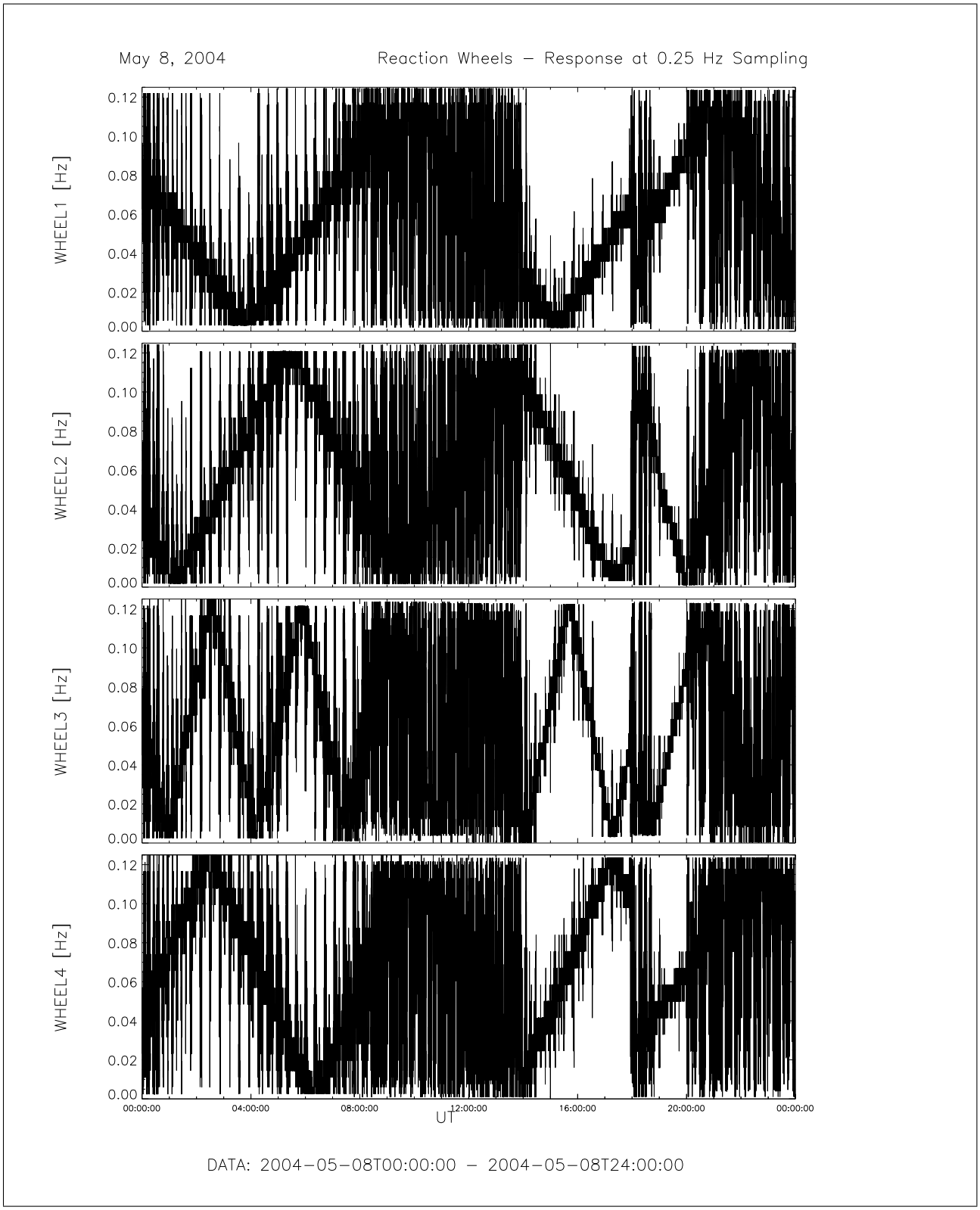


Figure 36: File: wheels_025Hz_Sampling2004-05-08T00-00

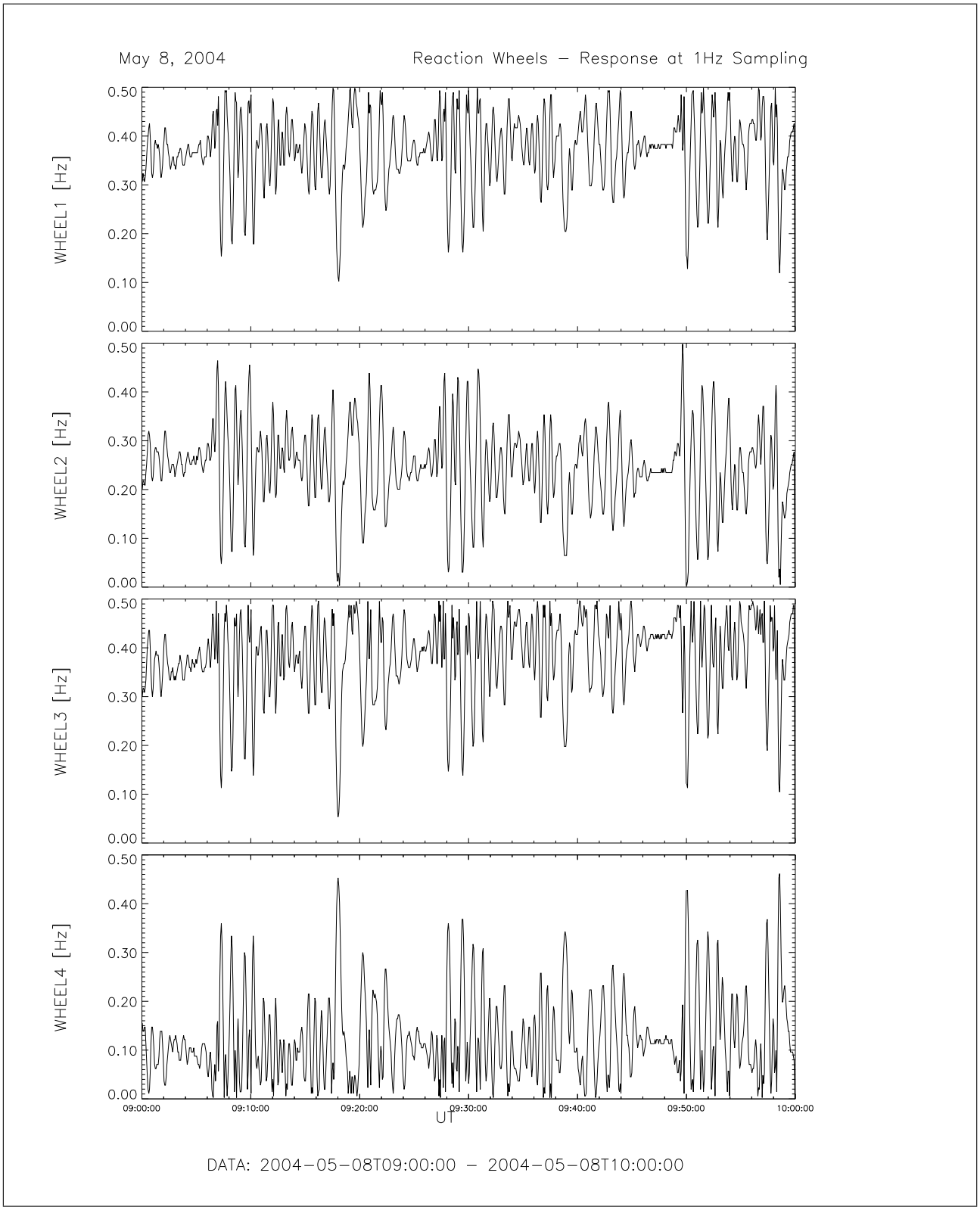


Figure 37: File: wheels_1Hz_Sampling2004-05-08T09-00

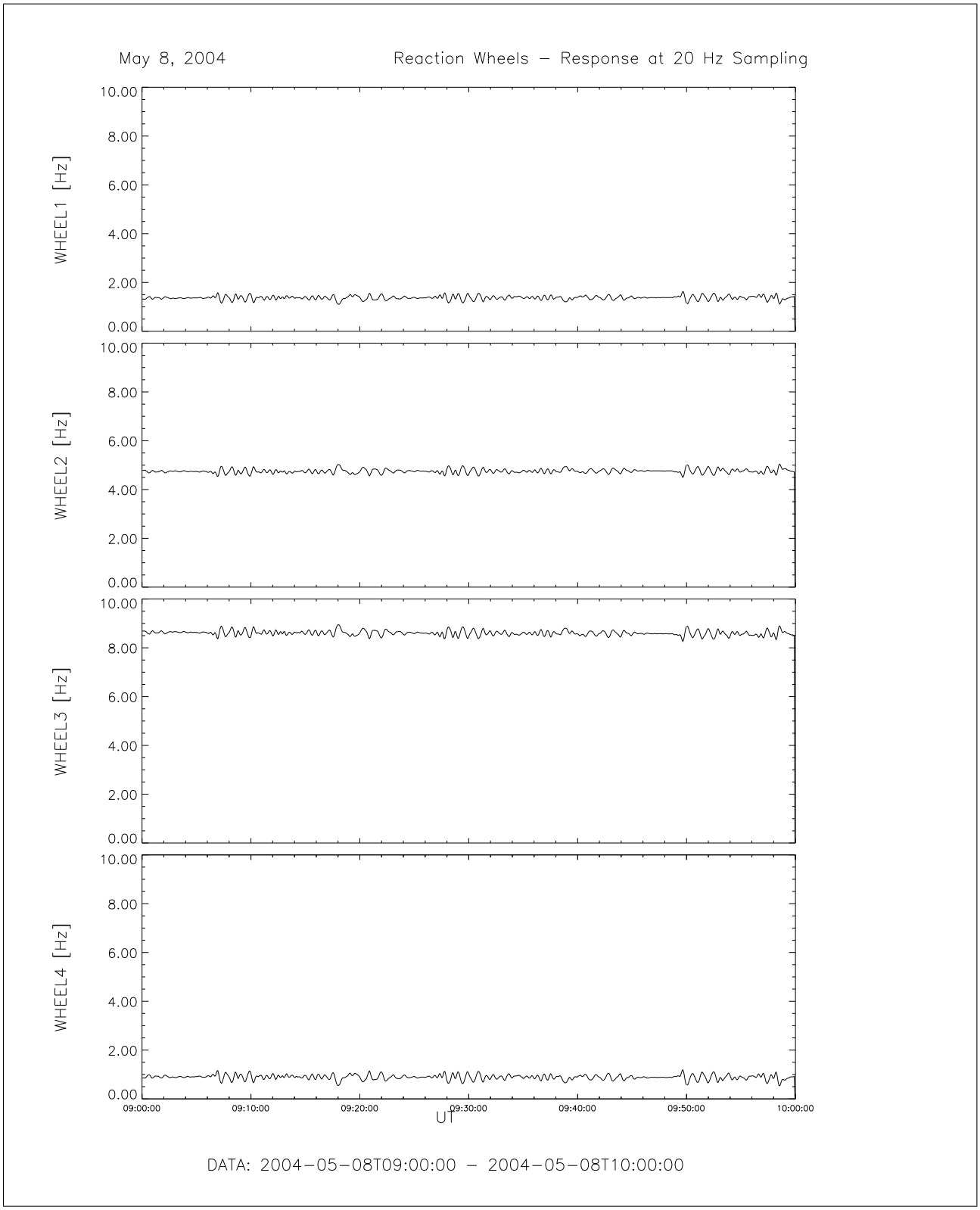


Figure 38: File: wheels_20Hz_Sampling2004-05-08T09-00

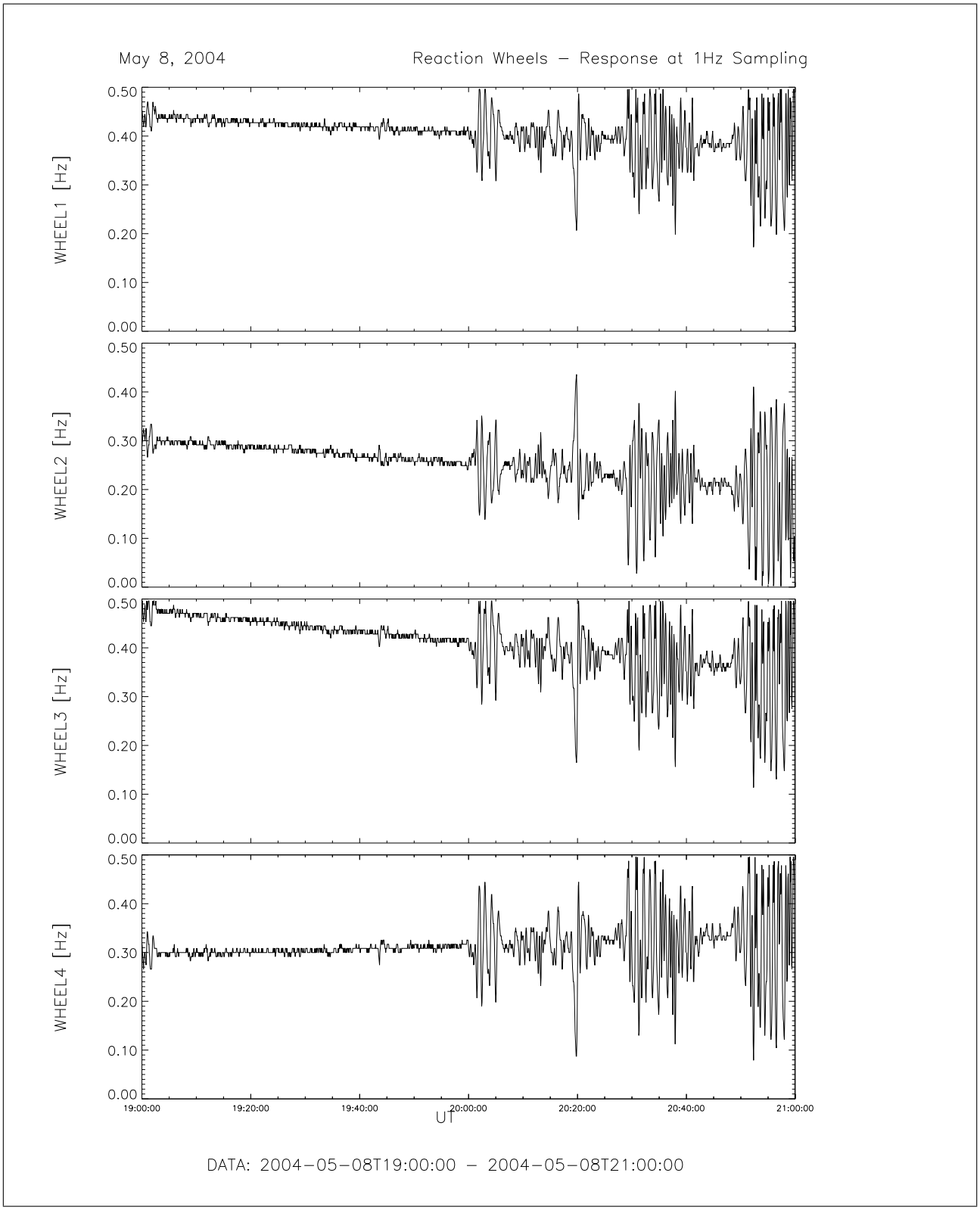


Figure 39: File: wheels_1Hz_Sampling2004-05-08T19-00

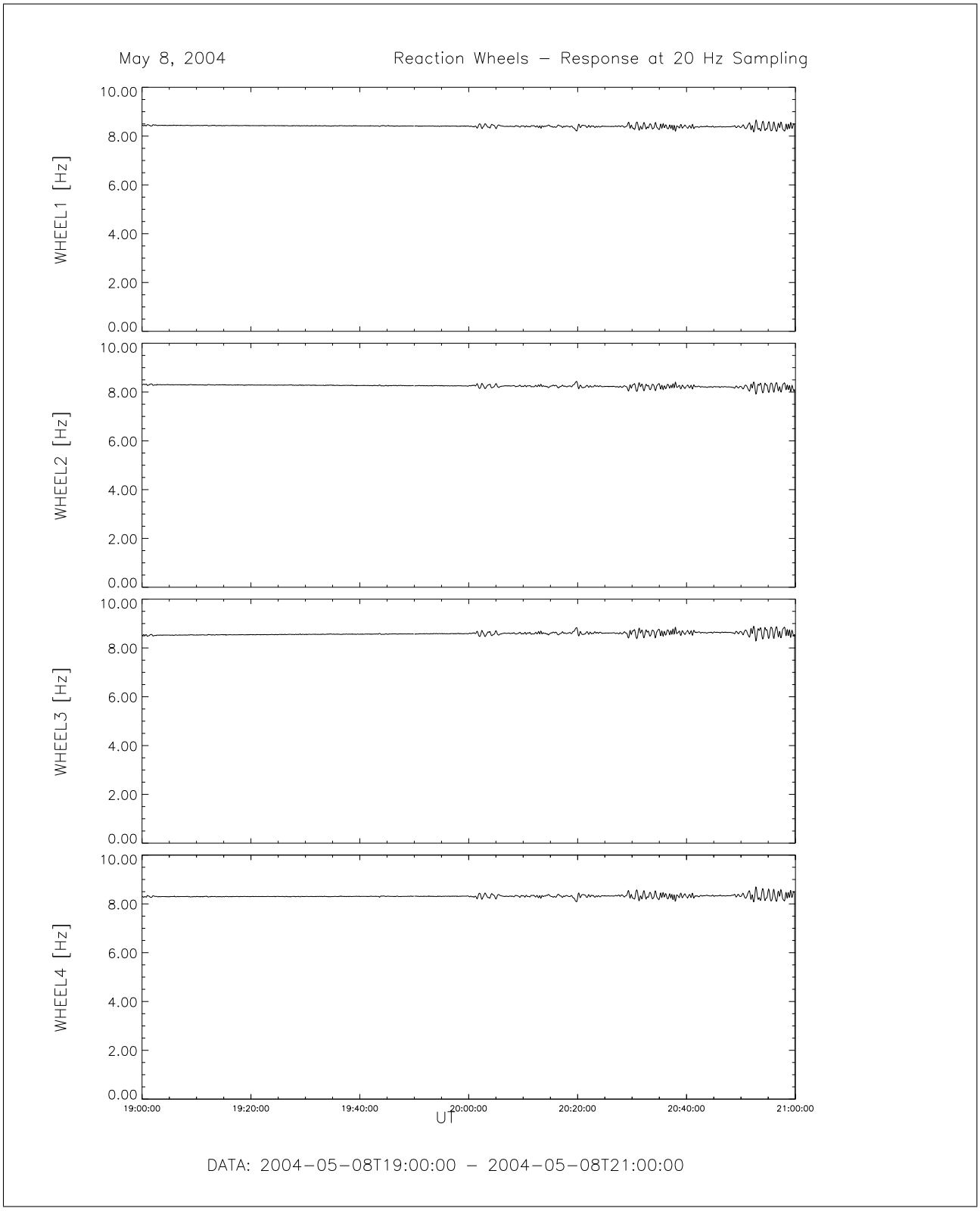


Figure 40: File: wheels_20Hz_Sampling2004-05-08T19-00

# 4 May 09, 2004:

## 4.1 Actions

Also today the instrument was operated in different modes. The instrument worked fine.

| Time | Stage A, Stage B,Filter cfg | Stage 1, Stage 2, Stage3 | Mode |
| --- | --- | --- | --- |
| 00:00 – 02:15 | 0 0 0 | 0 0 0 | SID3 |
| – 17:45 | 2 0 0 | 2 0 0 | SID4 |
| – 18:57 | 0 0 0 | 0 0 0 | SID3 |
| – 20:37 | 4 3 1 | 4 3 3 | SID1 |
| 20:42 – 23:01 | 1 2 0 | 1 2 0 | SID2 |
| – 23:34 | 0 0 0 | 0 0 0 | SID3 |
| – 24:00 | 1 2 0 | 1 2 0 | SID2 |

It is,however, remarkable that the very low frequent noise level is in the order of 8 $nT_{pp}$. This seems to be caused by various spikes, whose origin is not clear. There is no specific frequency peak to be seen in the spectra.

The temperature data between 02:00 and 17:00 suggest a s/c rotation. The maximum temperature was reached at about 11:00.

## 4.2 Plots of Calibrated Data using the new Temperature Model

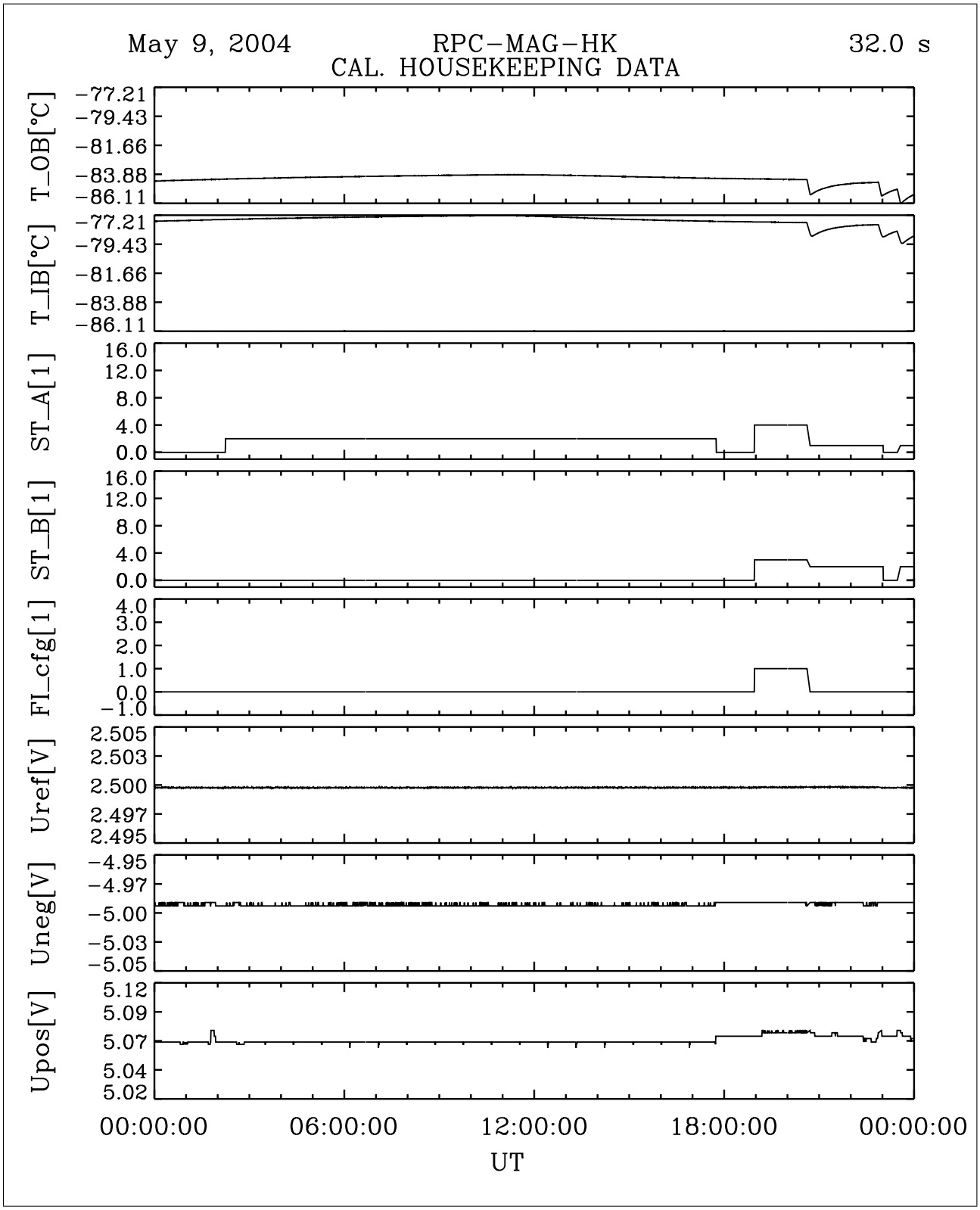


Figure 41: File: RPCMAG040509T0000_CLA_HK_P0000_2400

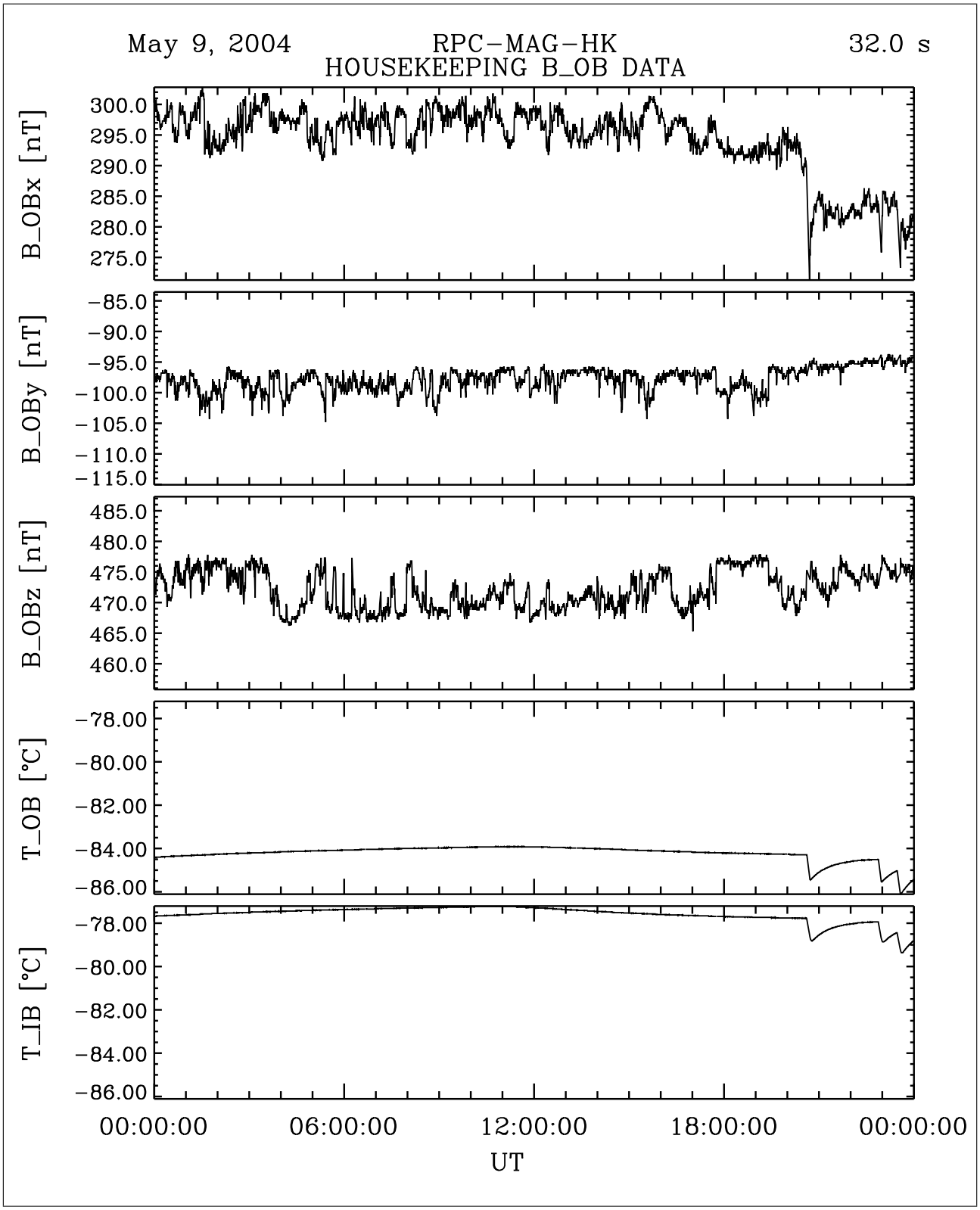


Figure 42: File: RPCMAG040509T0000_CLA_HK_B_P0000_2400

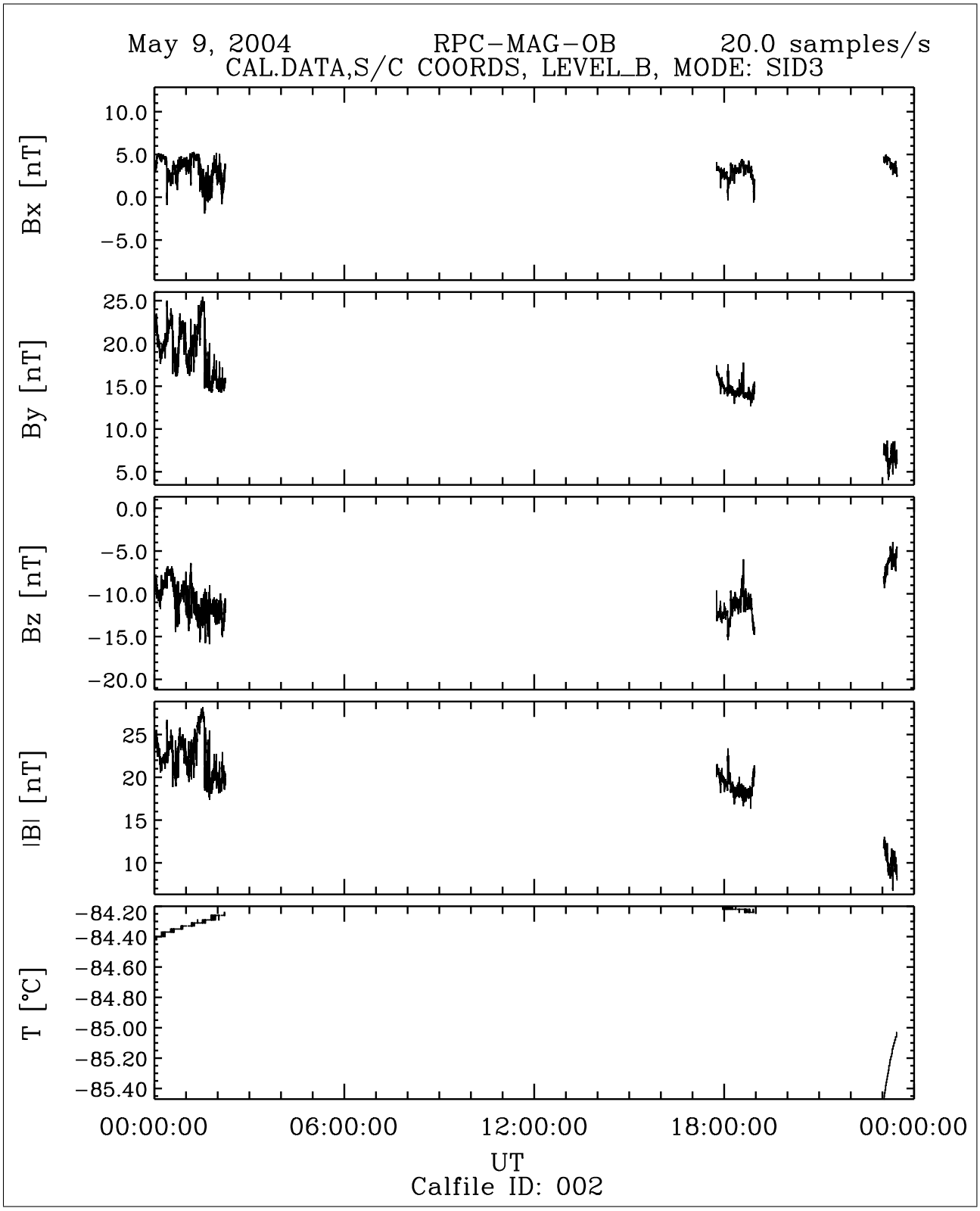


Figure 43: File: RPCMAG040509T0000_CLB_OB_M3_T0000_2400_002

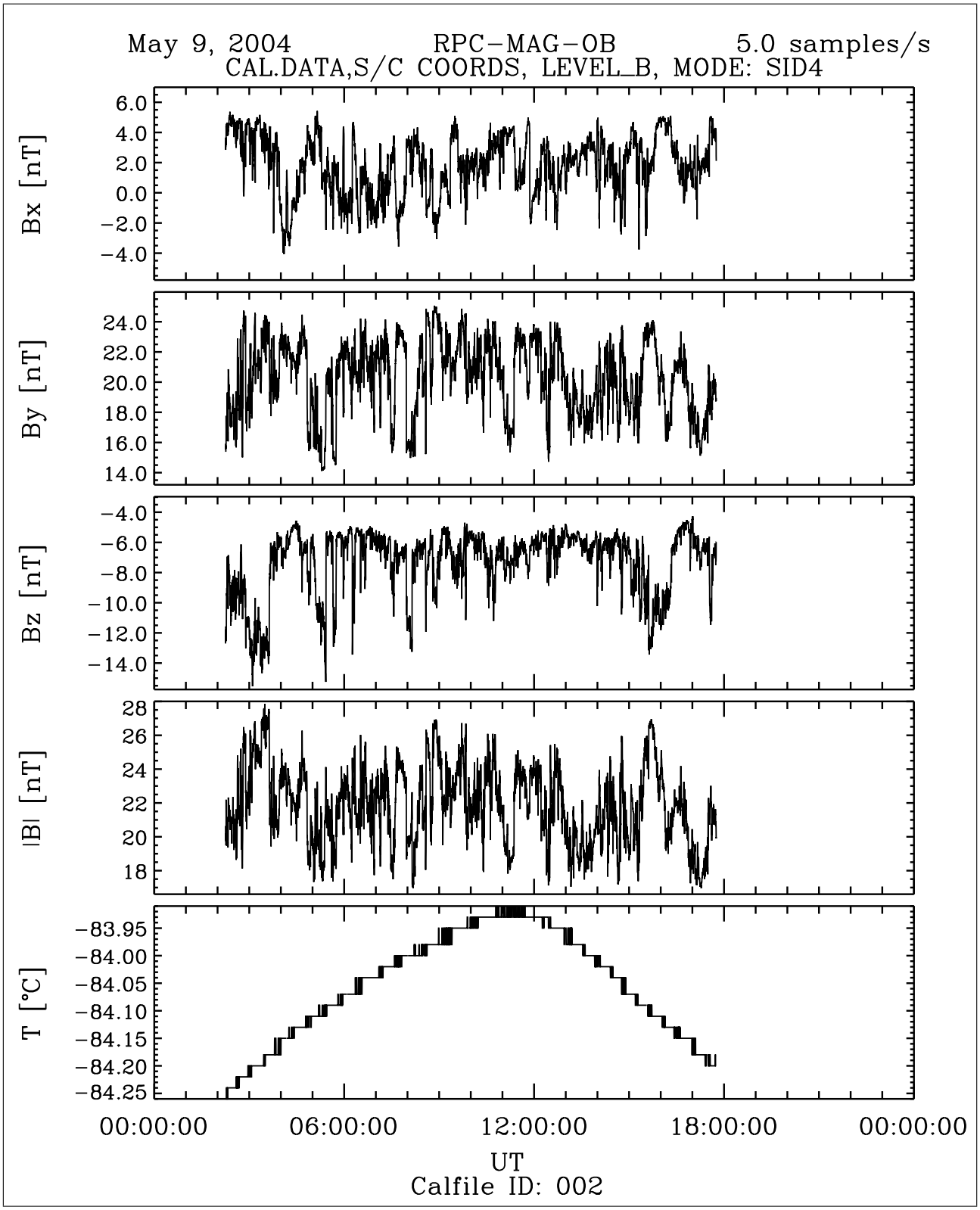


Figure 44: File: RPCMAG040509T0215_CLB_OB_M4_T0000_2400_002

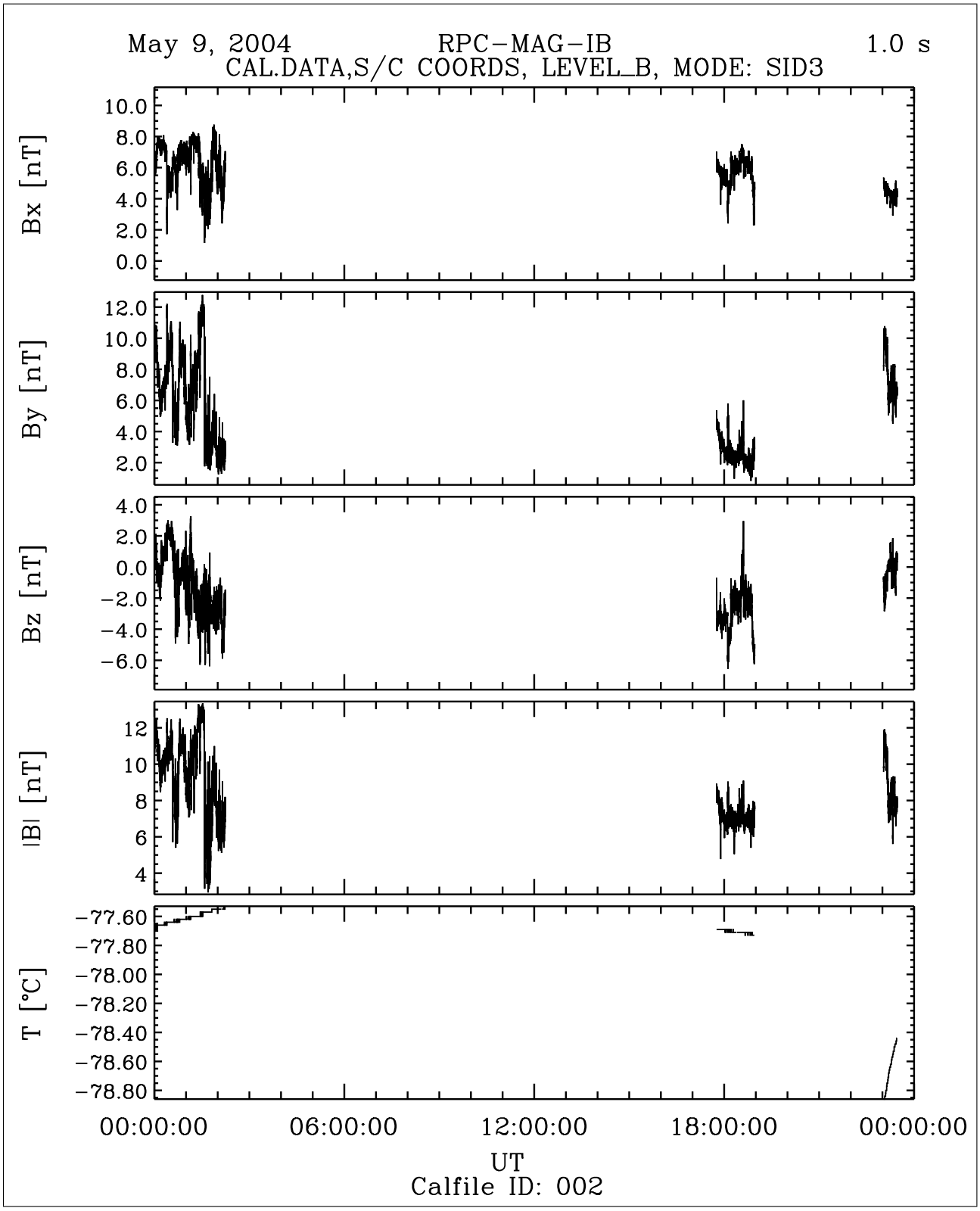


Figure 45: File: RPCMAG040509T0000_CLB_IB_M3_T0000_2400_002

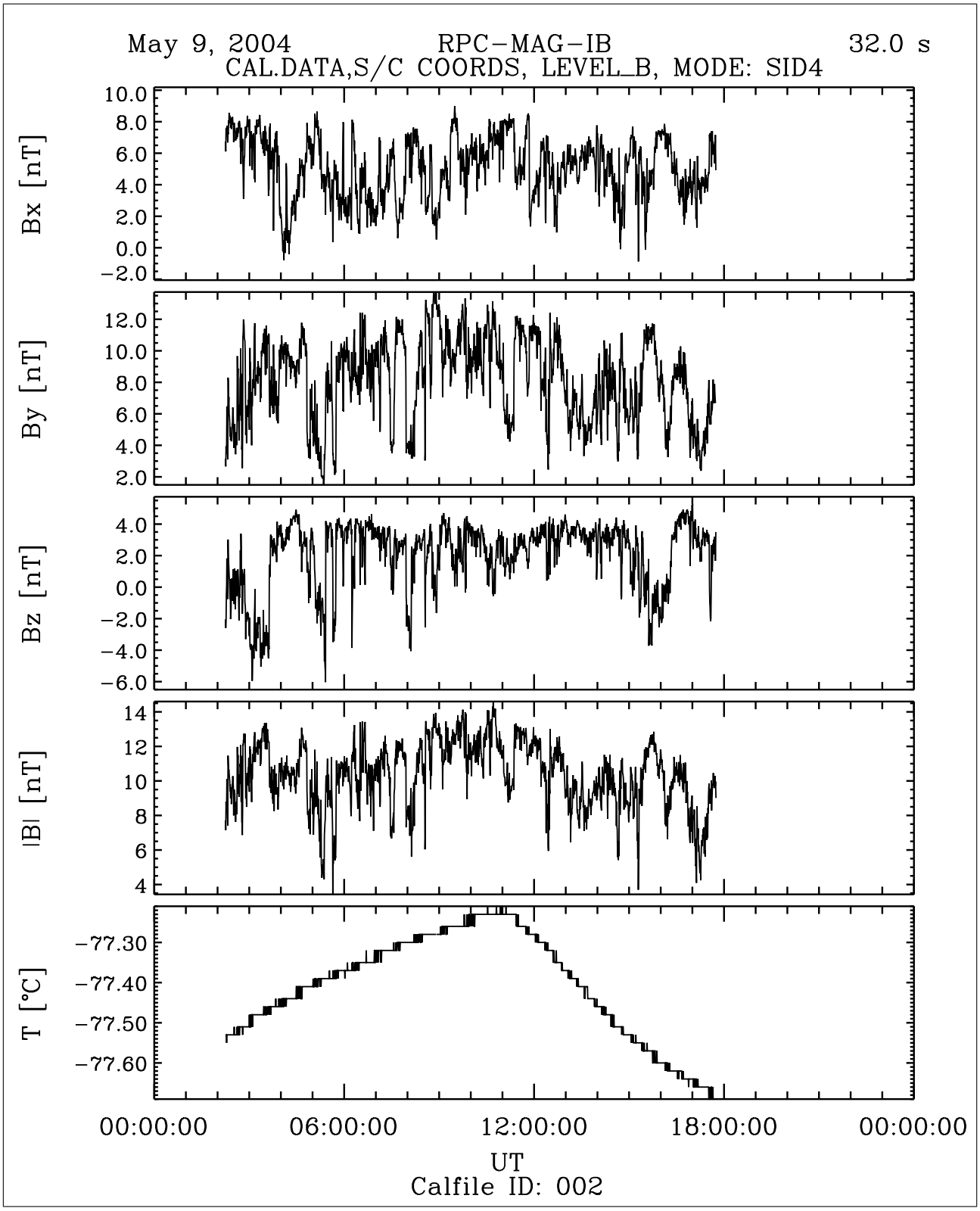


Figure 46: File: RPCMAG040509T0215_CLB_IB_M4_T0000_2400_002

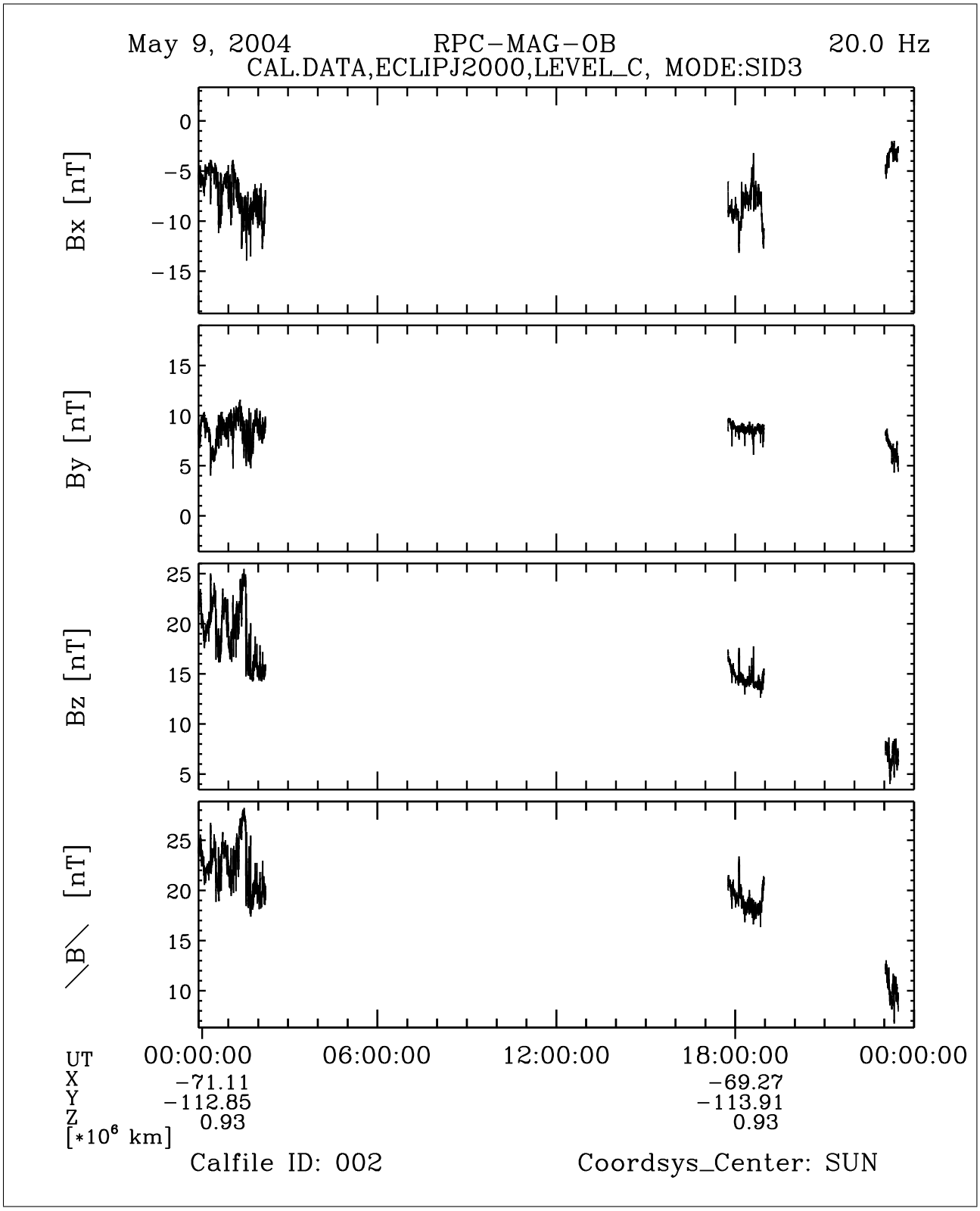


Figure 47: File: RPCMAG040509T0000_CLC_OB_M3_T0000_2400_002

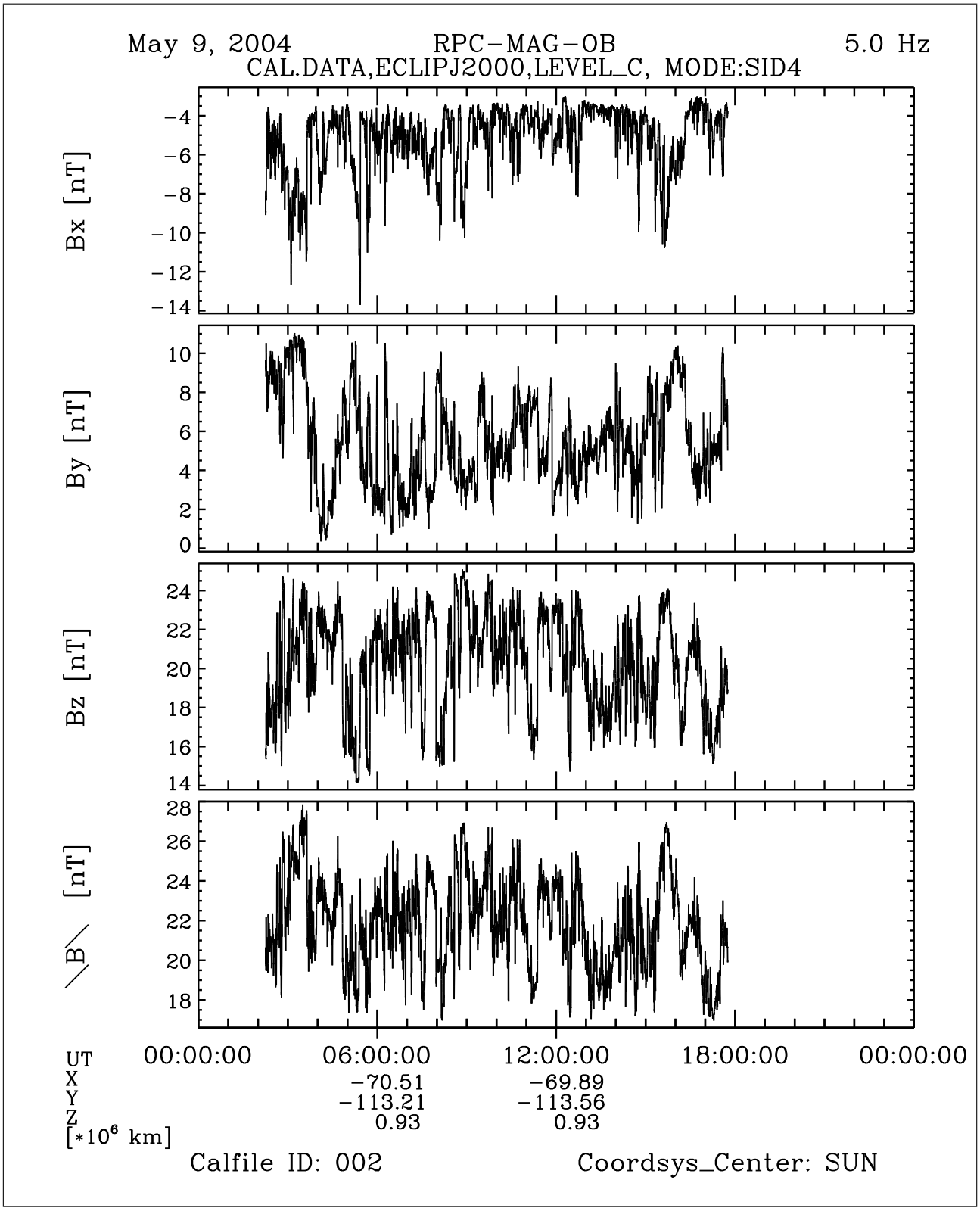


Figure 48: File: RPCMAG040509T0215_CLC_OB_M4_T0000_2400_002

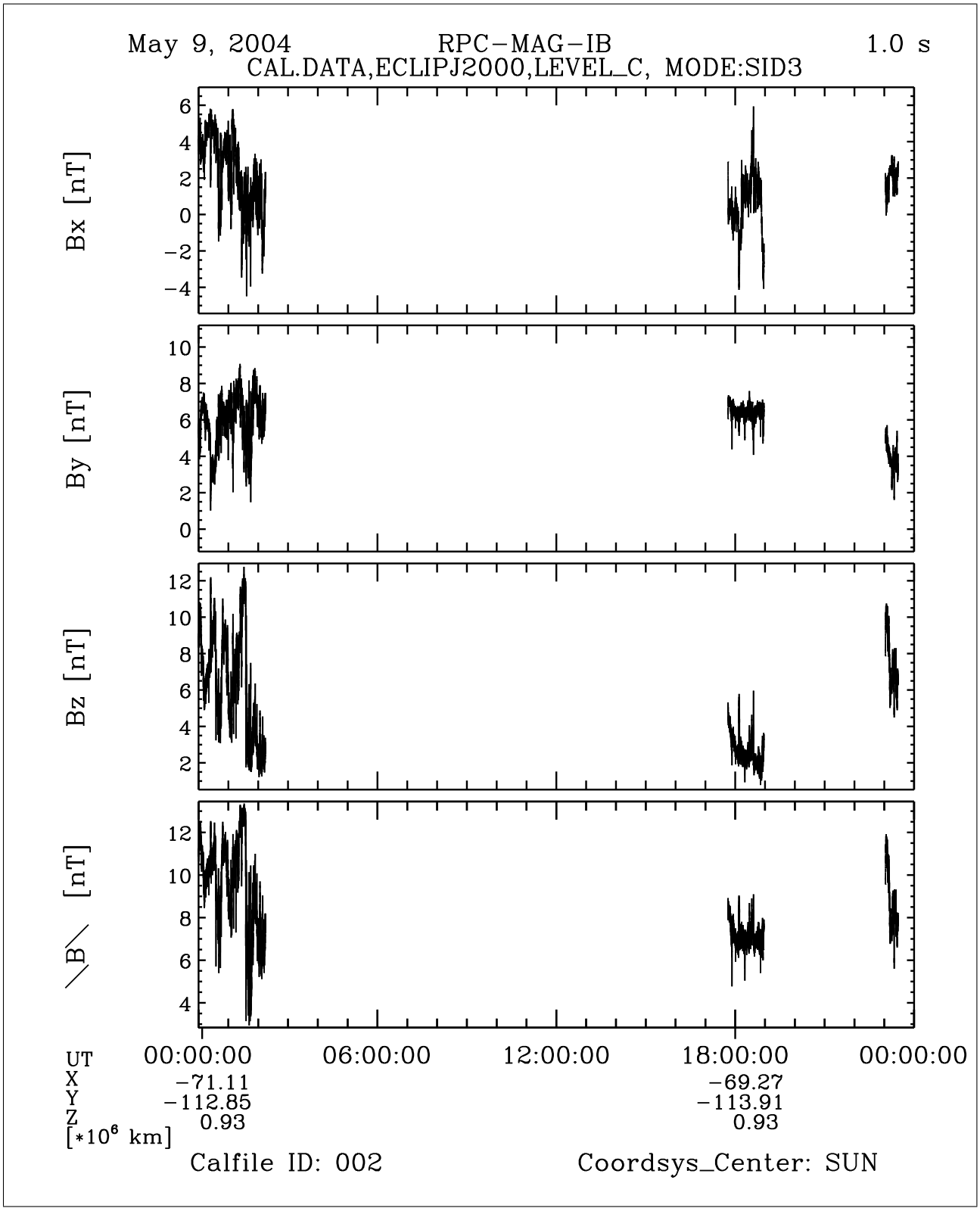


Figure 49: File: RPCMAG040509T0000_CLC_IB_M3_T0000_2400_002

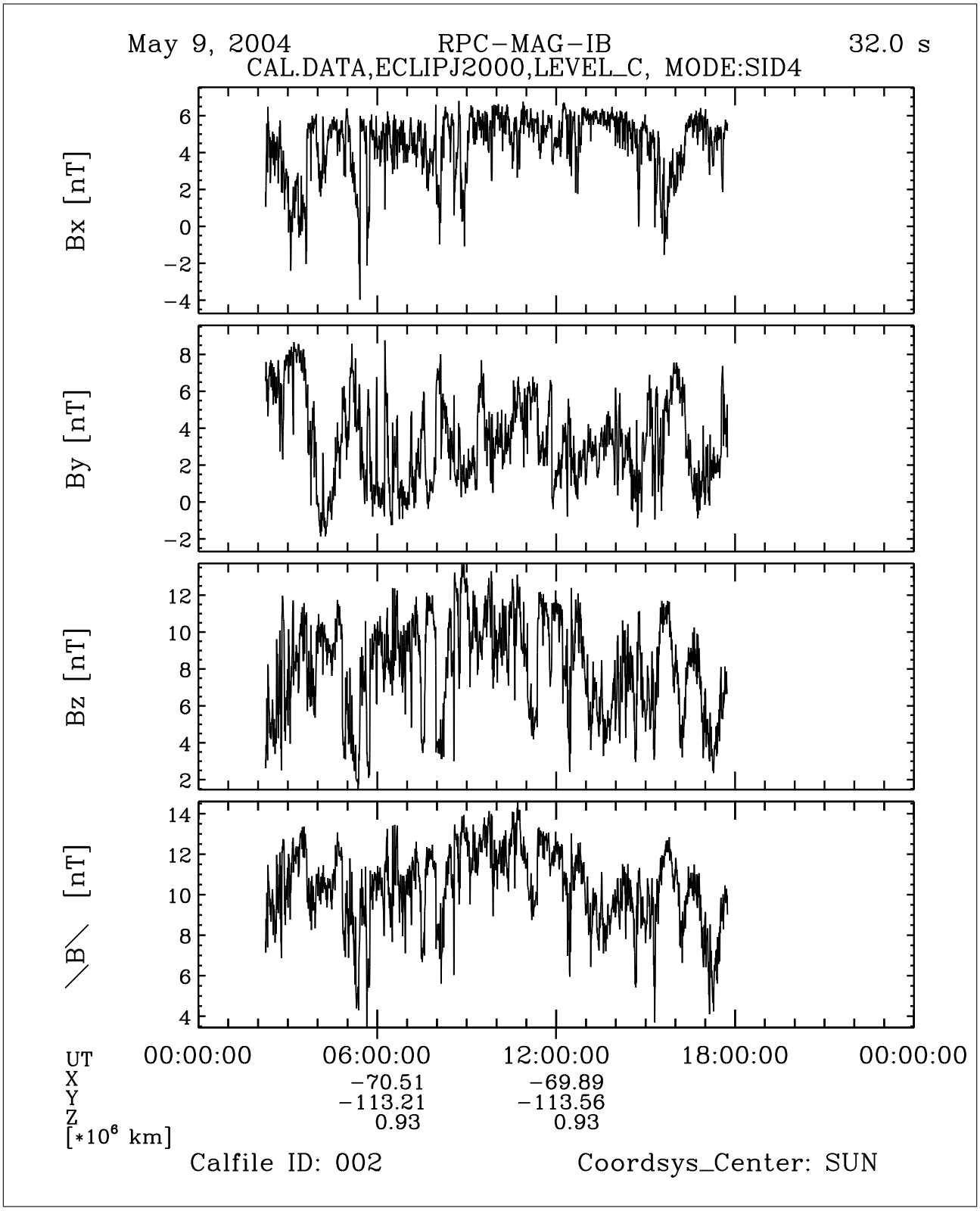


Figure 50: File: RPCMAG040509T0215_CLC_IB_M4_T0000_2400_002

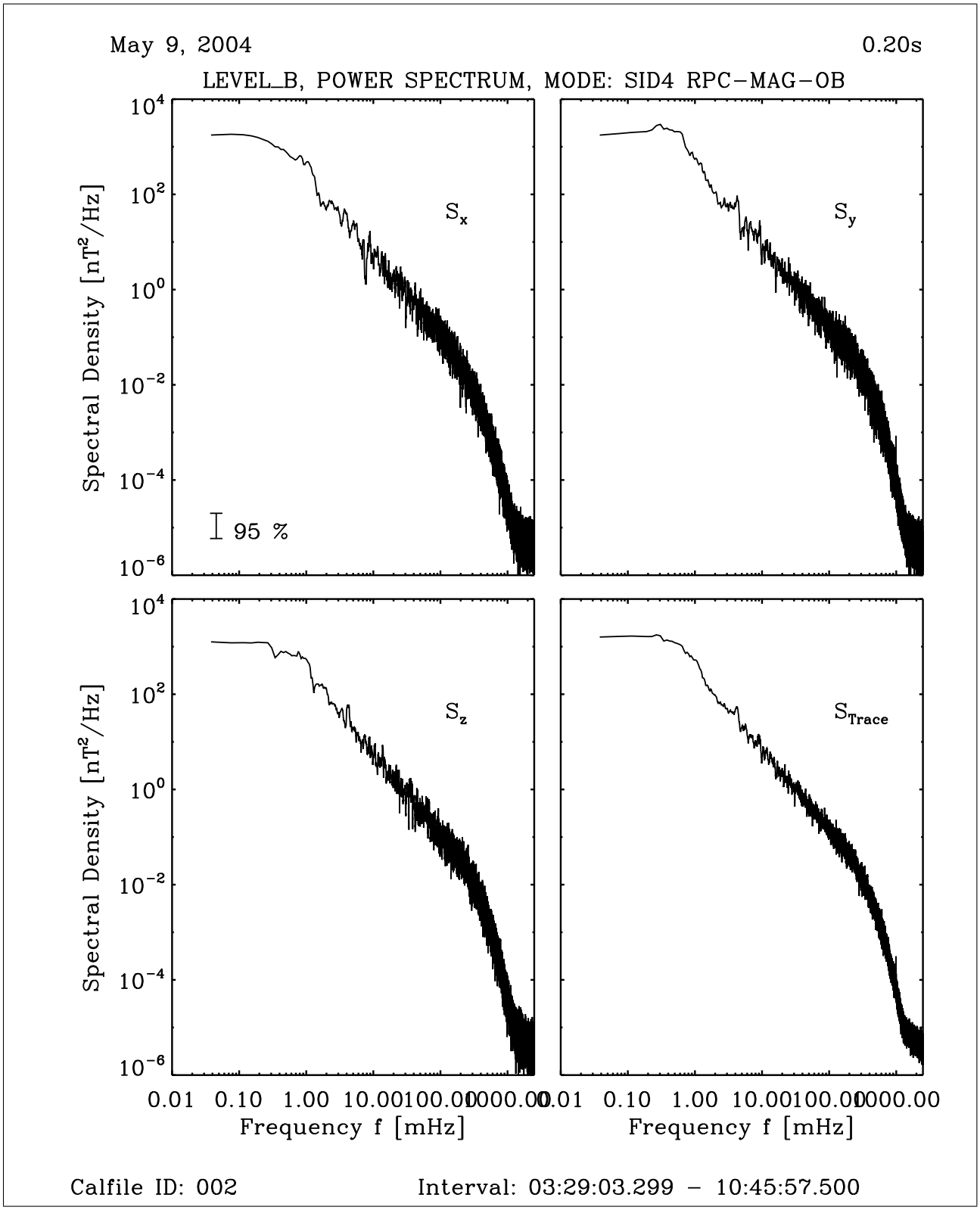


Figure 51: File: RPCMAG040509T0215_CLB_OB_M4_PS1e-2_10000_002

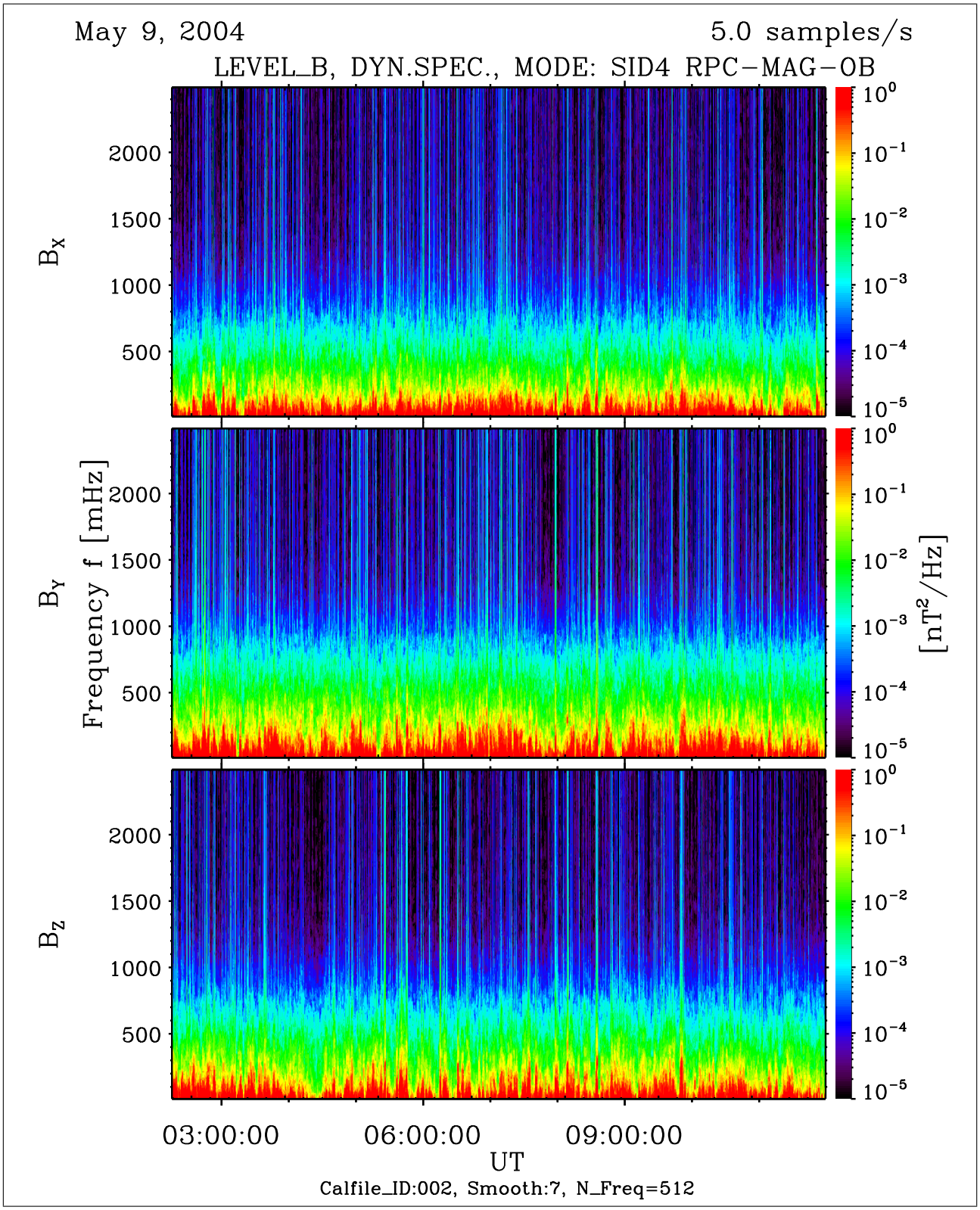


Figure 52: File: RPCMAG040509T0215_CLB_OB_M4_DS1e-2_2500_002

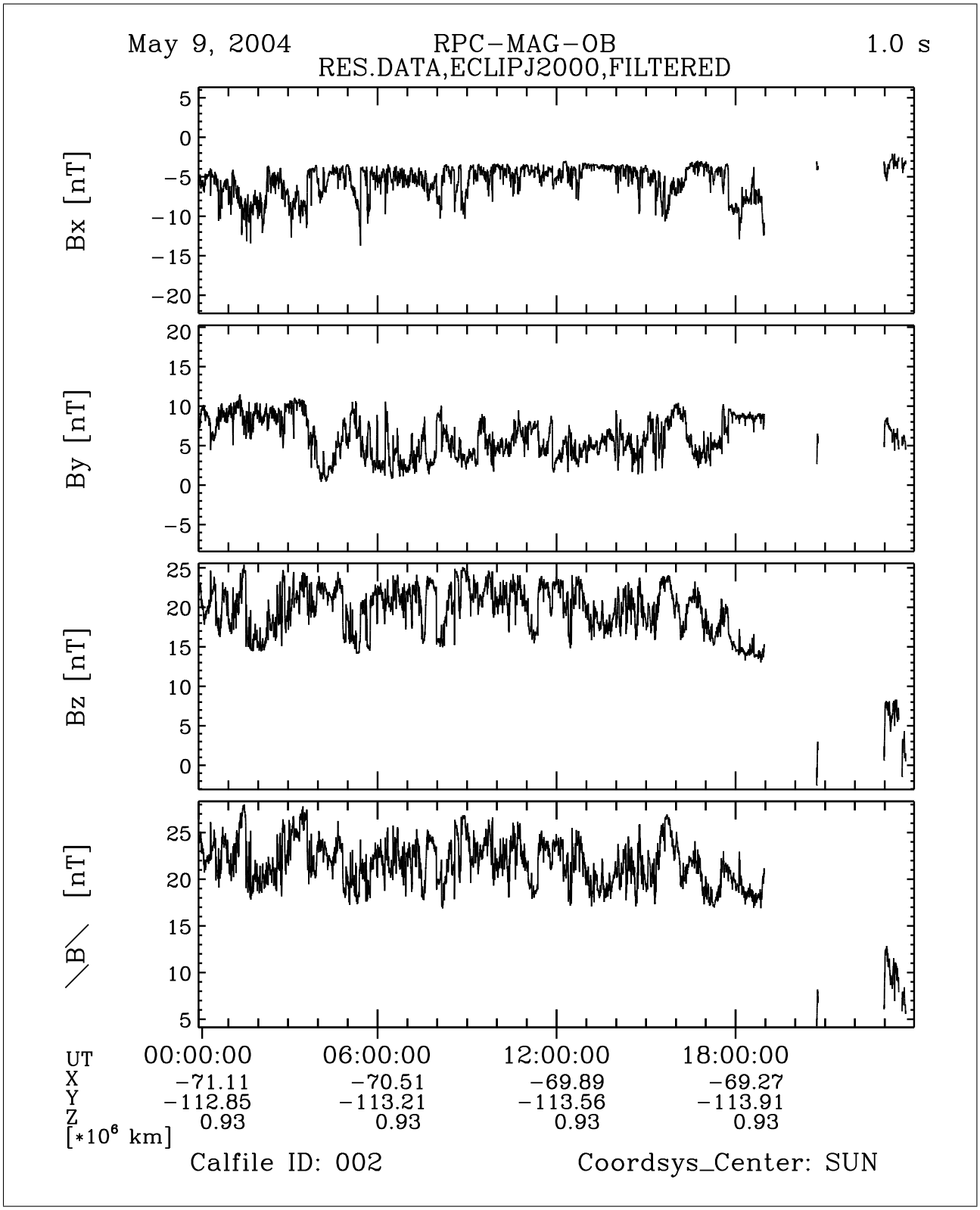


Figure 53: File: RPCMAG040509_CLG_OB_A1_T0000_2359_002

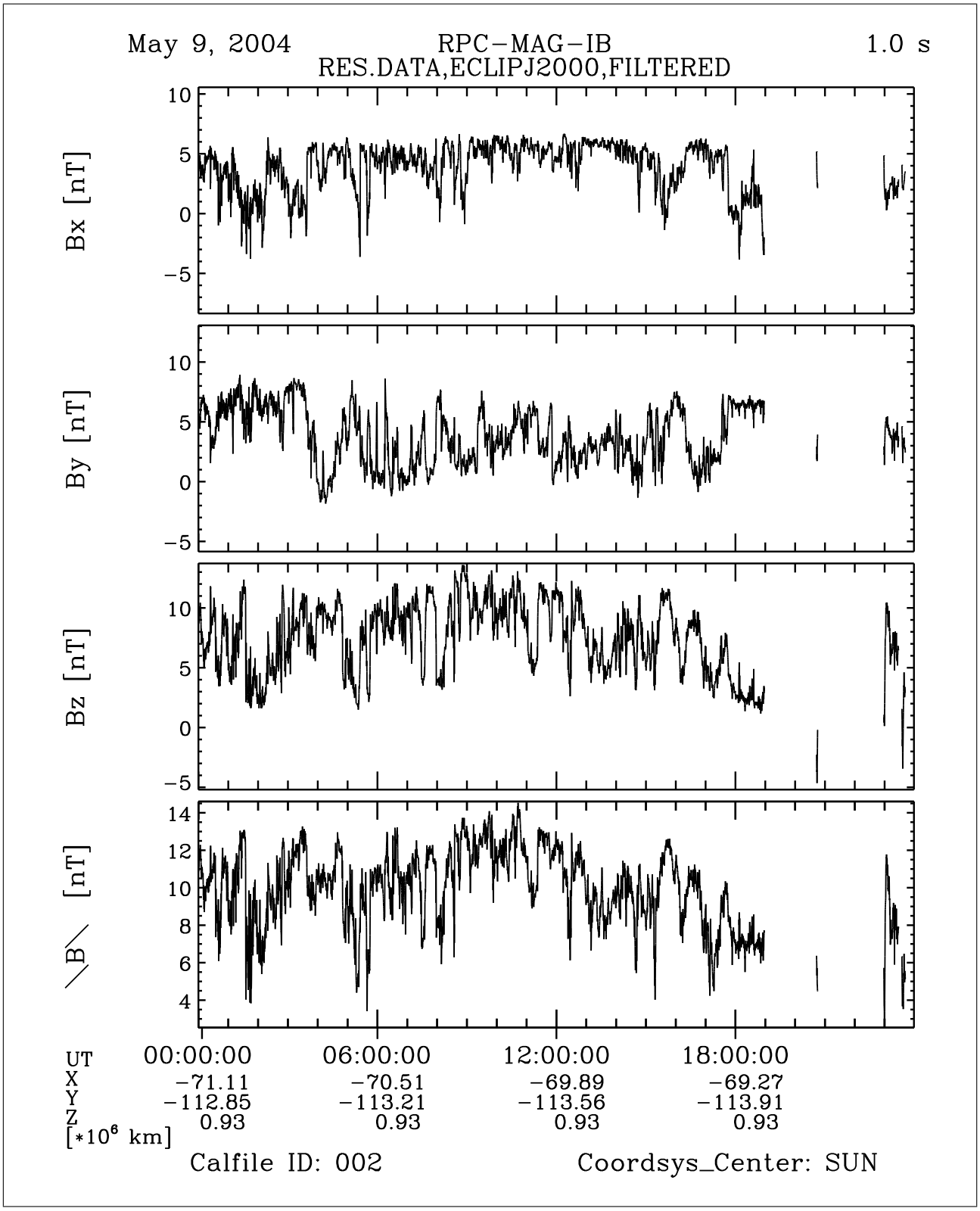


Figure 54: File: RPCMAG040509_CLG_IB_A1_T0000_2359_002

### 4.3 Plots of ROSETTA's Reaction Wheels Speeds

The following plots show the time series of the revolutions of the 4 reaction wheels. Two kinds of data are shown:

- The original reaction wheel data as they are stored in the DDS.
- The theoretical response of the wheels impact seen by an instrument sampling with different frequencies. Here the response in the at 20 Hz, 5 Hz and 1 Hz sampling frequency is plotted.

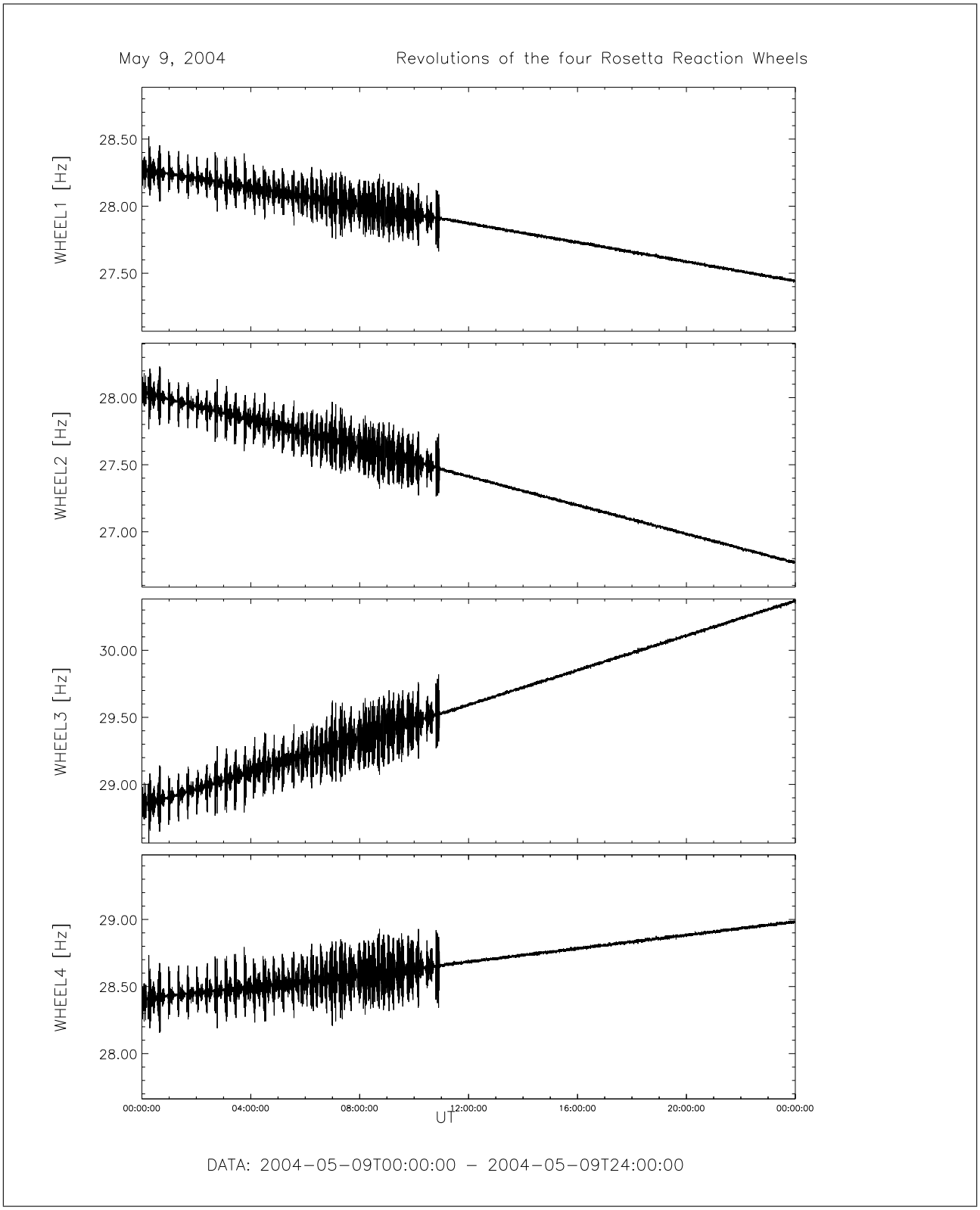


Figure 55: File: wheels_Hz2004-05-09T00-00

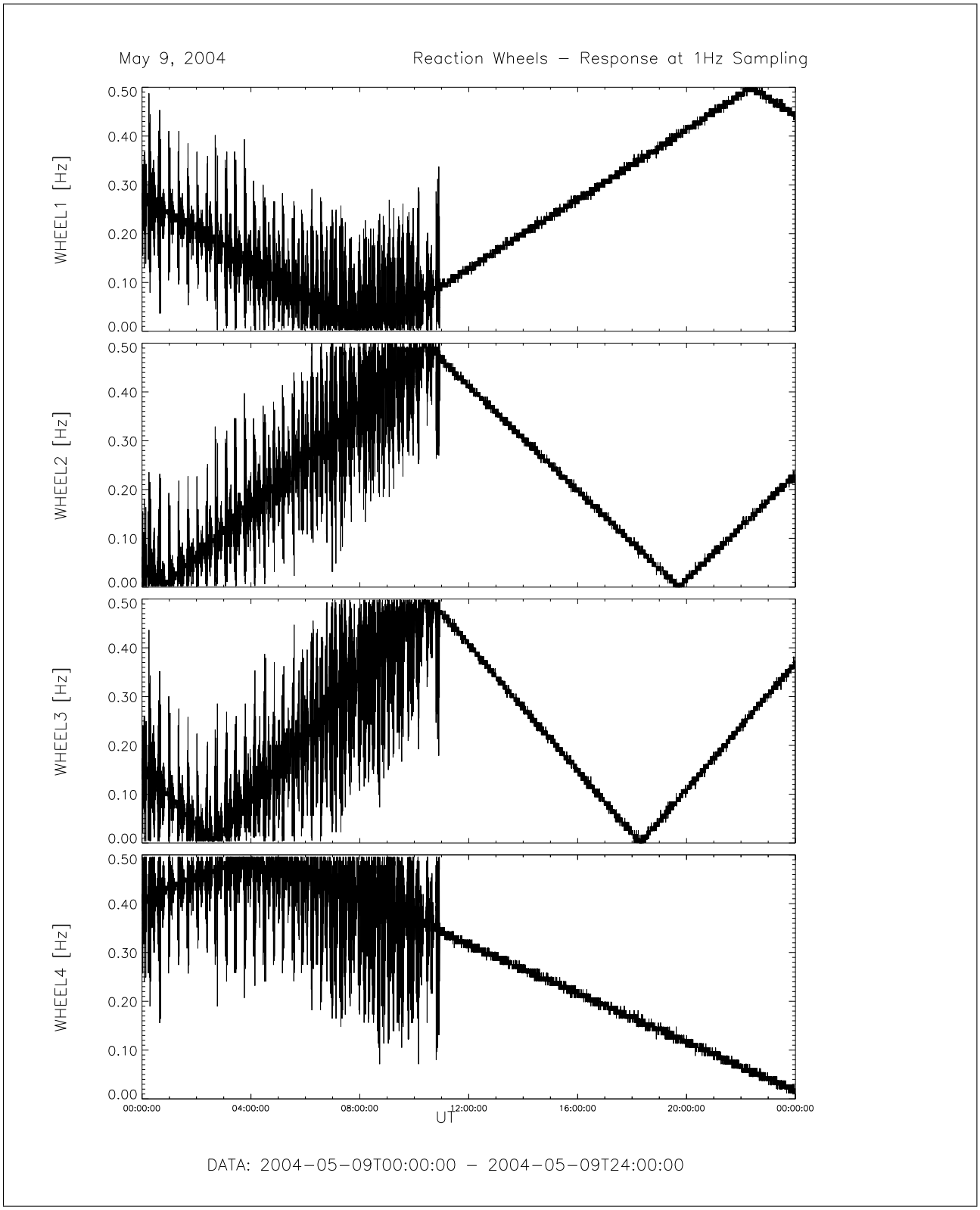


Figure 56: File: wheels_1Hz_Sampling2004-05-09T00-00

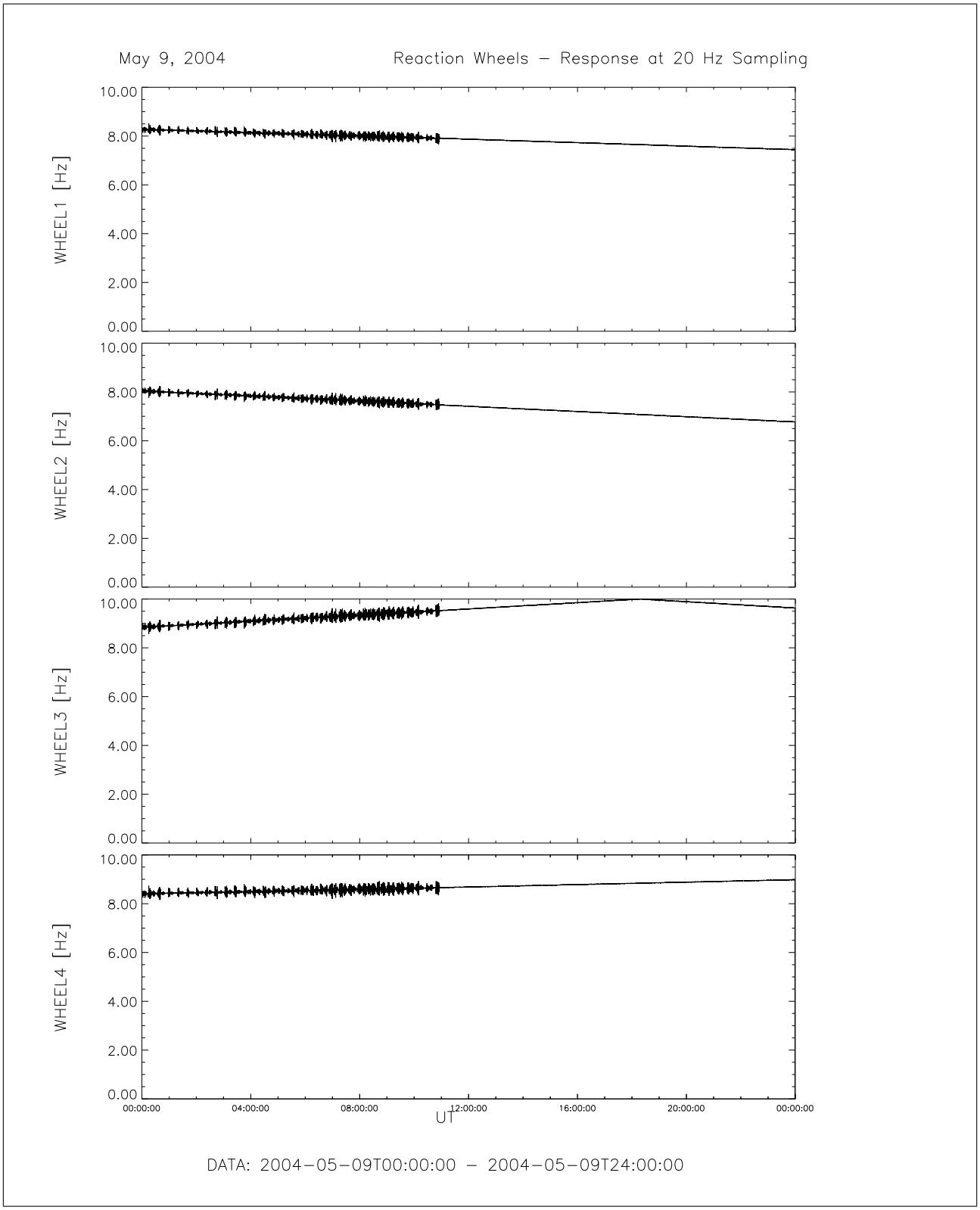


Figure 57: File: wheels_20Hz_Sampling2004-05-09T00-00

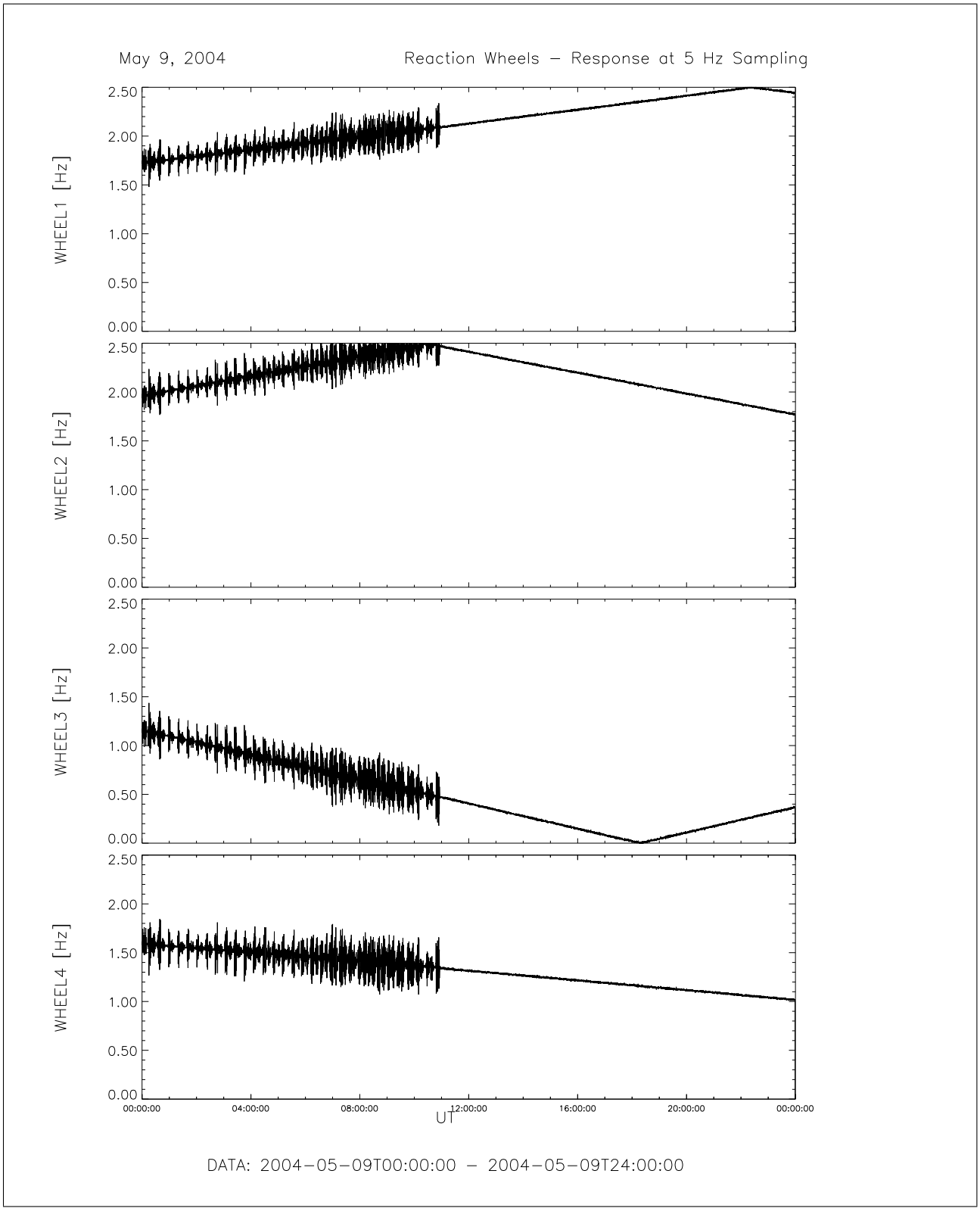


Figure 58: File: wheels_5Hz_Sampling2004-05-09T00-00

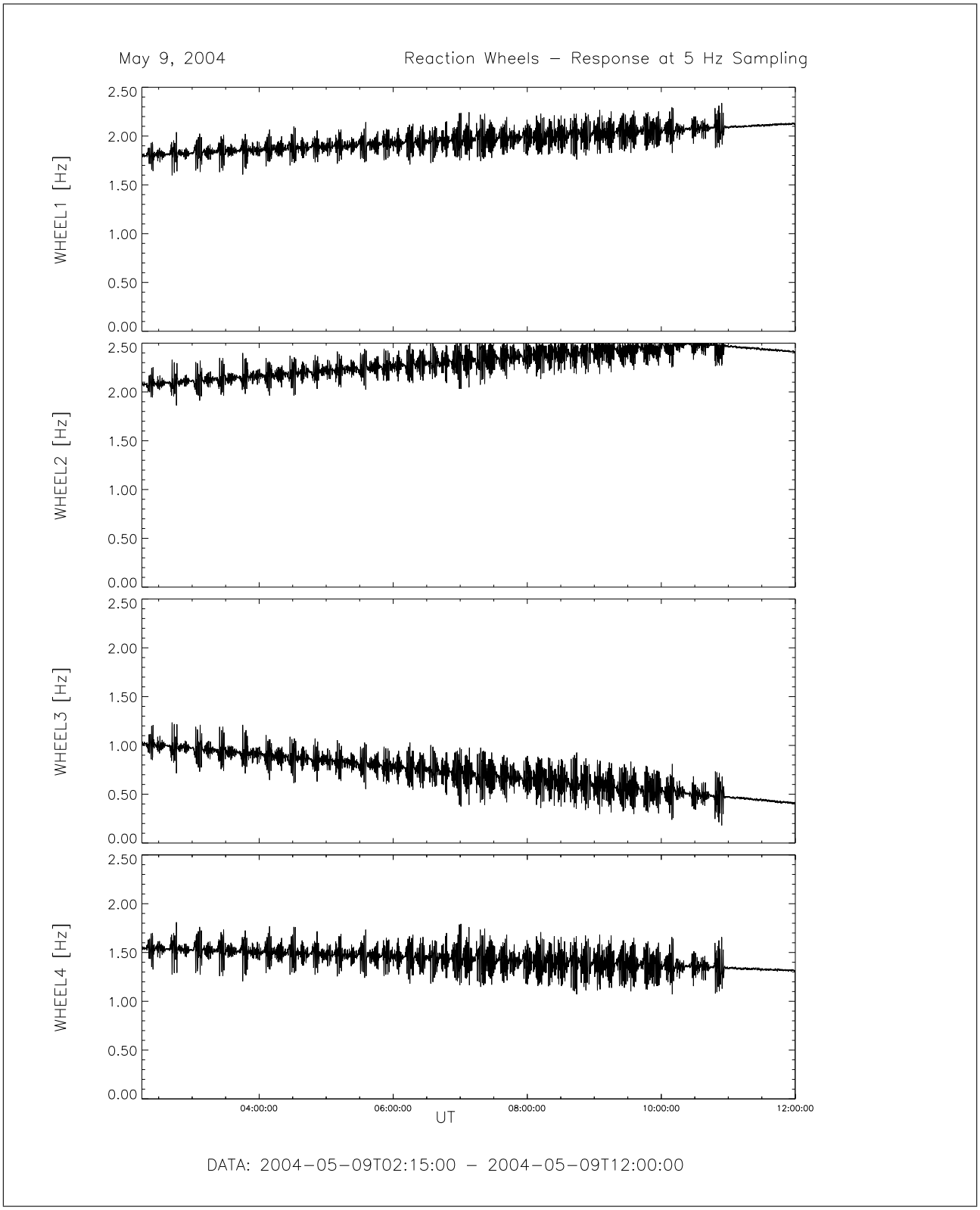


Figure 59: File: wheels_5Hz_Sampling2004-05-09T02-15

# 5 May 10, 2004:

## 5.1 Actions

Today we got some SID3 data in the early morning hours. There were no special events.

The spectrum shows significant peaks at 300 mHz and 400 mHz.

## 5.2 Plots of Calibrated Data using the new Temperature Model

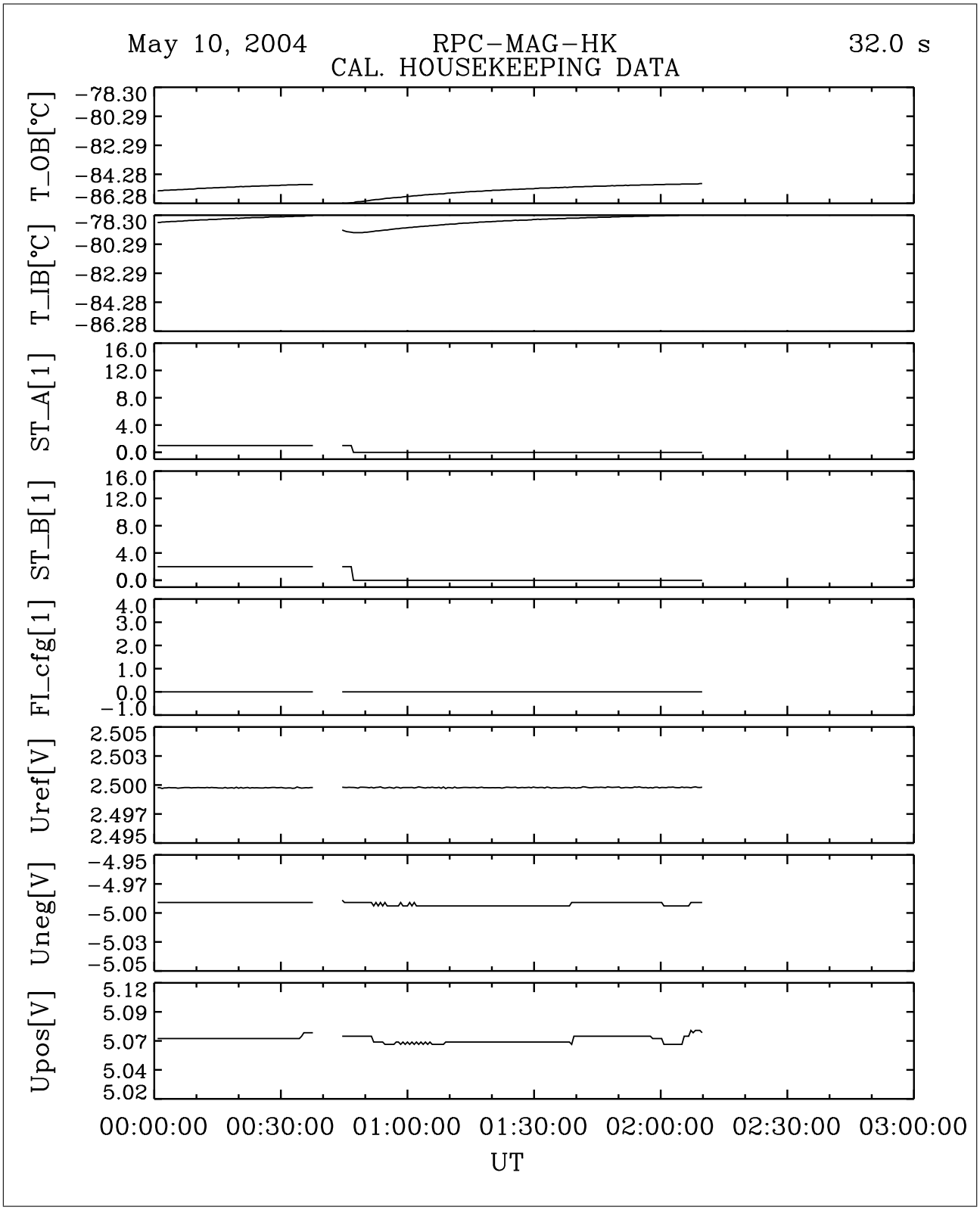


Figure 60: File: RPCMAG040510T0000_CLA_HK_P0000_0300

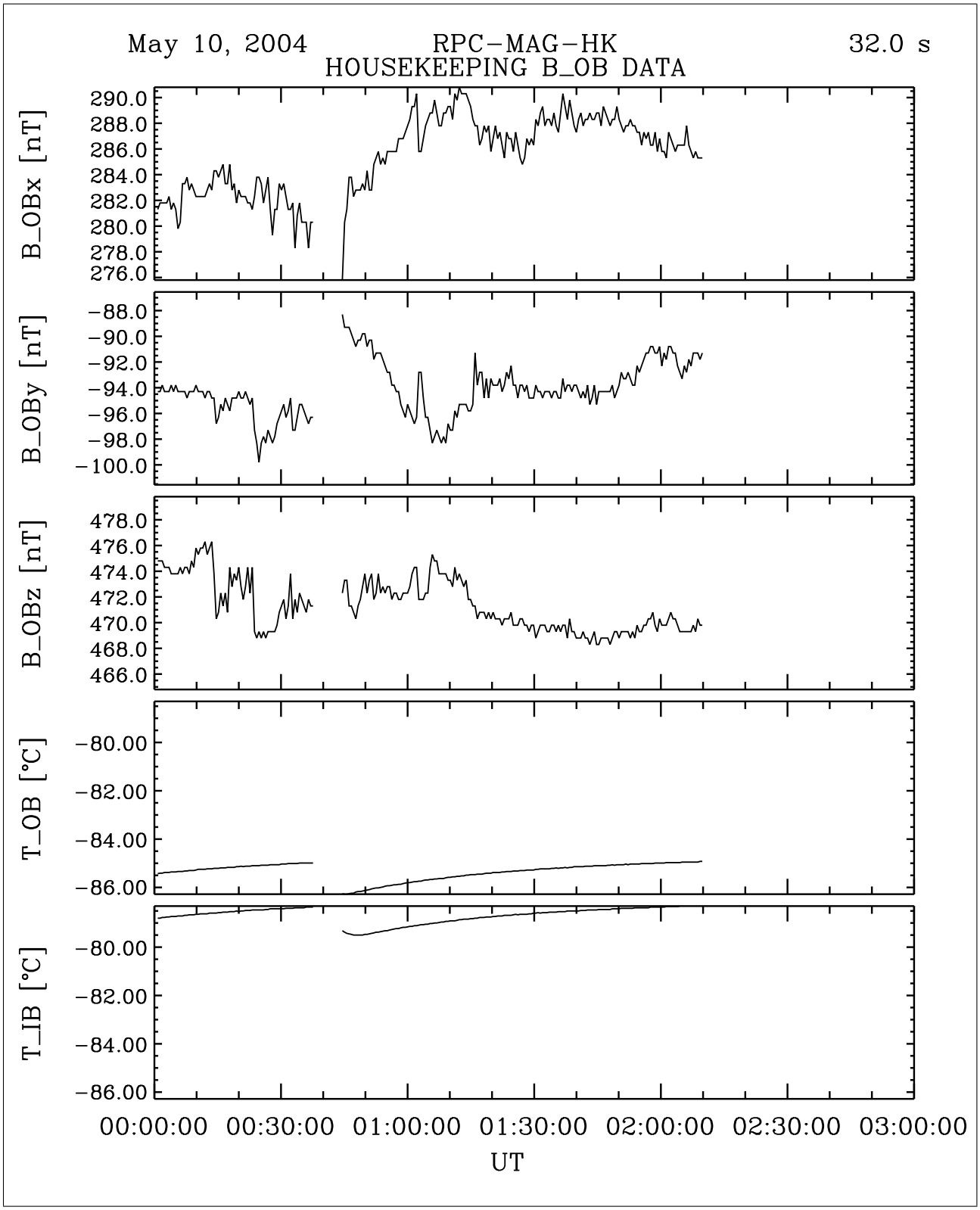


Figure 61: File: RPCMAG040510T0000_CLA_HK_B_P0000_0300

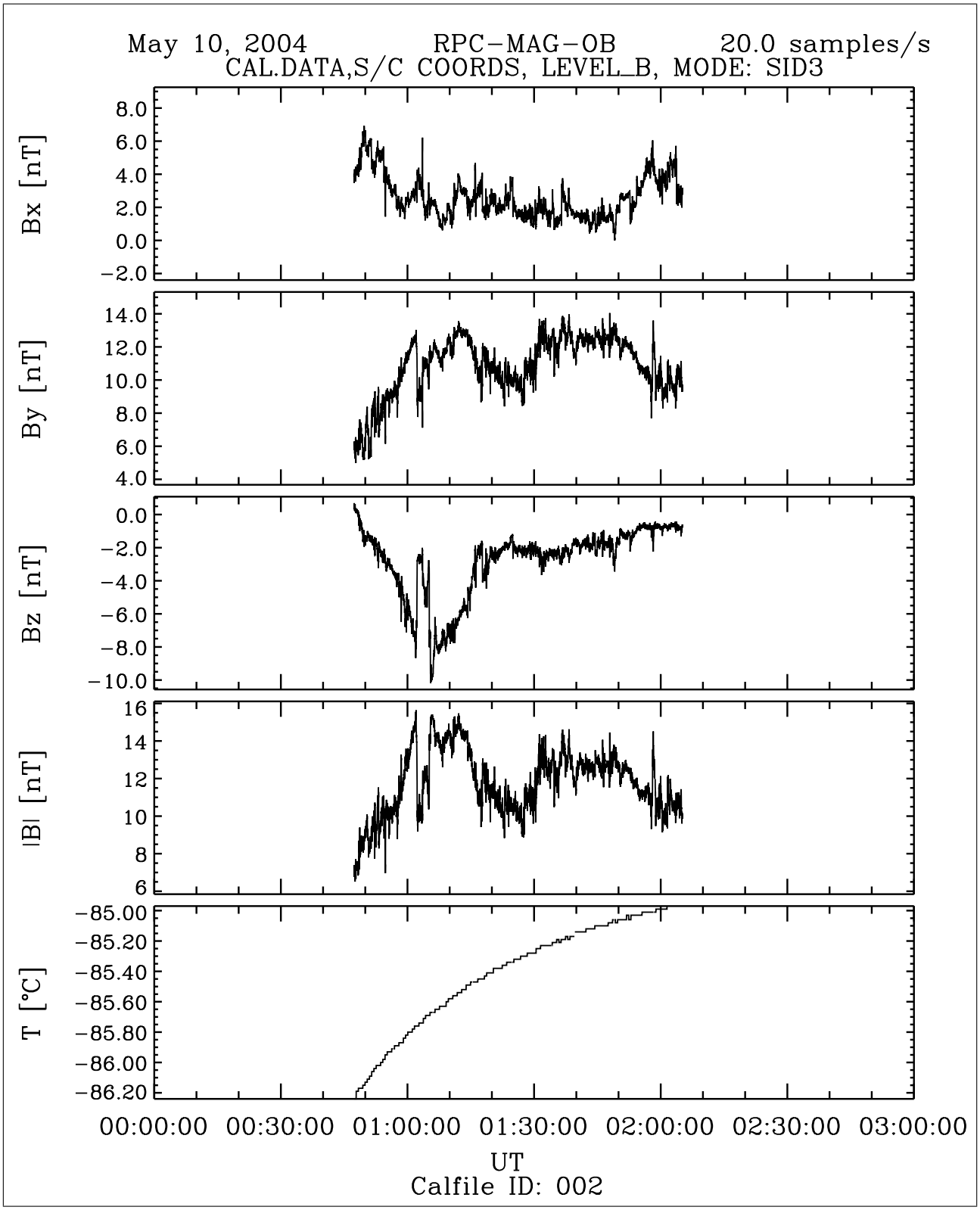


Figure 62: File: RPCMAG040510T0047_CLB_OB_M3_T0000_0300_002

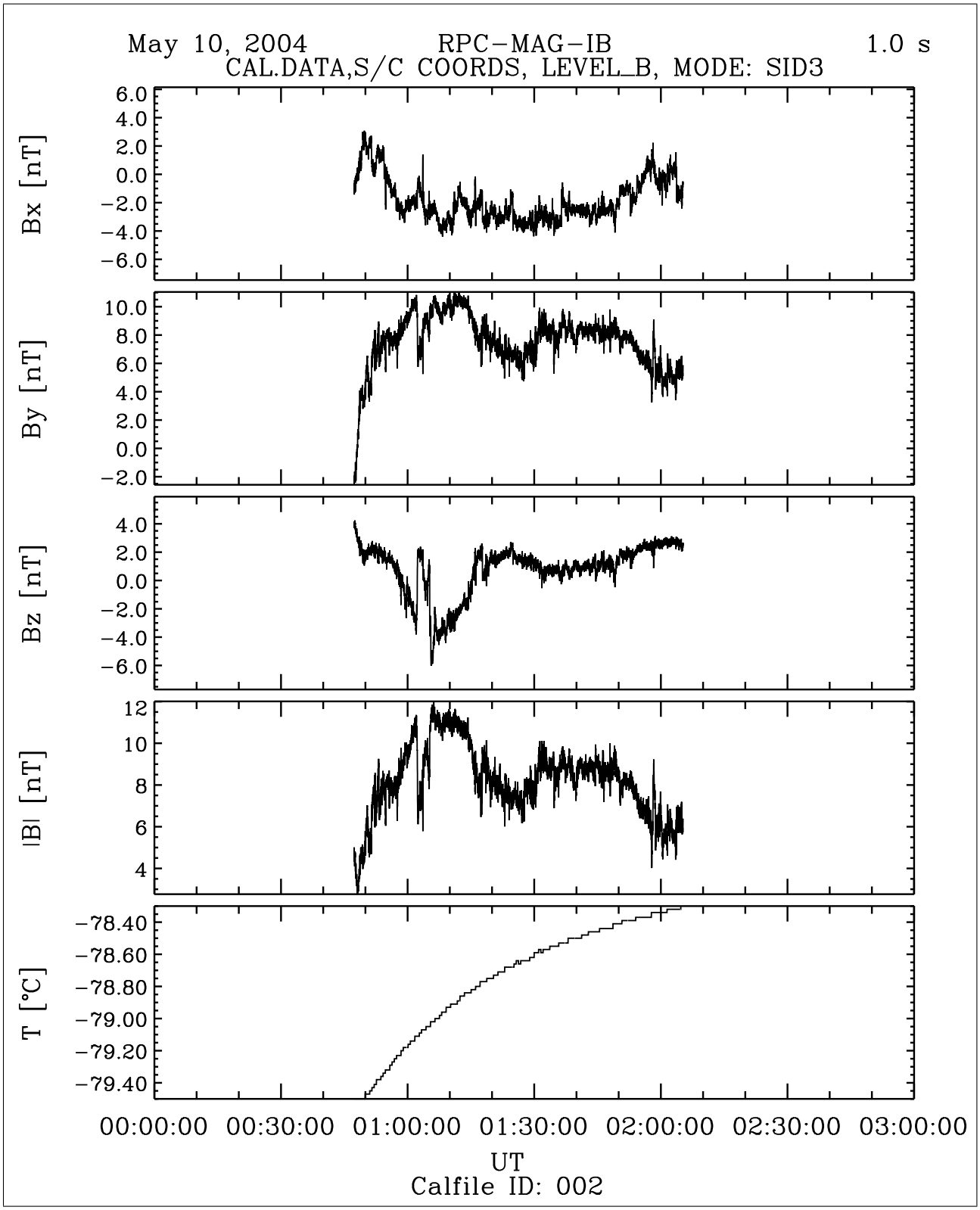


Figure 63: File: RPCMAG040510T0047_CLB_IB_M3_T0000_0300_002

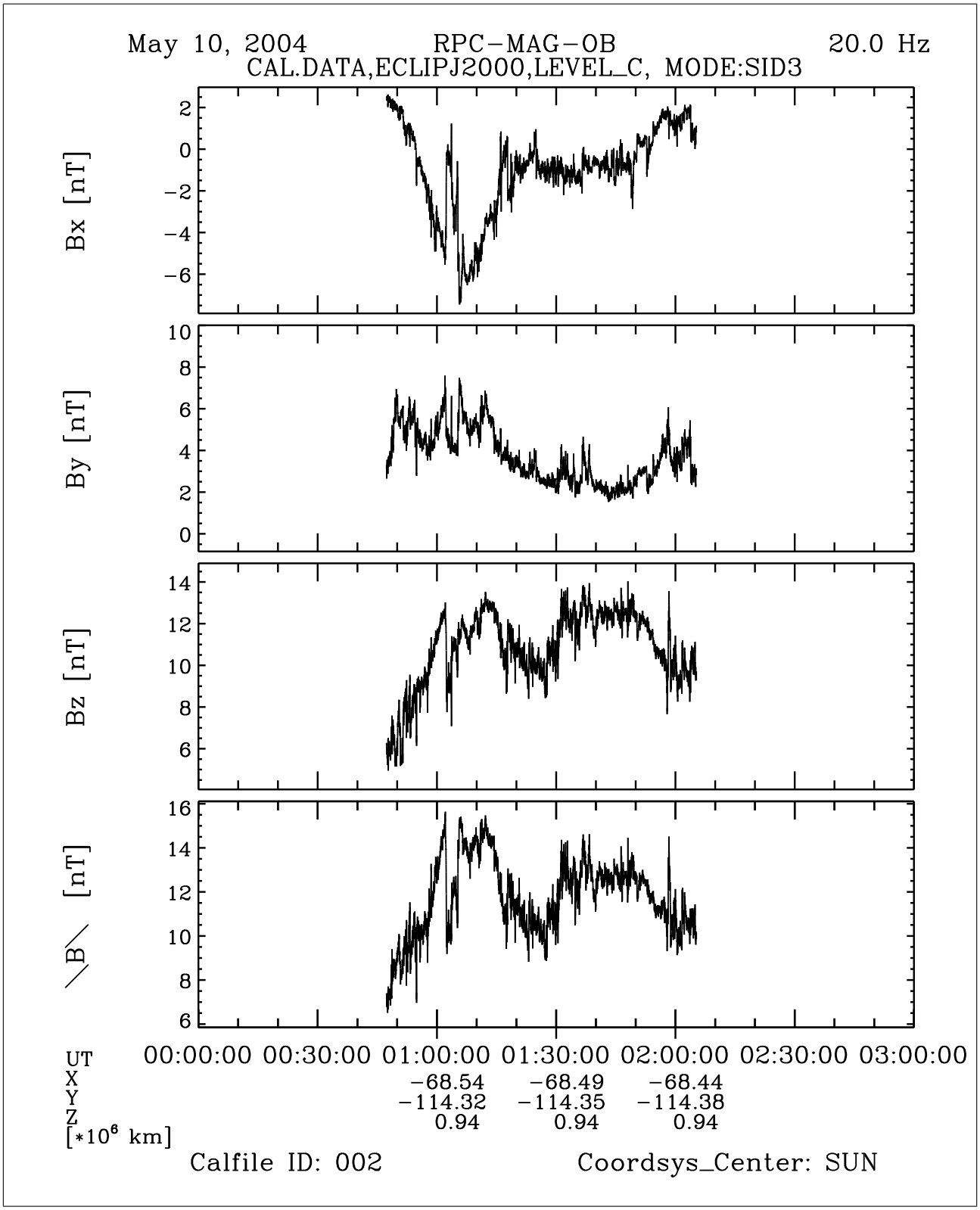


Figure 64: File: RPCMAG040510T0047_CLC_OB_M3_T0000_0300_002

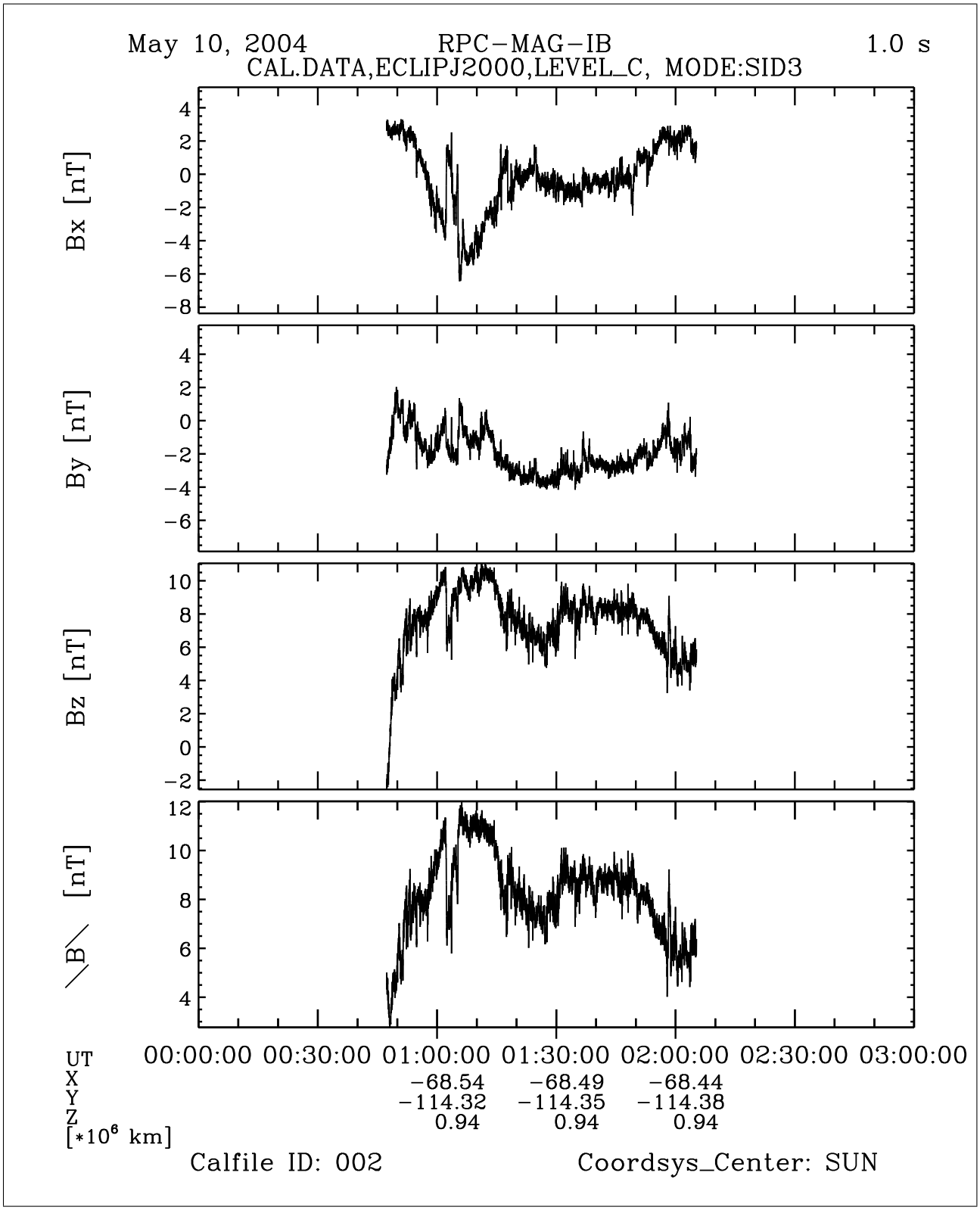


Figure 65: File: RPCMAG040510T0047_CLC_IB_M3_T0000_0300_002

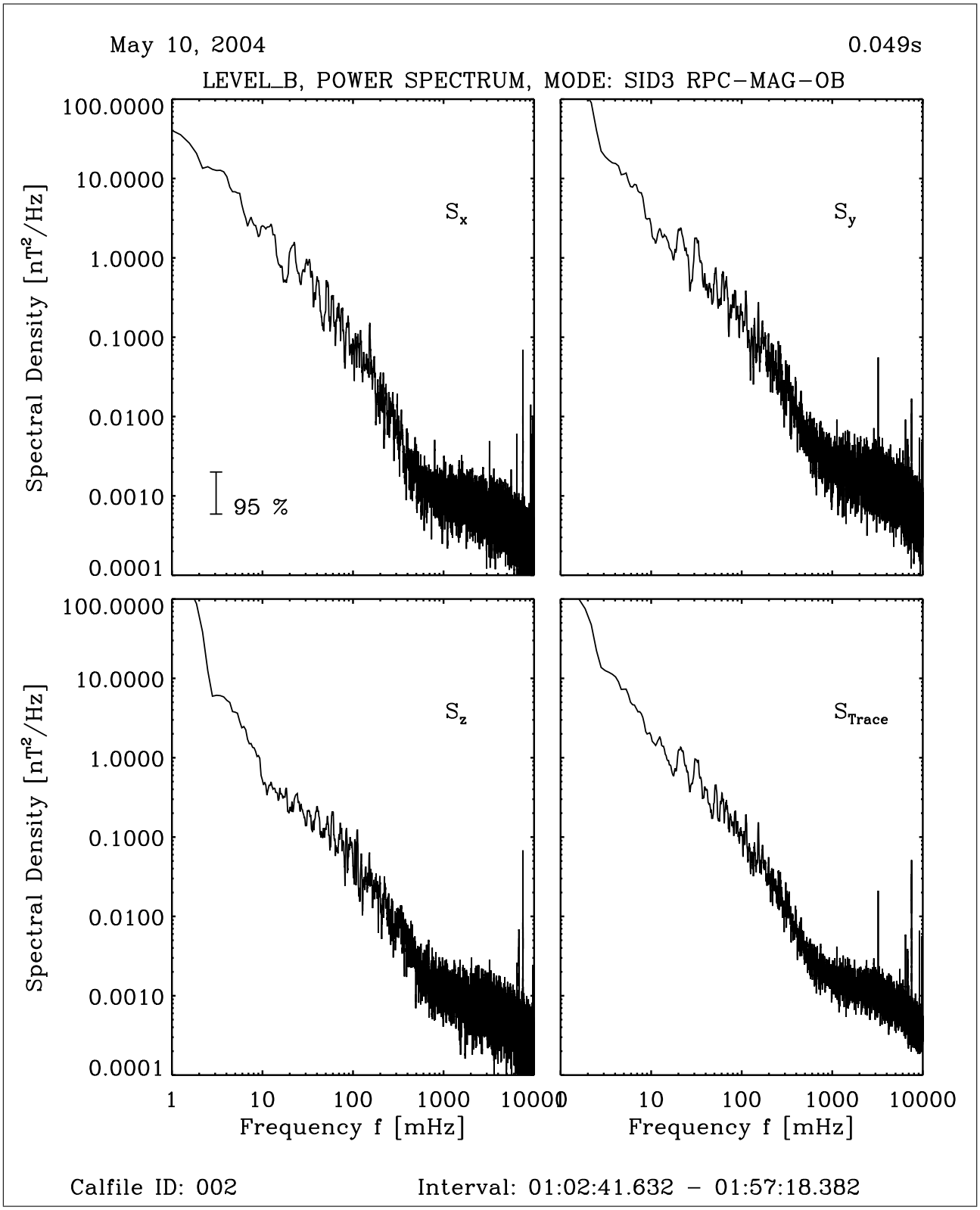


Figure 66: File: RPCMAG040510T0047_CLB_OB_M3_PS1_10000_002

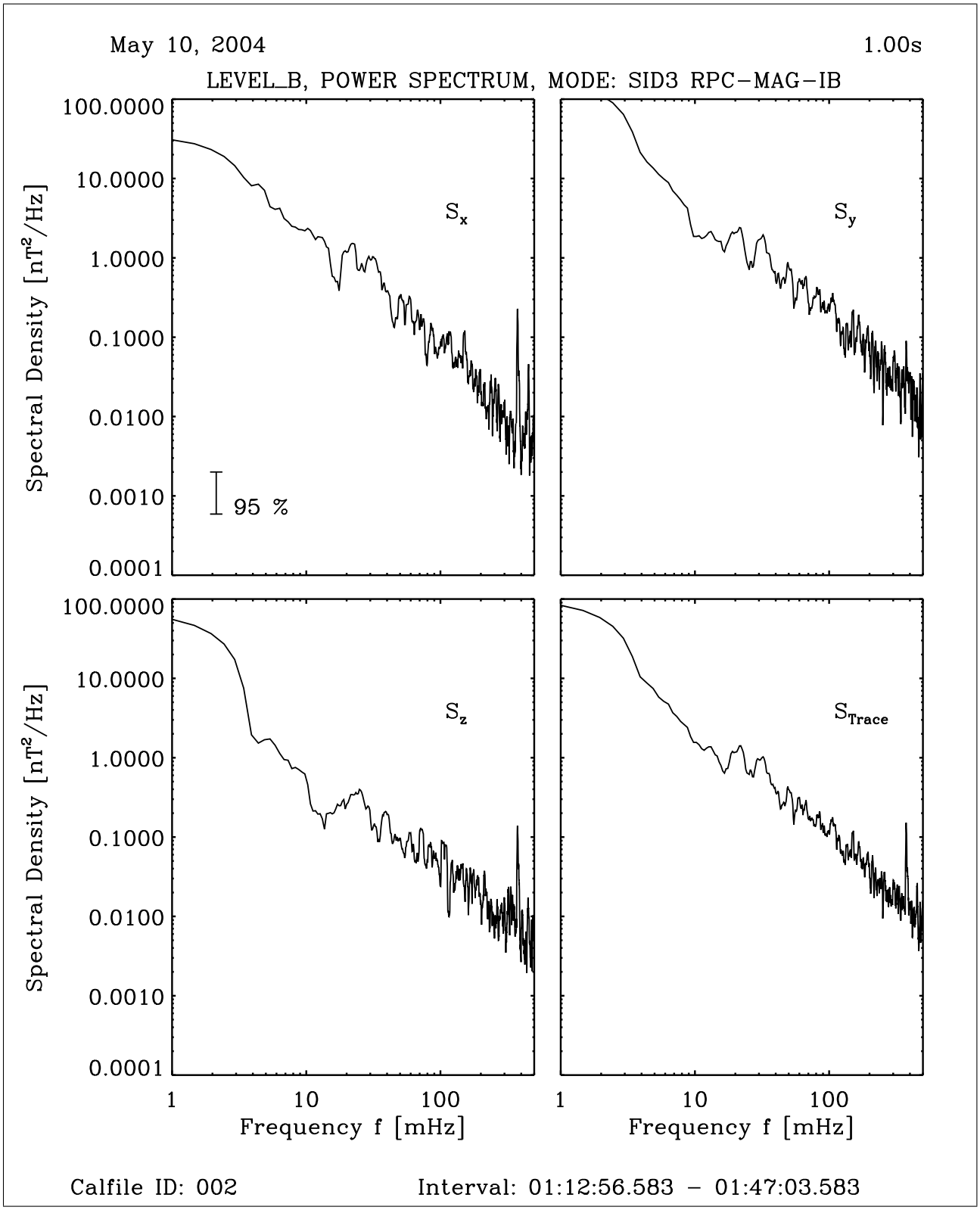


Figure 67: File: RPCMAG040510T0047_CLB_IB_M3_PS1_10000_002

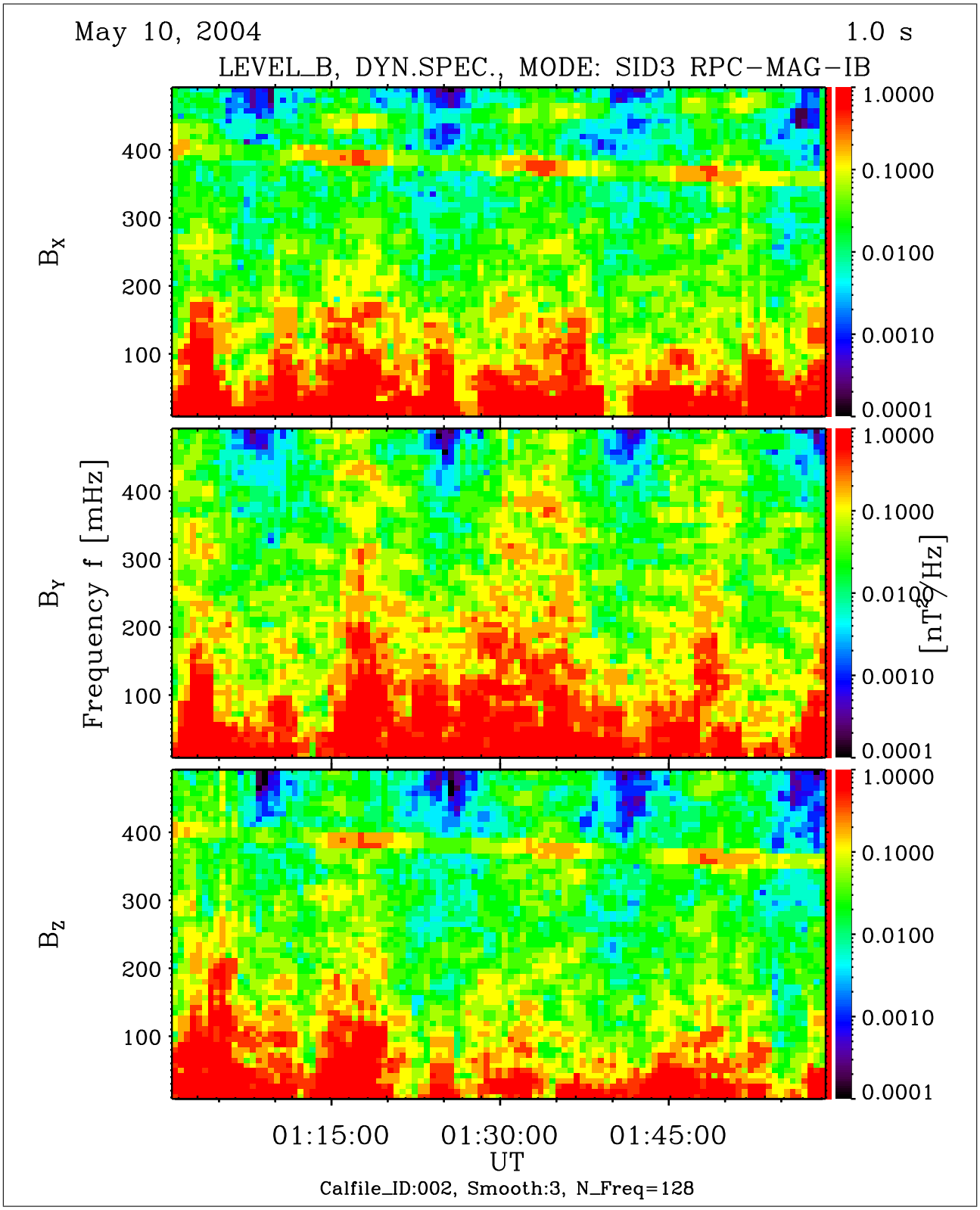


Figure 68: File: RPCMAG040510T0047_CLB_IB_M3_DS1_500_002

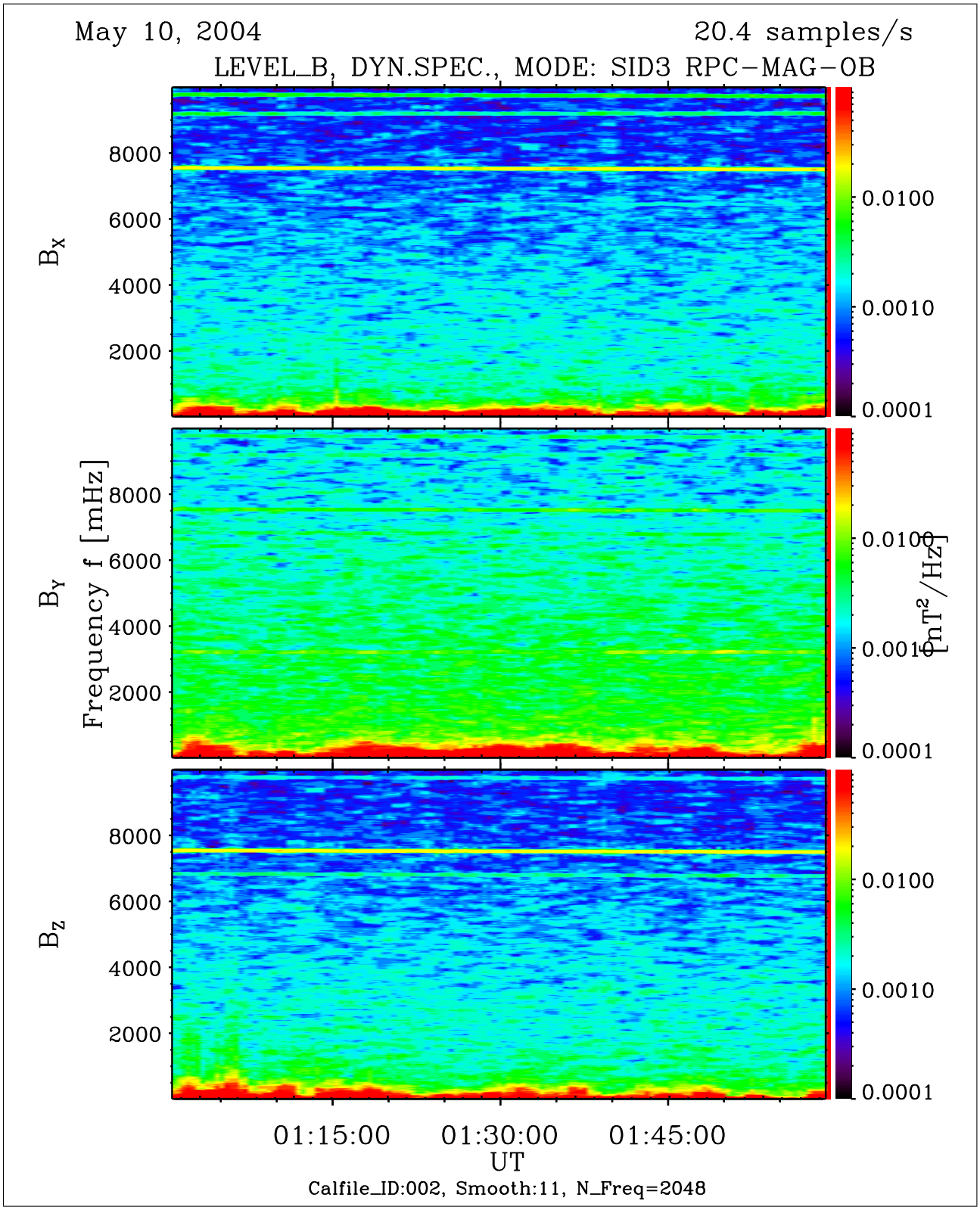


Figure 69: File: RPCMAG040510T0047_CLB_OB_M3_DS2_10000_002

### 5.3 Plots of ROSETTA's Reaction Wheels Speeds

The following plots show the time series of the revolutions of the 4 reaction wheels. Two kinds of data are shown:

- The original reaction wheel data as they are stored in the DDS.
- The theoretical response of the wheels impact seen by an instrument sampling with different frequencies. Here the response in the at 20 Hz, 1 Hz and 0.25 Hz sampling frequency is plotted.

A comparison with the dynamic spectra of the MAG data gives an impressive accordance between the reaction wheel frequencies and the spectral lines observed in the dynamic MAG spectra.

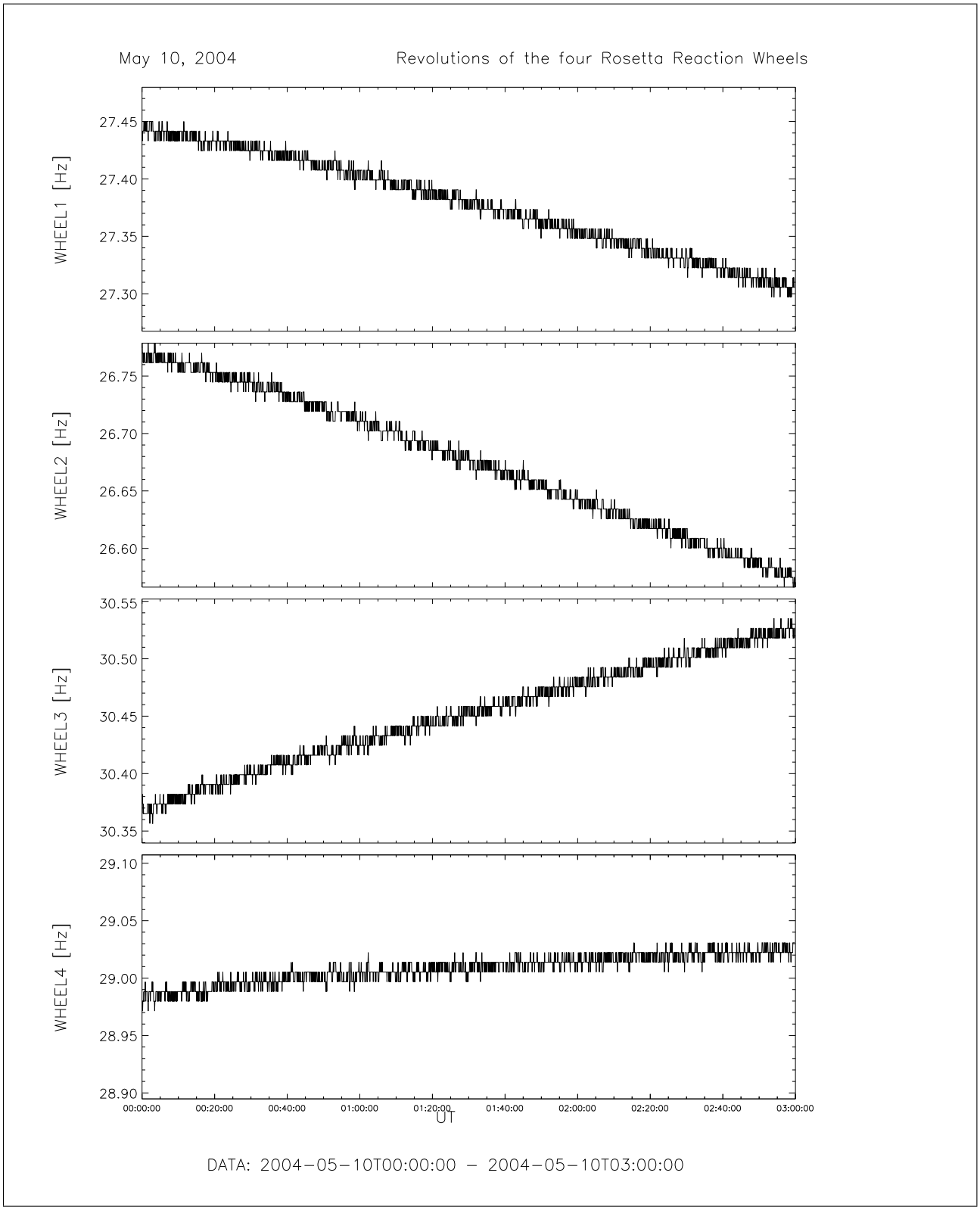


Figure 70: File: wheels_Hz2004-05-10T00-00

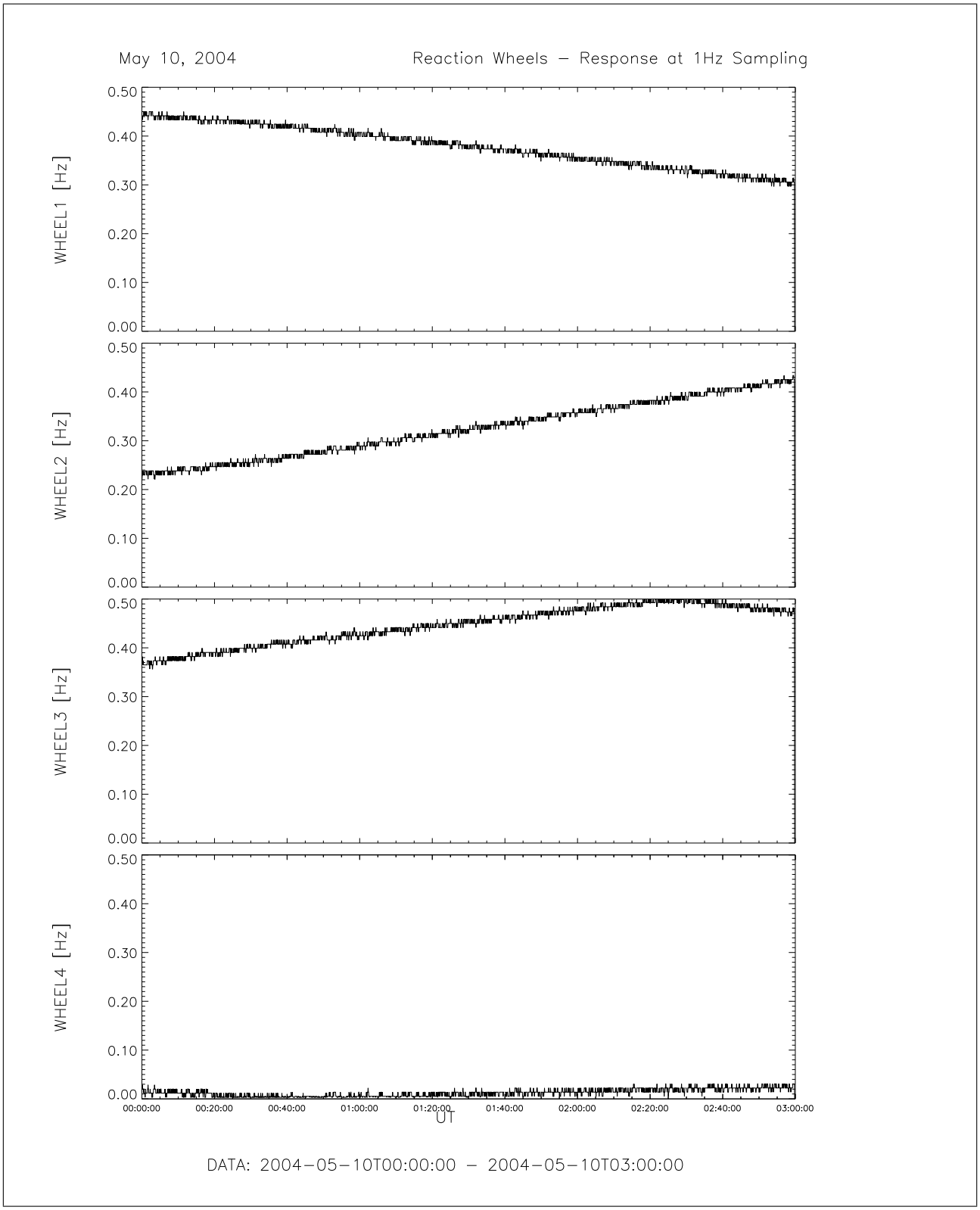


Figure 71: File: wheels_1Hz_Sampling2004-05-10T00-00

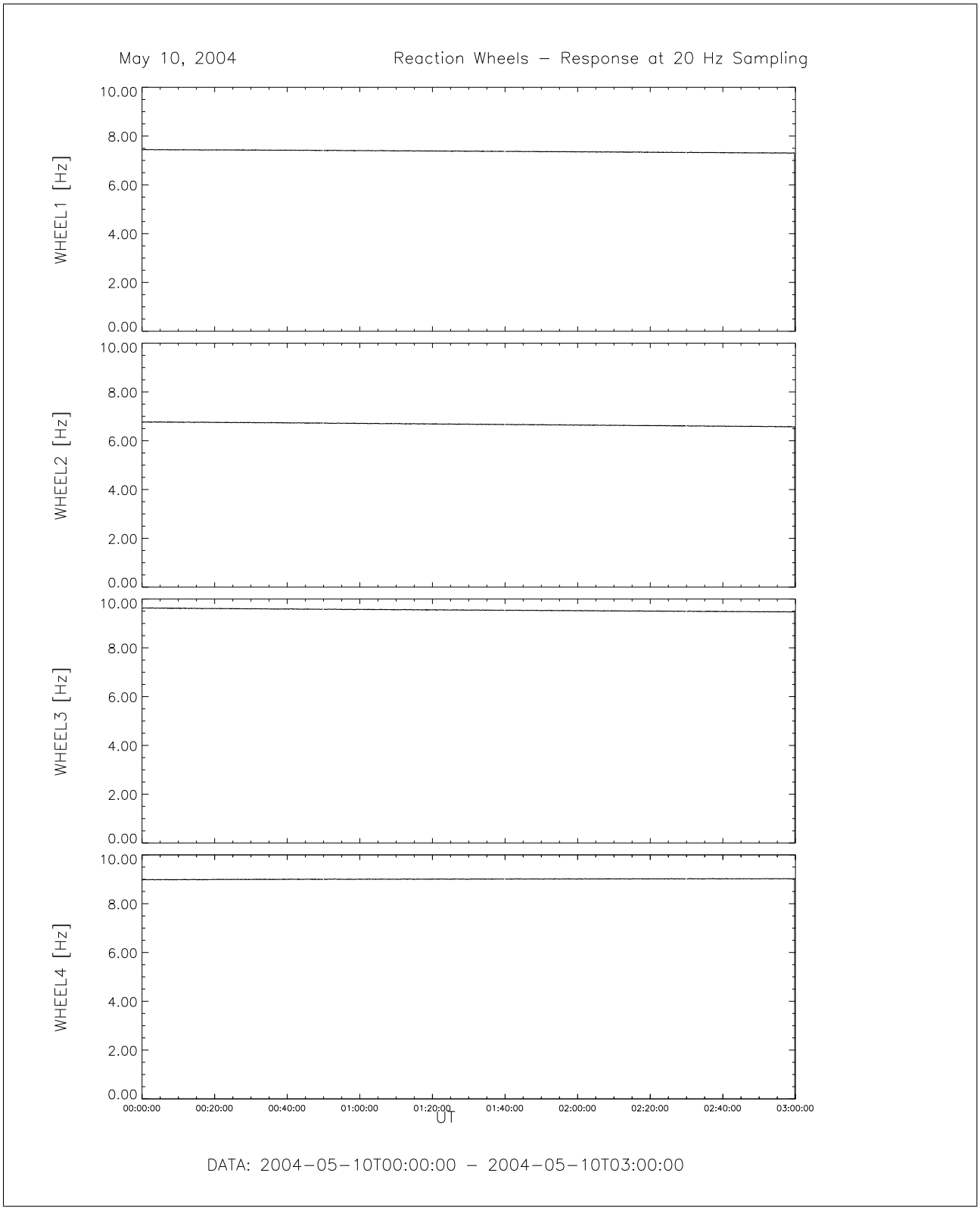


Figure 72: File: wheels_20Hz_Sampling2004-05-10T00-00