

**R O S E T T A**  
**FLIGHT REPORTS**  
**of RPC-MAG**

**RO-IGEP-TR-0008**

Issue: 6    Revision: 0

February 8, 2019

**Report of the**  
**COMMISSIONING PART 2**  
**Time period: May 05. - 10., 2004**

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## 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 ( $-115^{\circ}\text{C} - -80^{\circ}\text{C}$ ), 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 009 using flight data from the complete ROSETTA mission until 2016. 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.

From time to time there are also horizontal lines in the dynamic spectrum to be seen. These lines represent constant frequencies and are caused by the LAP instrument. This behavior was investigated and proofed during the PC10 campaign in November 2010. See RO-IGEP-TR0030 for further details.

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## **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**



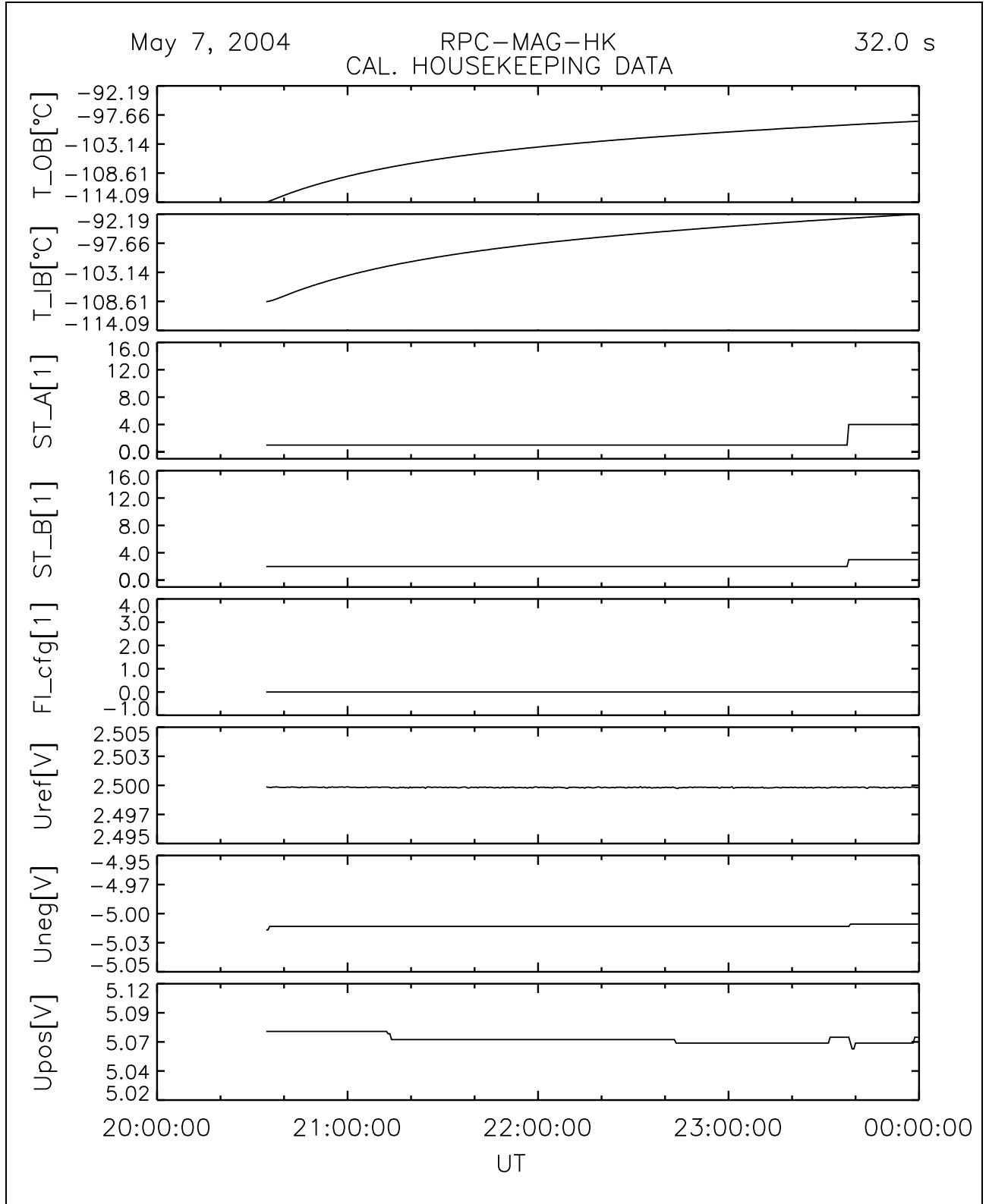


Figure 1: File: RPCMAG040507T2033\_CLA\_HK\_P2000\_2400

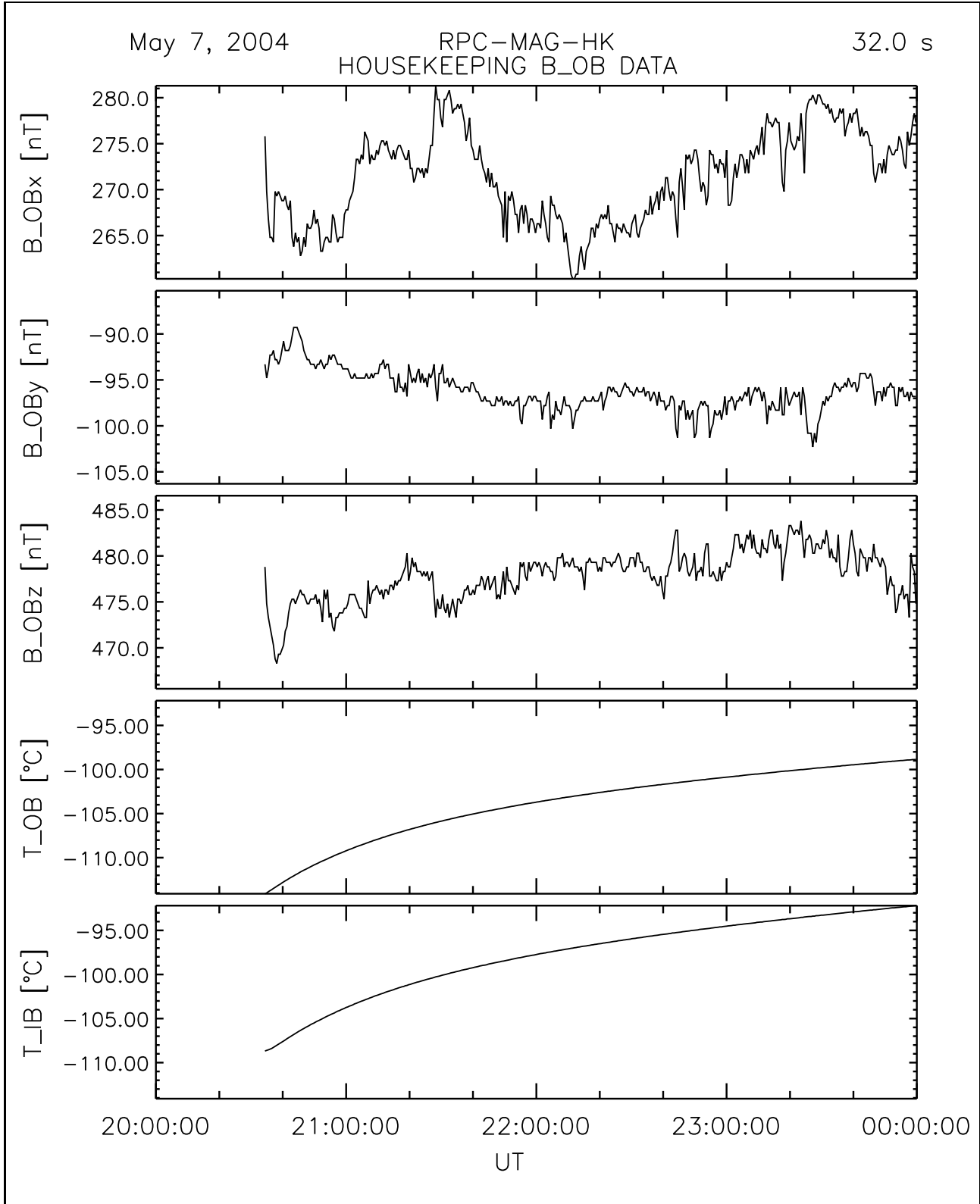


Figure 2: File: RPCMAG040507T2033\_CLA\_HK\_B\_P2000\_2400

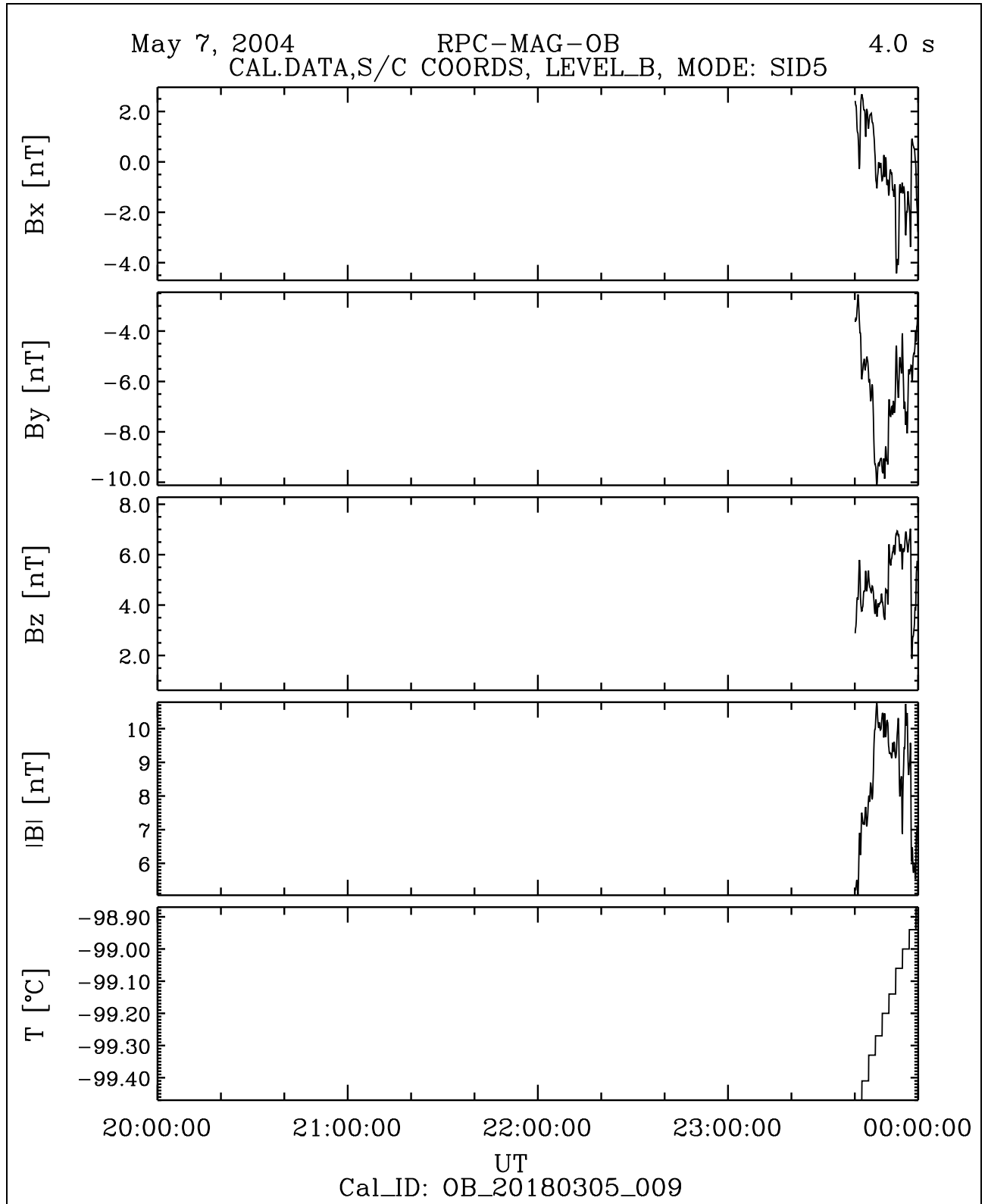


Figure 3: File: RPCMAG040507T2339\_CLB\_OB\_M5\_T2000\_2400\_009

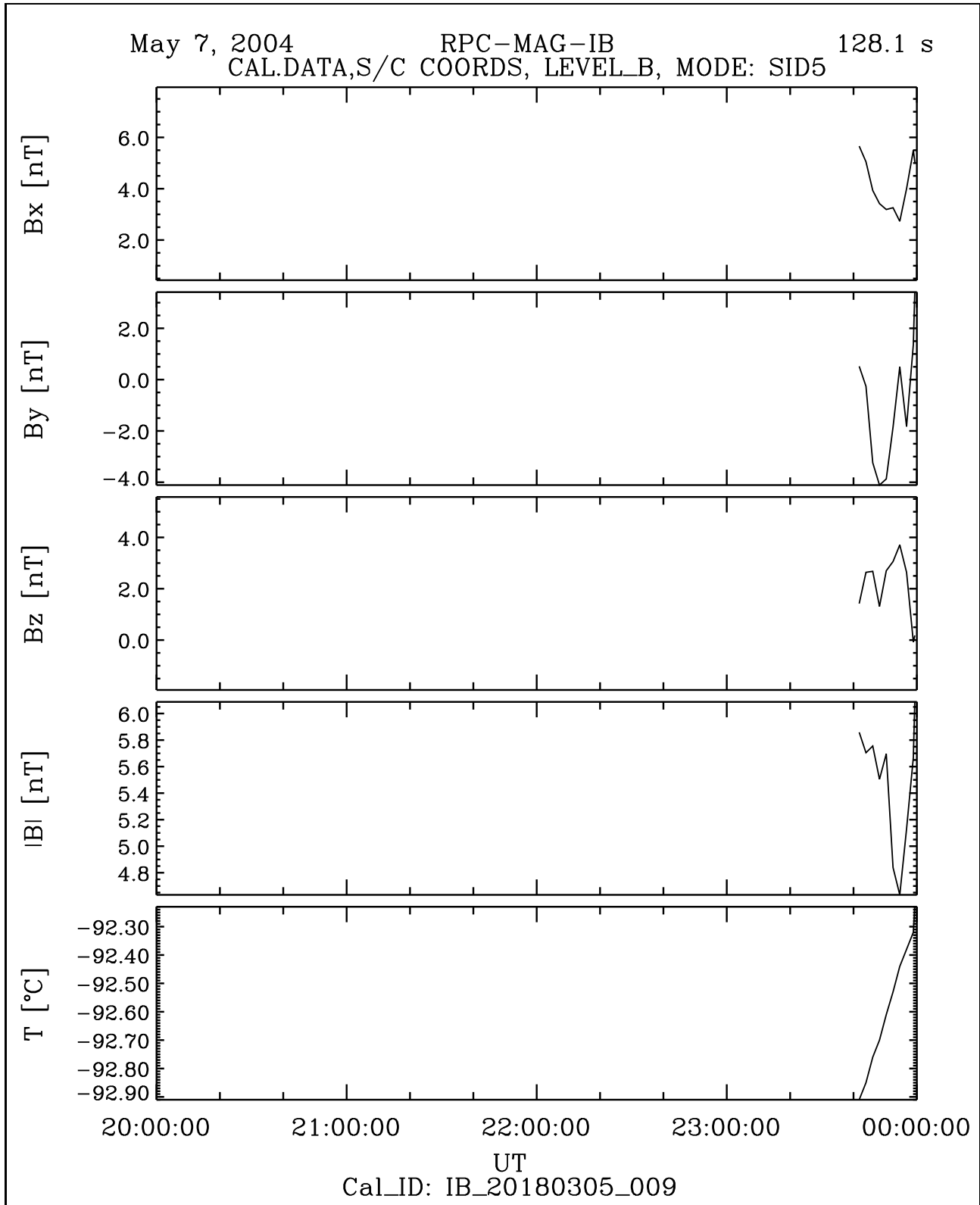


Figure 4: File: RPCMAG040507T2339\_CLB\_IB\_M5\_T2000\_2400\_009

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### 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 and 1 Hz sampling frequency is plotted.

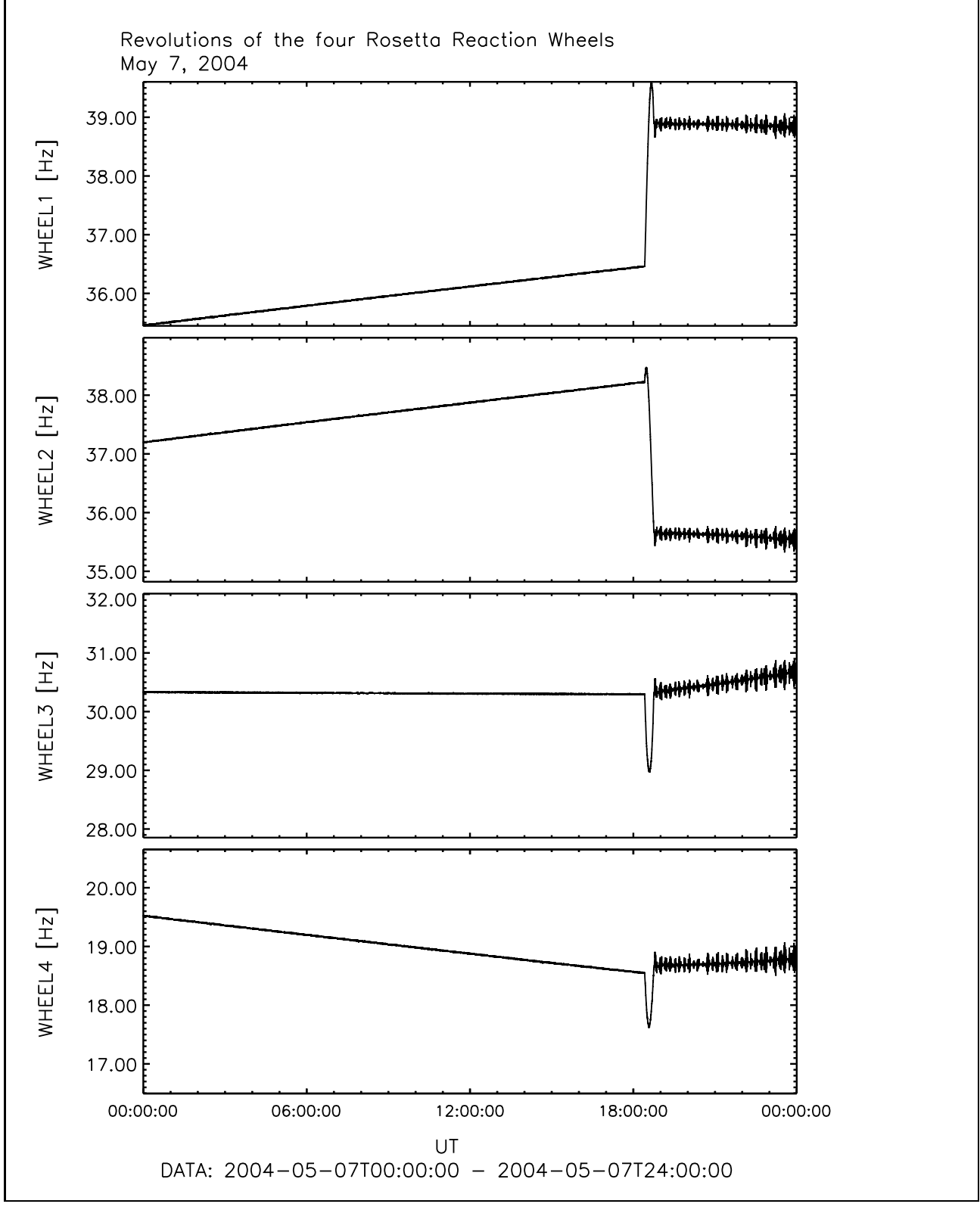


Figure 5: File: wheels\_Hz2004-05-07T00-00

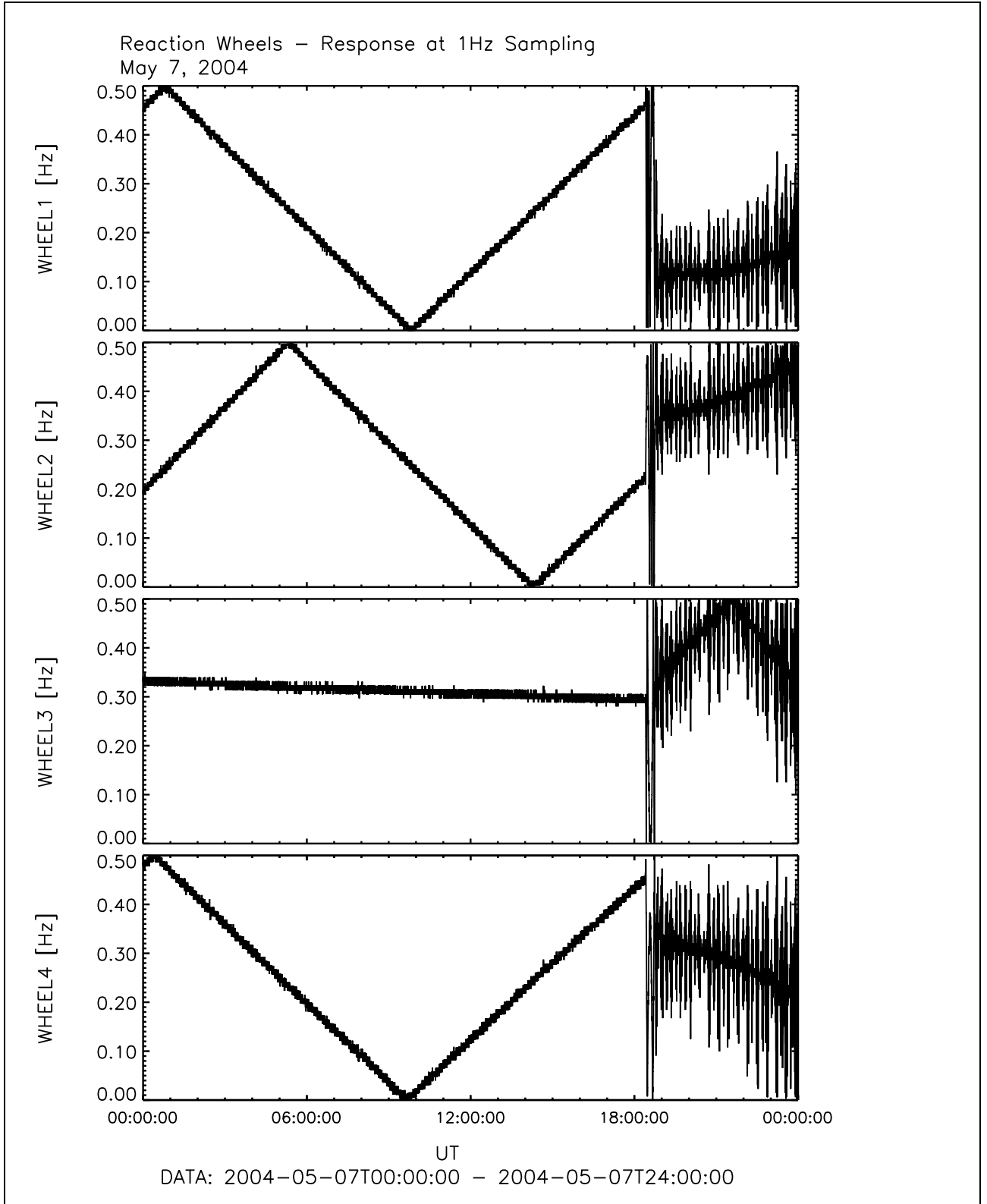


Figure 6: File: wheels\_1Hz\_Sampling2004-05-07T00-00

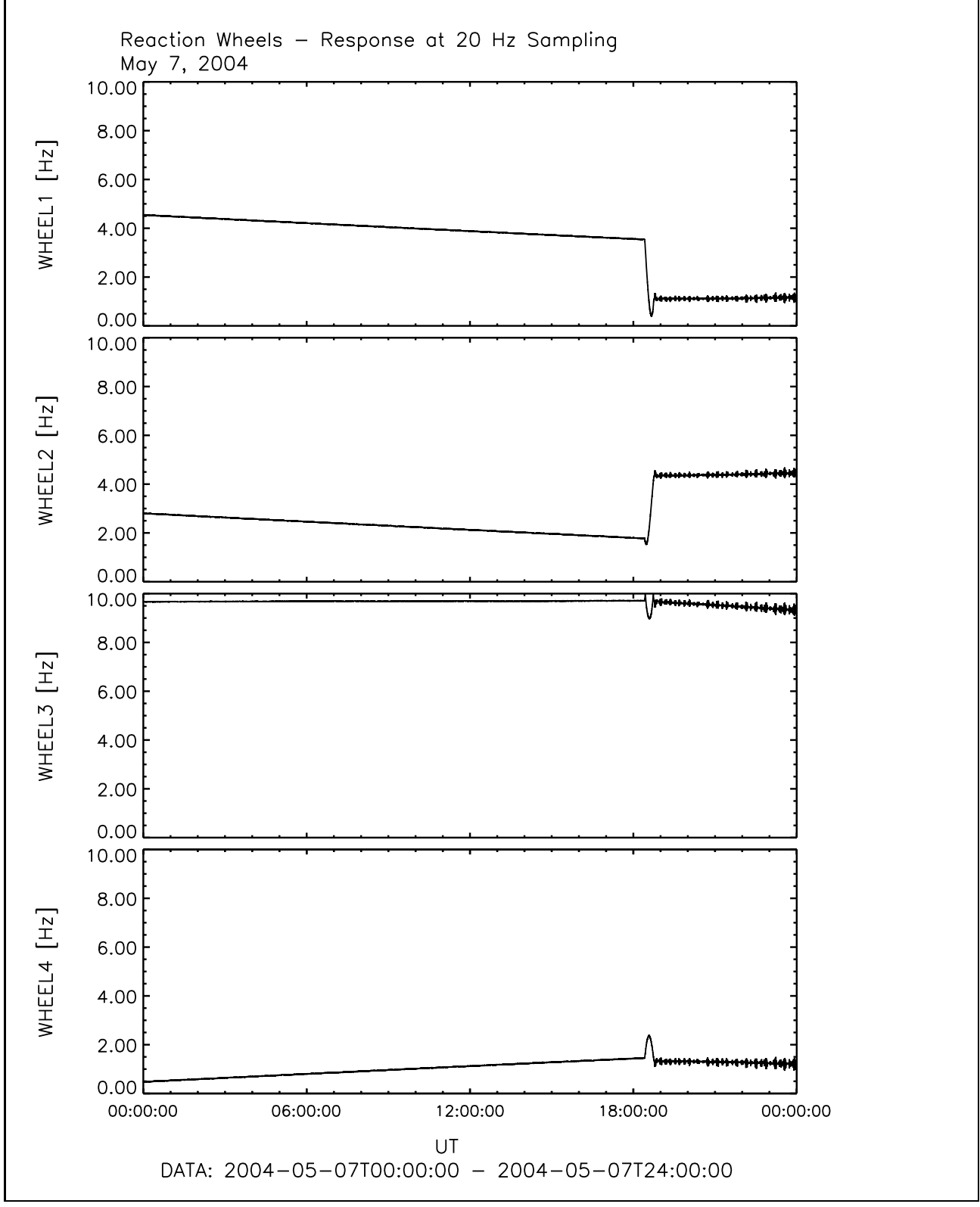


Figure 7: File: wheels\_20Hz\_Sampling2004-05-07T00-00



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### 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 20 and Figure 27. 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

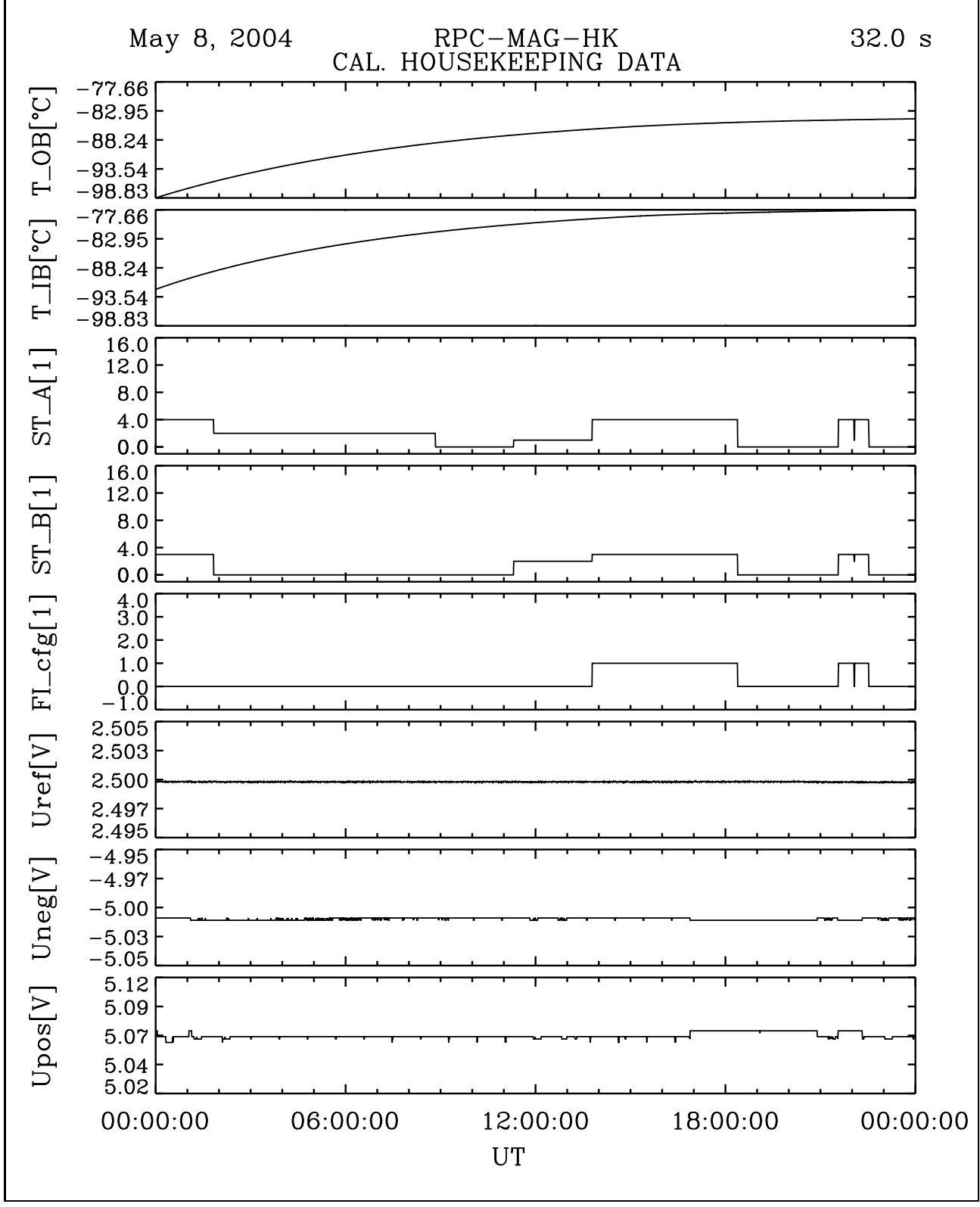


Figure 8: File: RPCMAG040508T0000\_CLA\_HK\_P0000\_2400

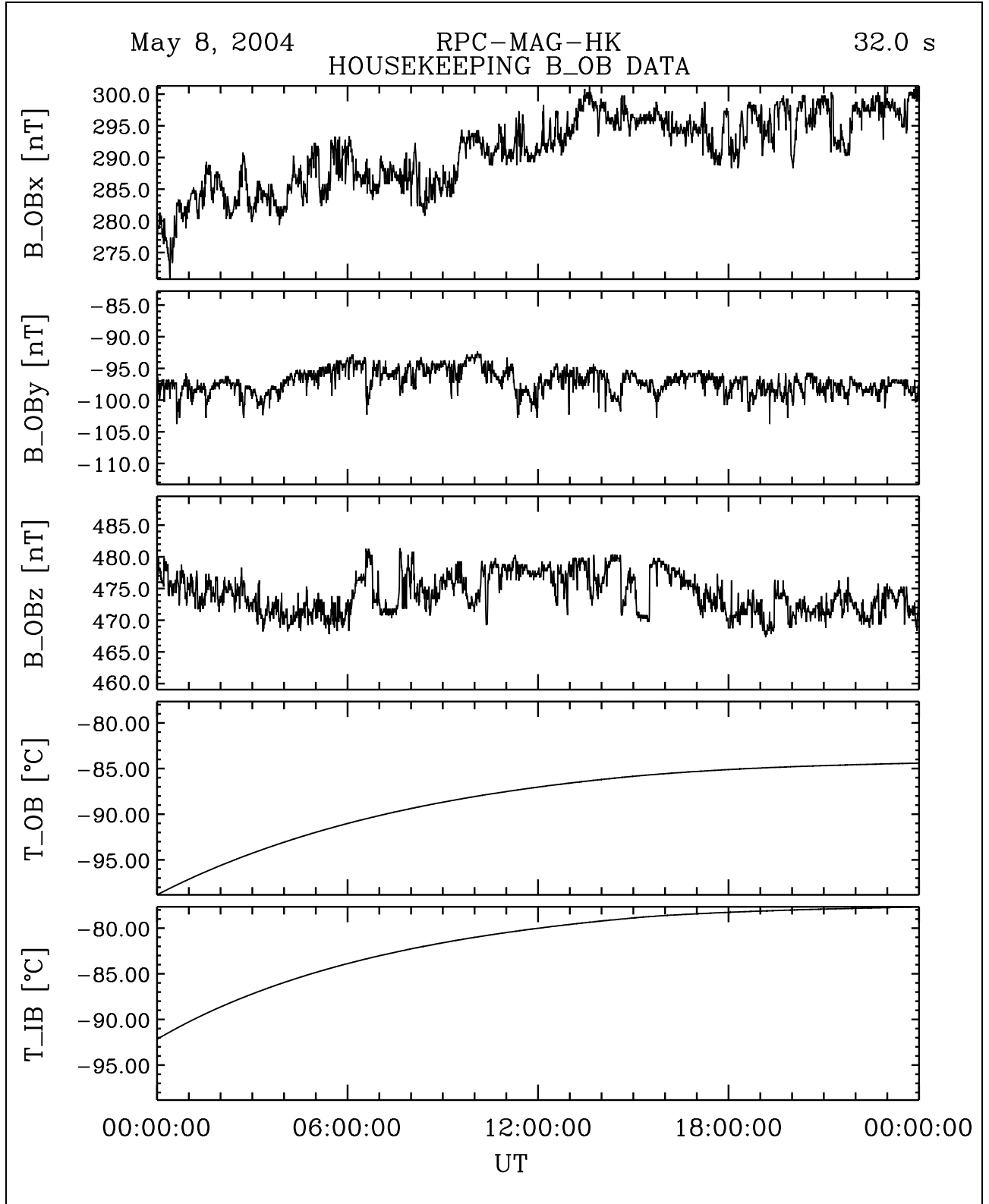


Figure 9: File: RPCMAG040508T0000\_CLA\_HK\_B\_P0000\_2400

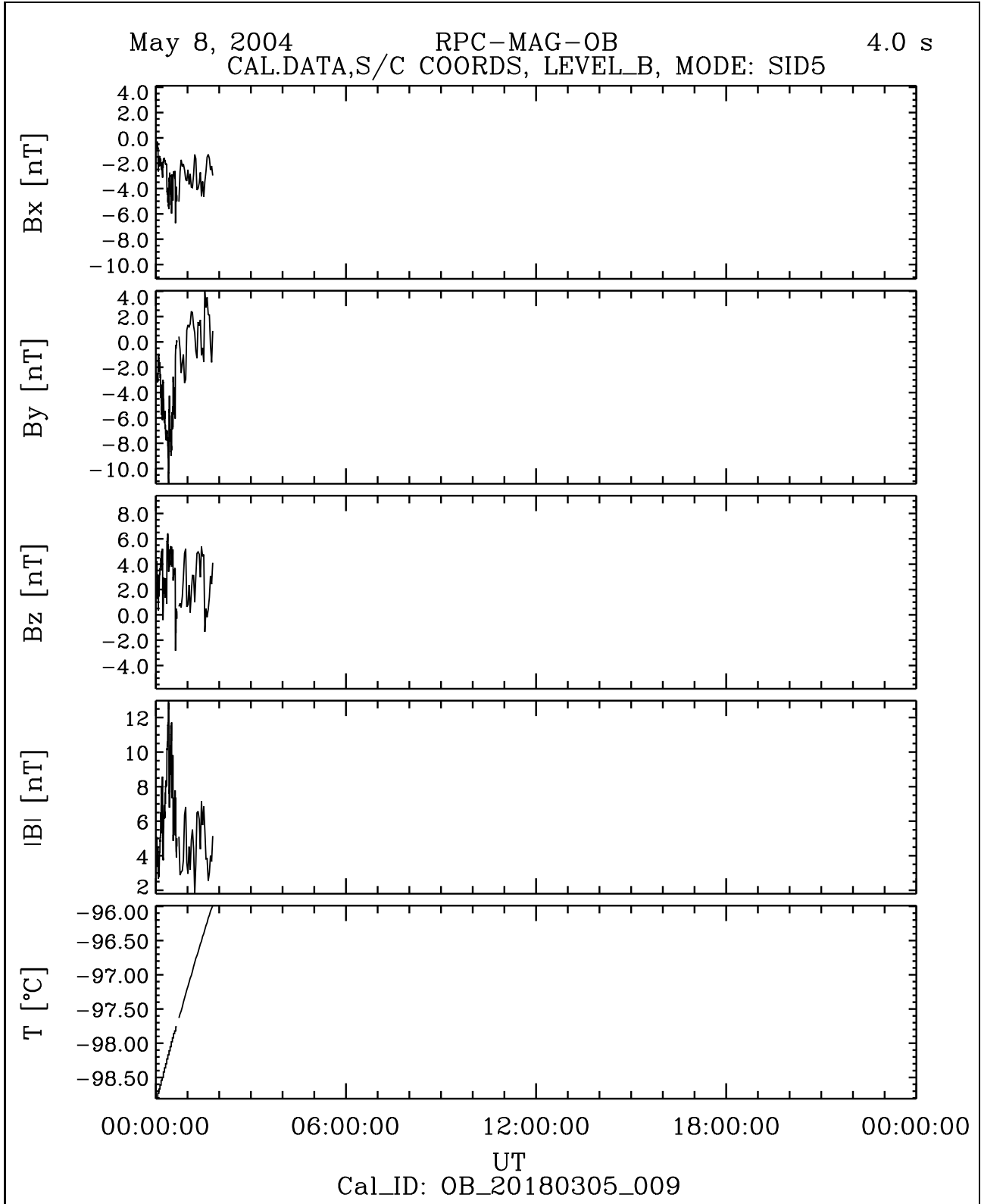


Figure 10: File: RPCMAG040508T0000\_CLB\_OB\_M5\_T0000\_2400\_009

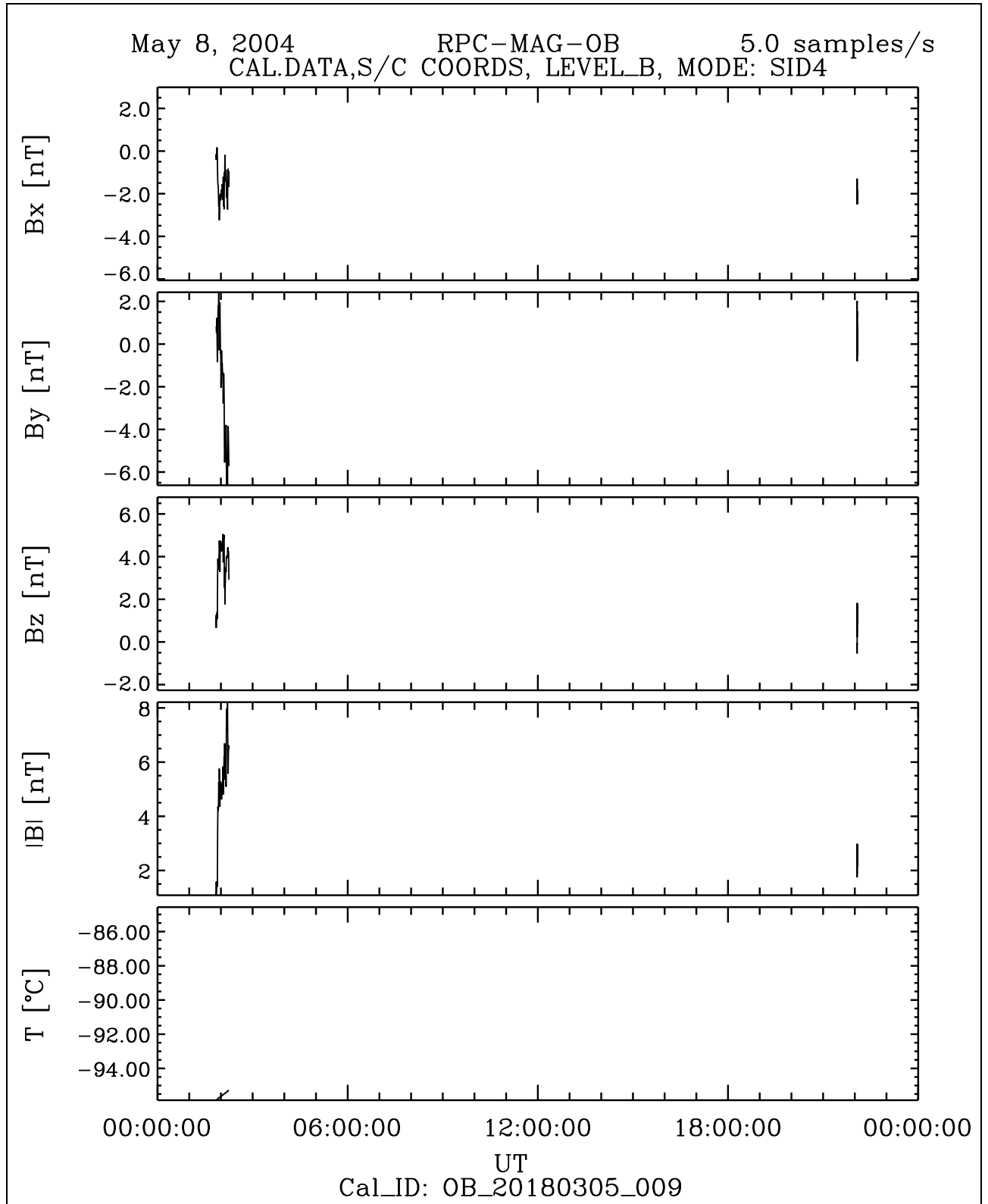


Figure 11: File: RPCMAG040508T0150\_CLB\_OB\_M4\_T0000\_2400\_009

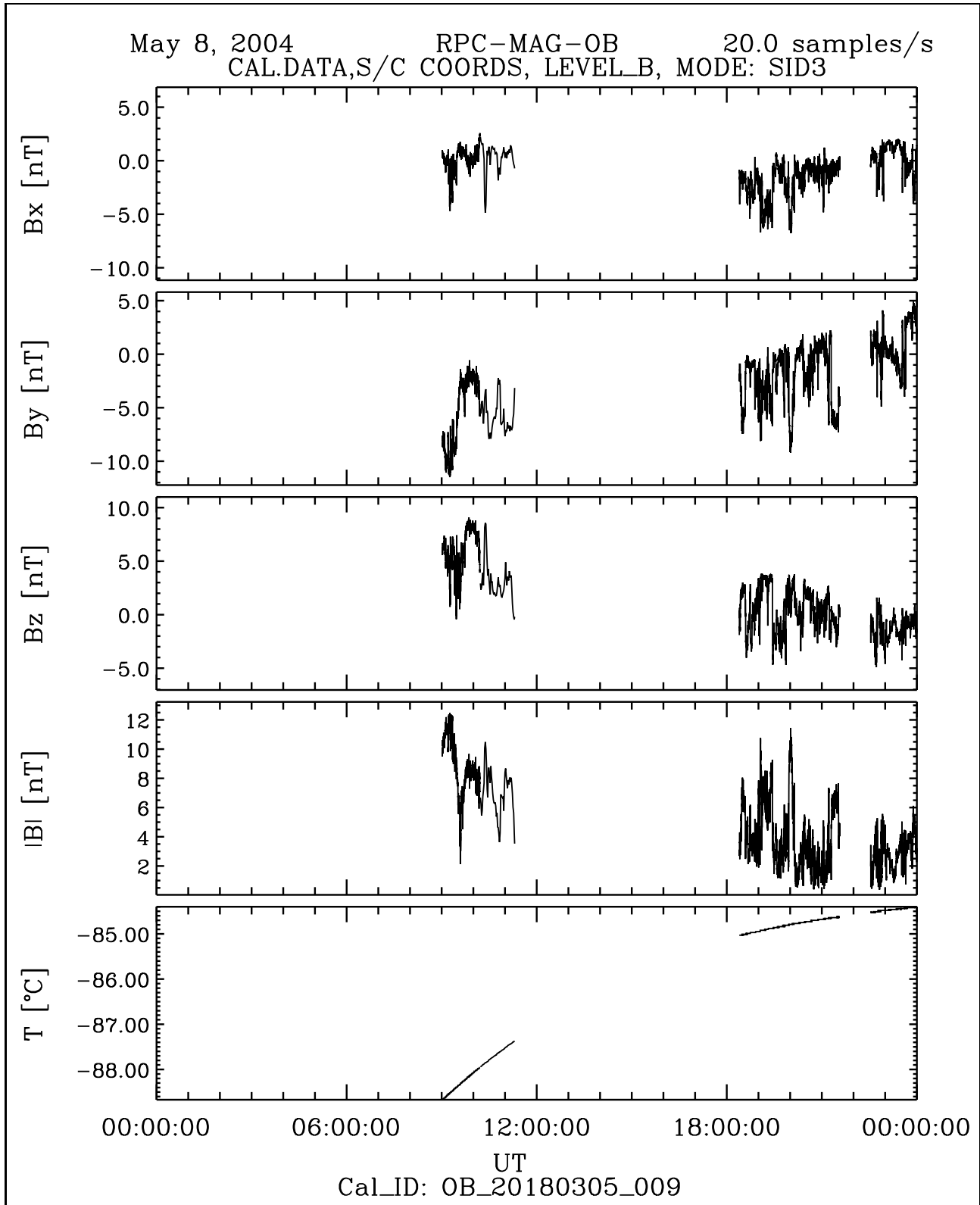


Figure 12: File: RPCMAG040508T0900\_CLB\_OB\_M3\_T0000\_2400\_009

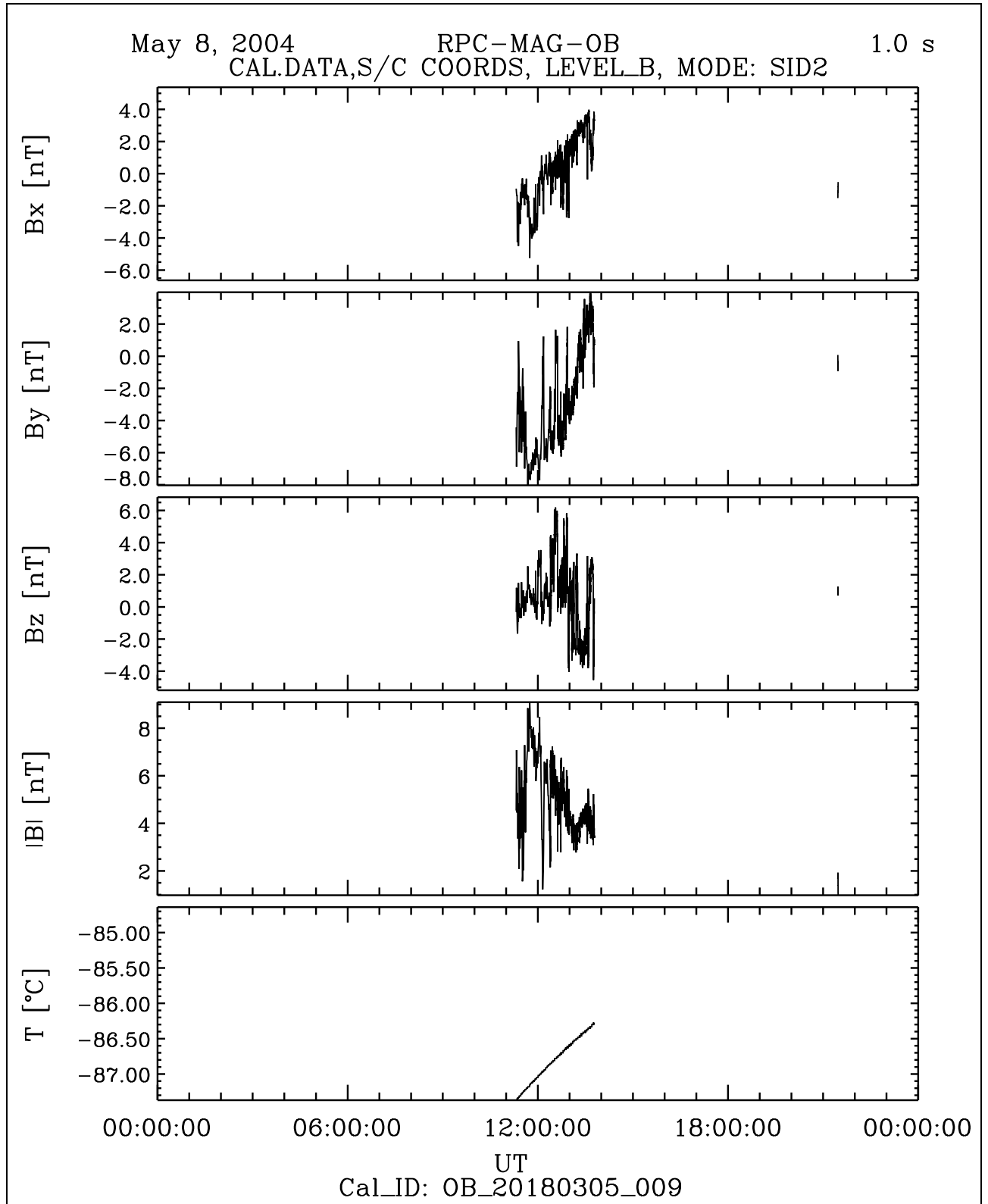


Figure 13: File: RPCMAG040508T1118\_CLB\_OB\_M2\_T0000\_2400\_009

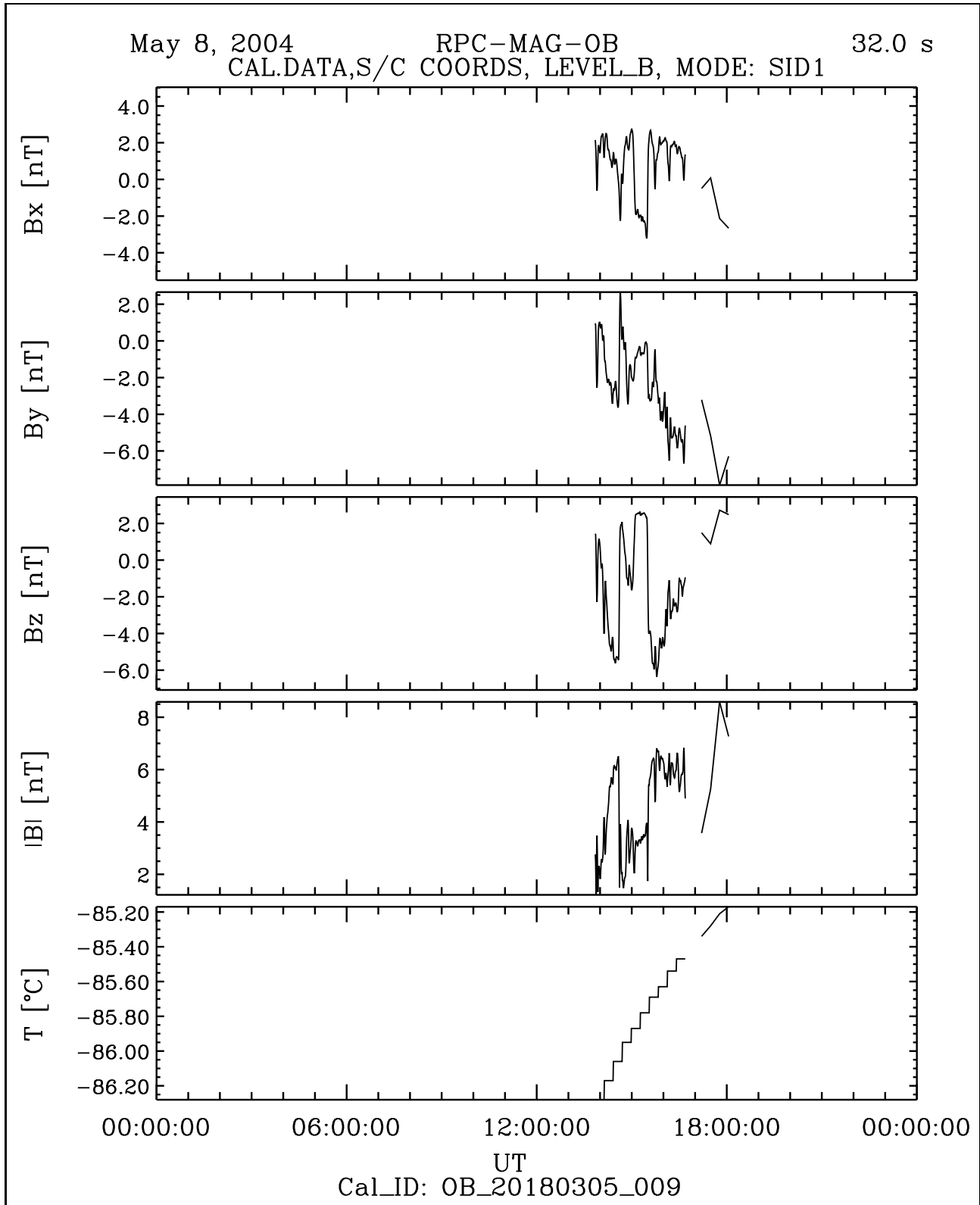


Figure 14: File: RPCMAG040508T1347\_CLB\_OB\_M1\_T0000\_2400\_009



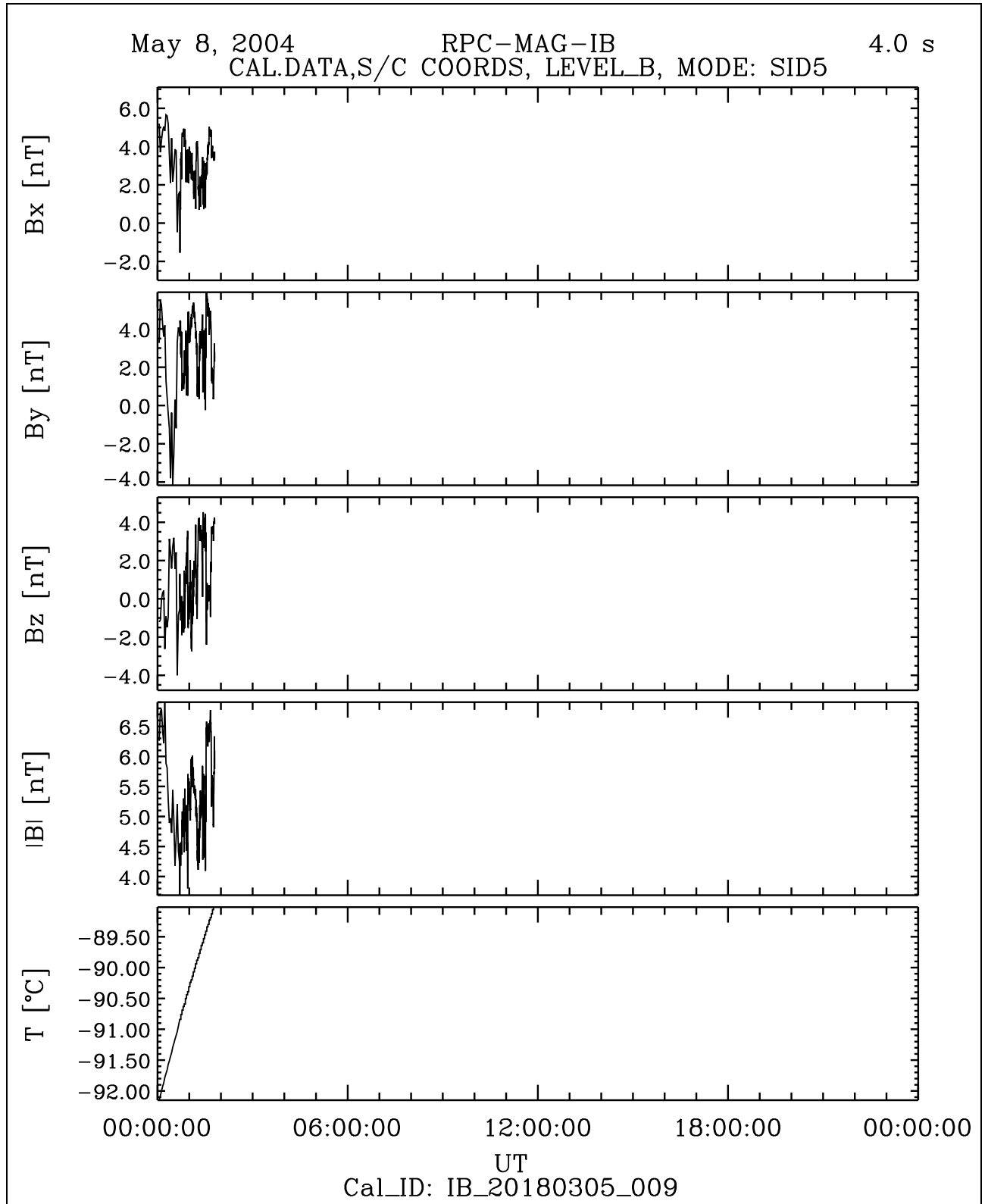


Figure 15: File: RPCMAG040508T0001\_CLB\_IB\_M5\_T0000\_2400\_009

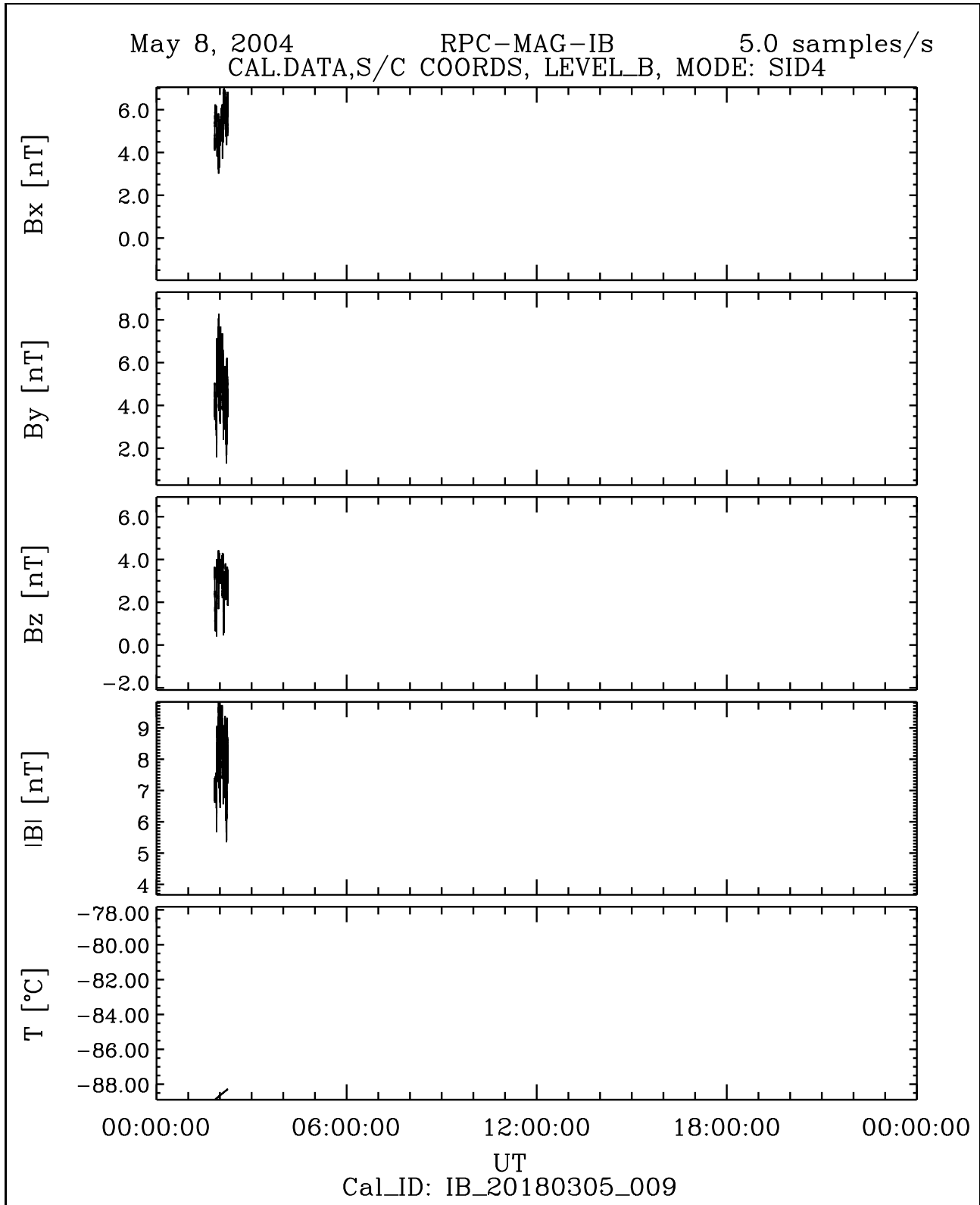


Figure 16: File: RPCMAG040508T0150\_CLB\_IB\_M4\_T0000\_2400\_009

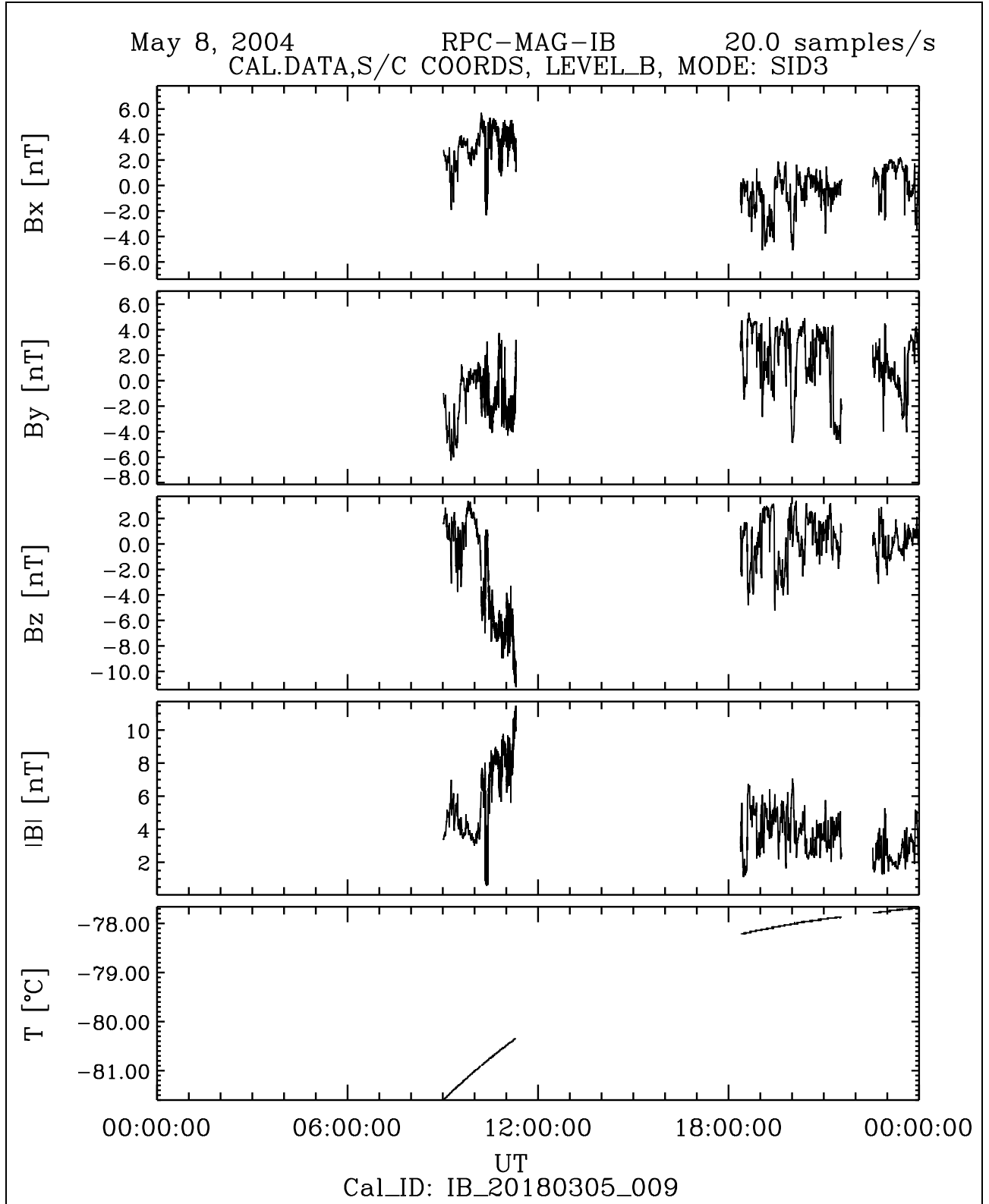


Figure 17: File: RPCMAG040508T0900\_CLB\_IB\_M3\_T0000\_2400\_009

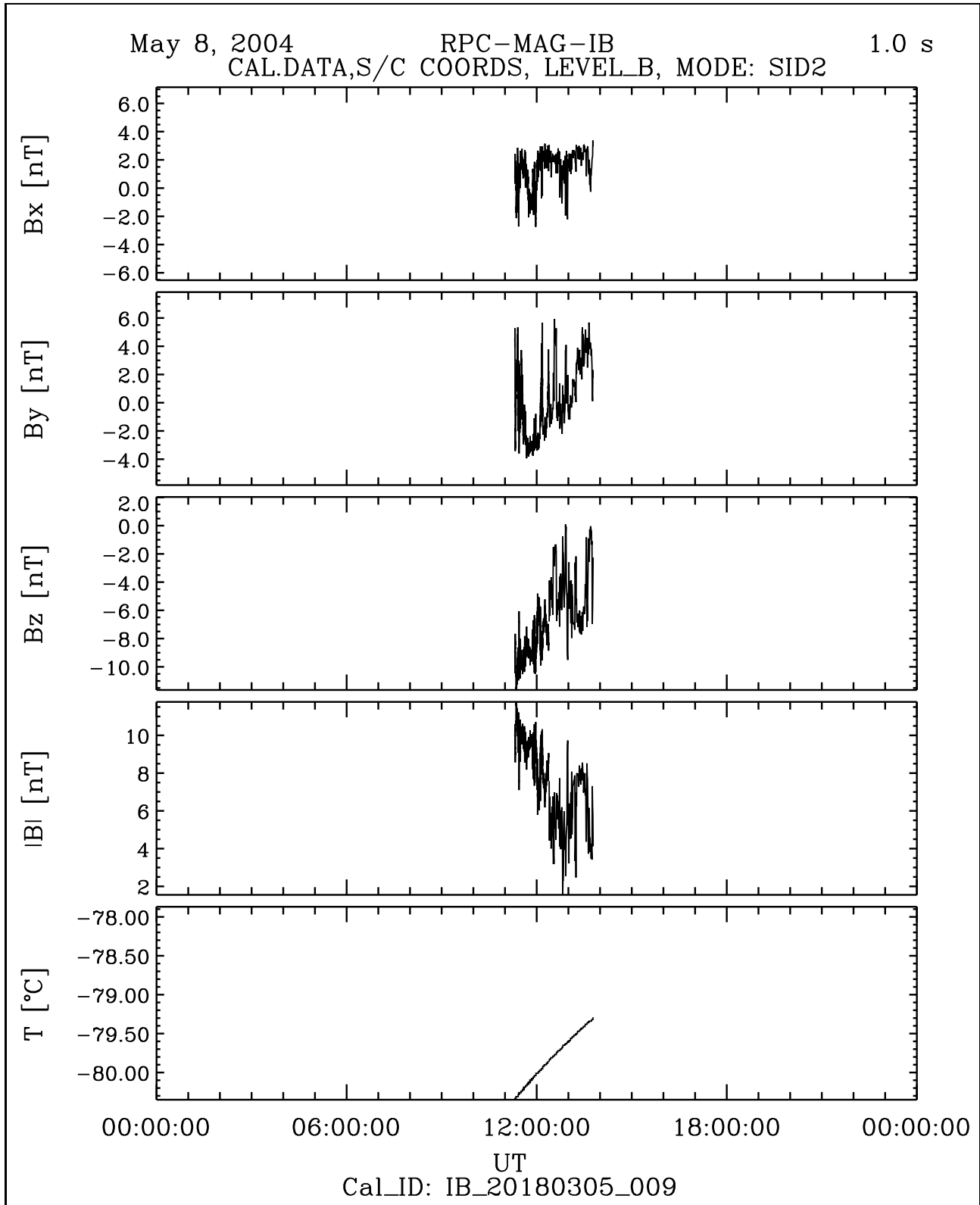


Figure 18: File: RPCMAG040508T1118\_CLB\_IB\_M2\_T0000\_2400\_009

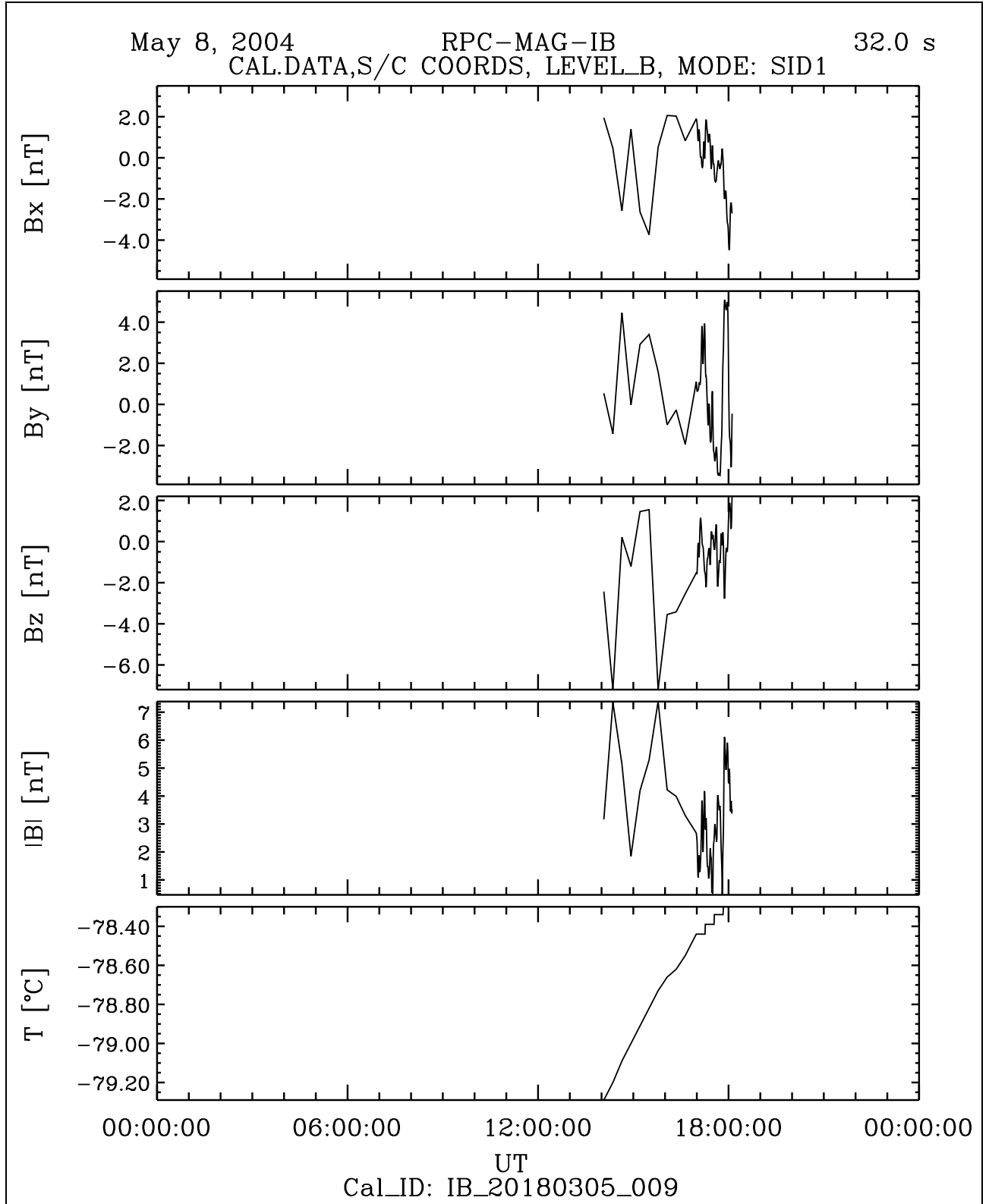


Figure 19: File: RPCMAG040508T1347\_CLB\_IB\_M1\_T0000\_2400\_009

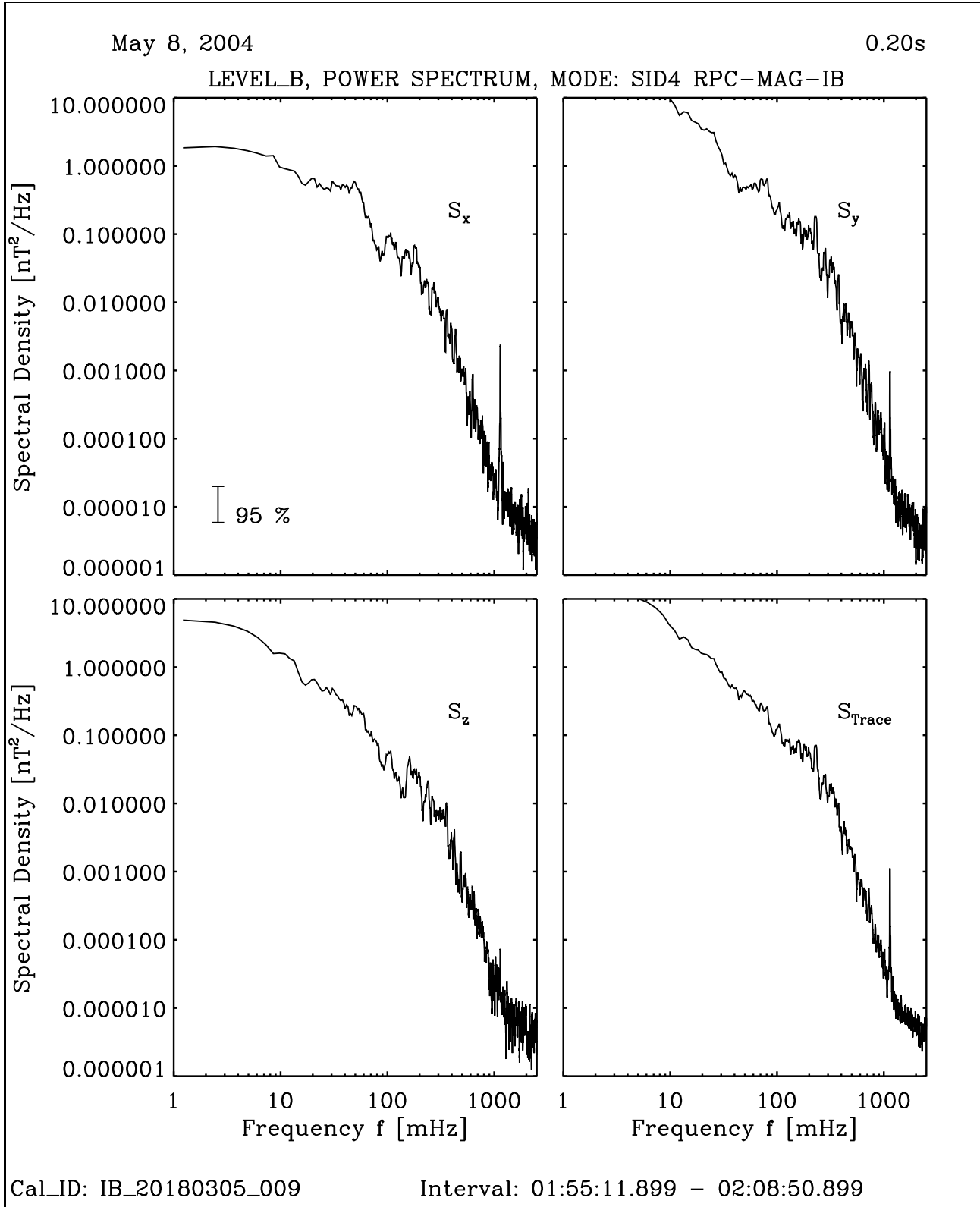


Figure 20: File: RPCMAG040508T0150\_CLB\_IB\_M4\_PS1\_10000\_009

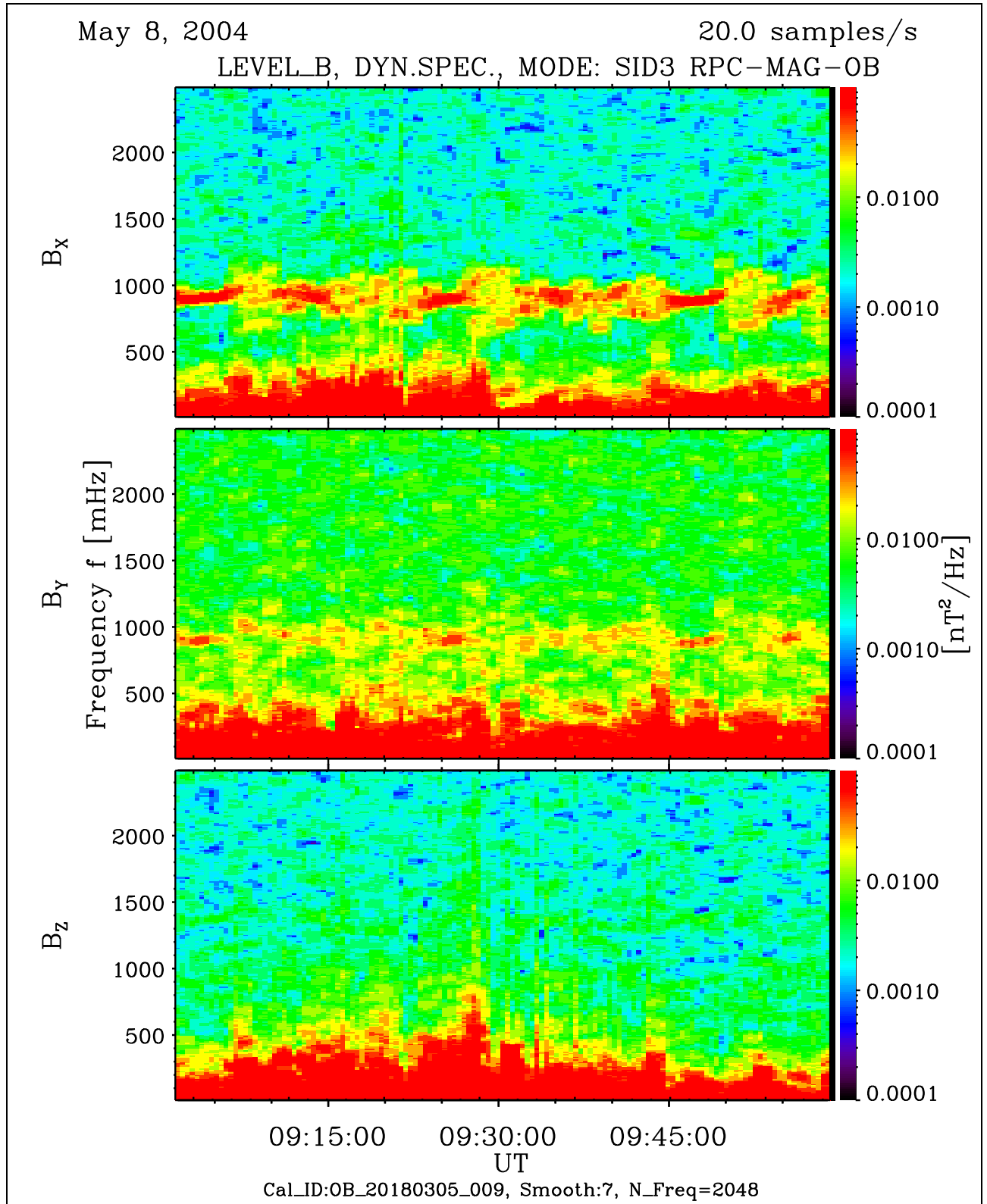


Figure 21: File: RPCMAG040508T0900\_CLB\_OB\_M3\_DS1e-2\_2500\_009

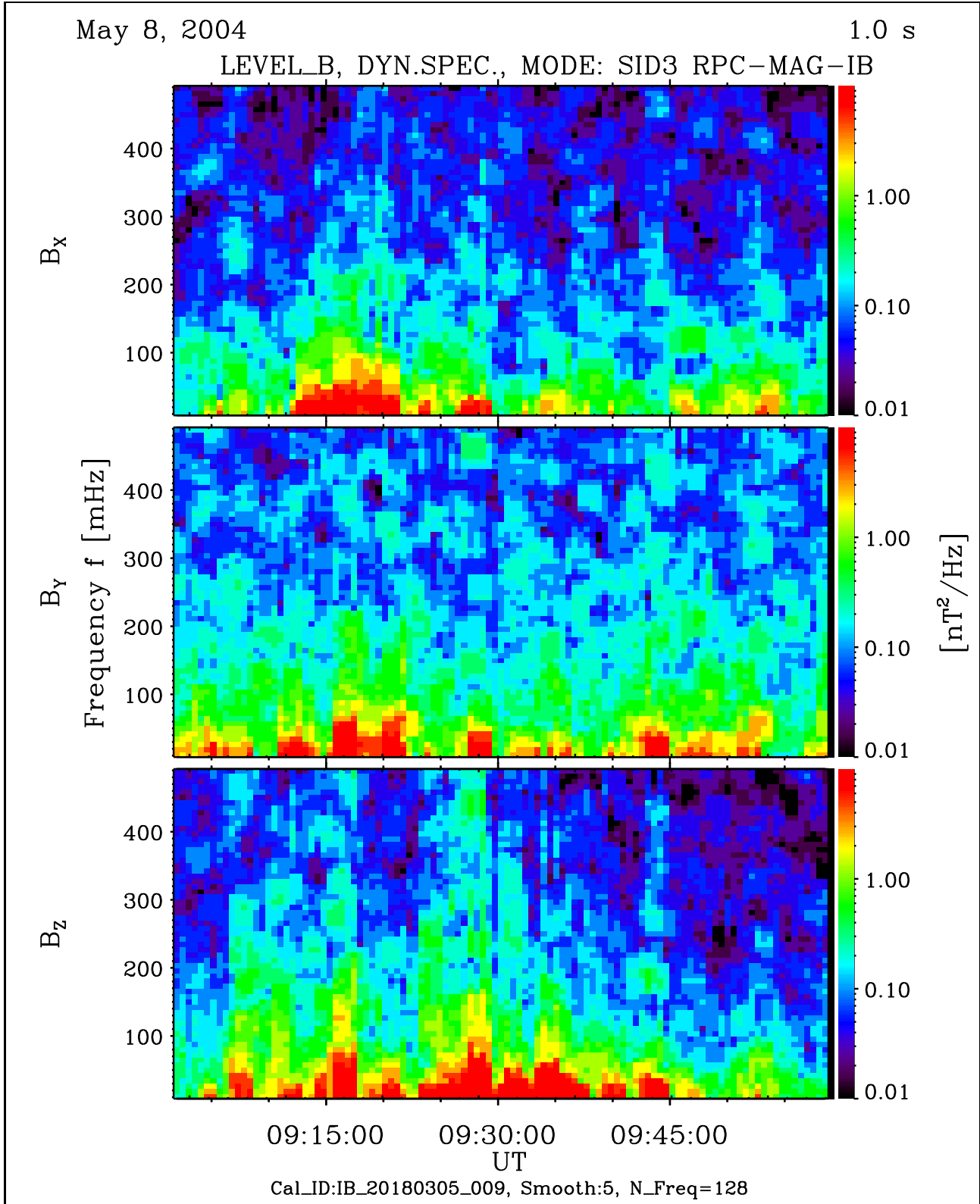


Figure 22: File: RPCMAG040508T0900\_CLB\_IB\_M3\_DS1e-2\_500\_009



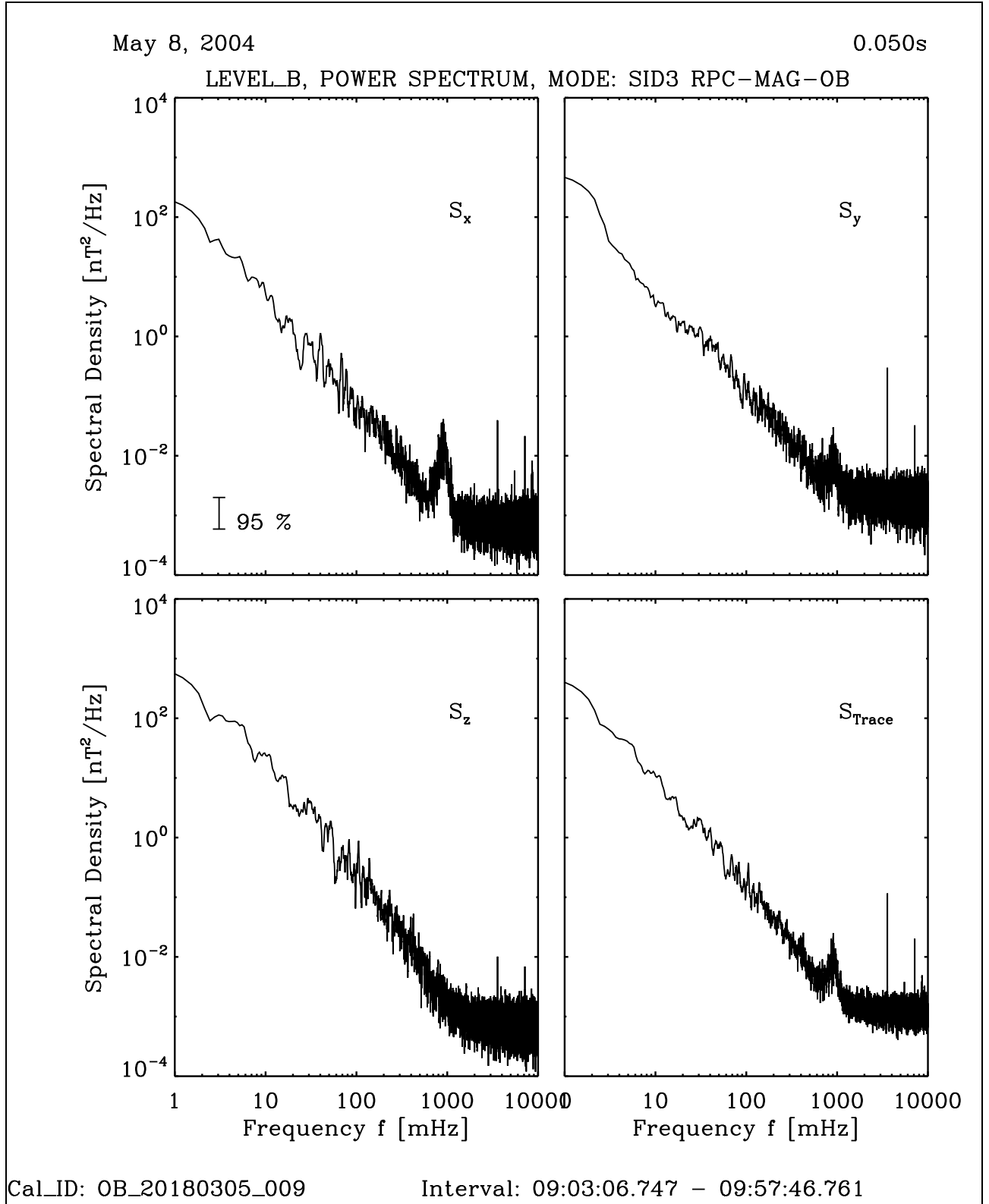


Figure 23: File: RPCMAG040508T0900\_CLB\_OB\_M3\_PS1\_10000\_009

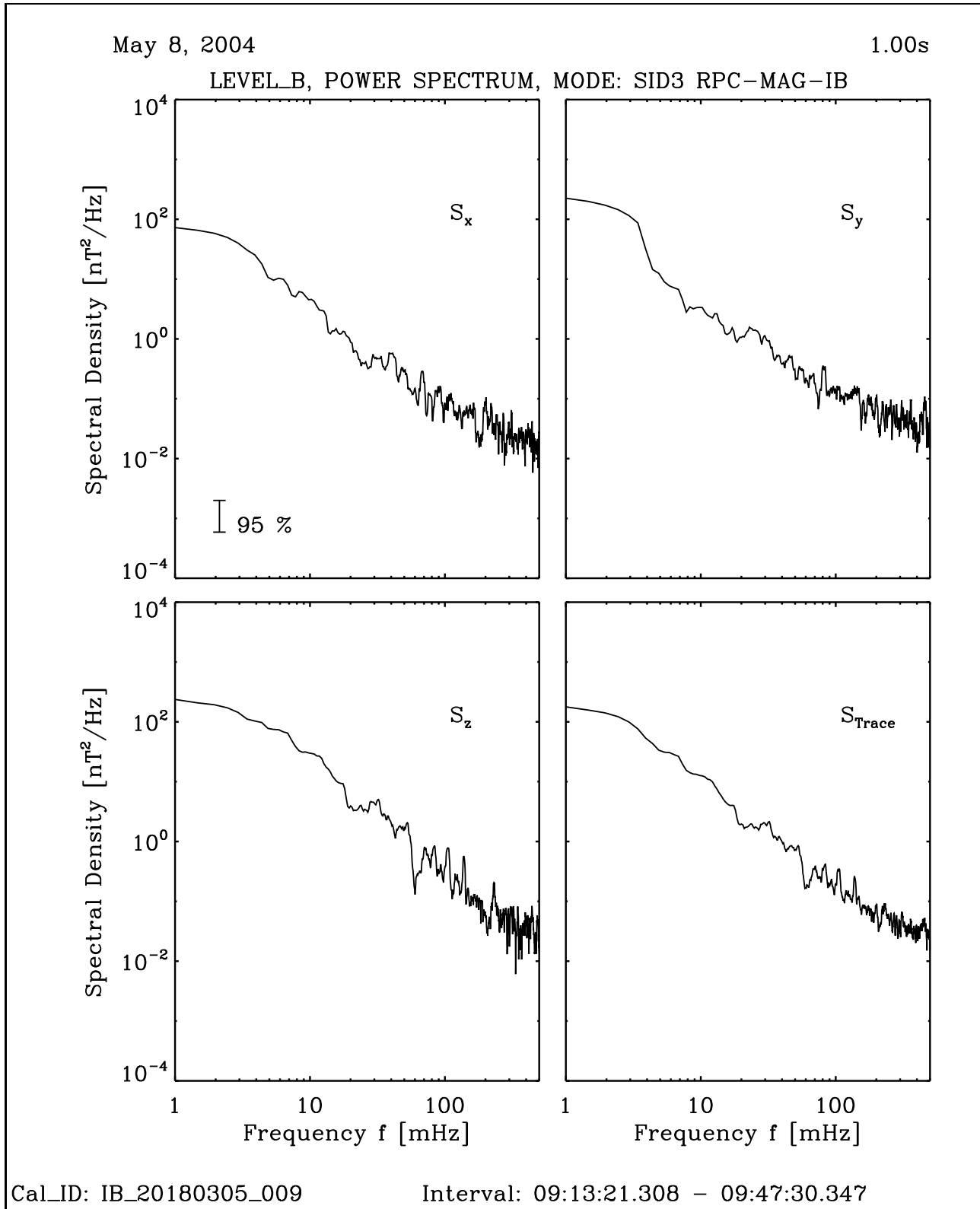


Figure 24: File: RPCMAG040508T0900\_CLB\_IB\_M3\_PS1\_10000\_009

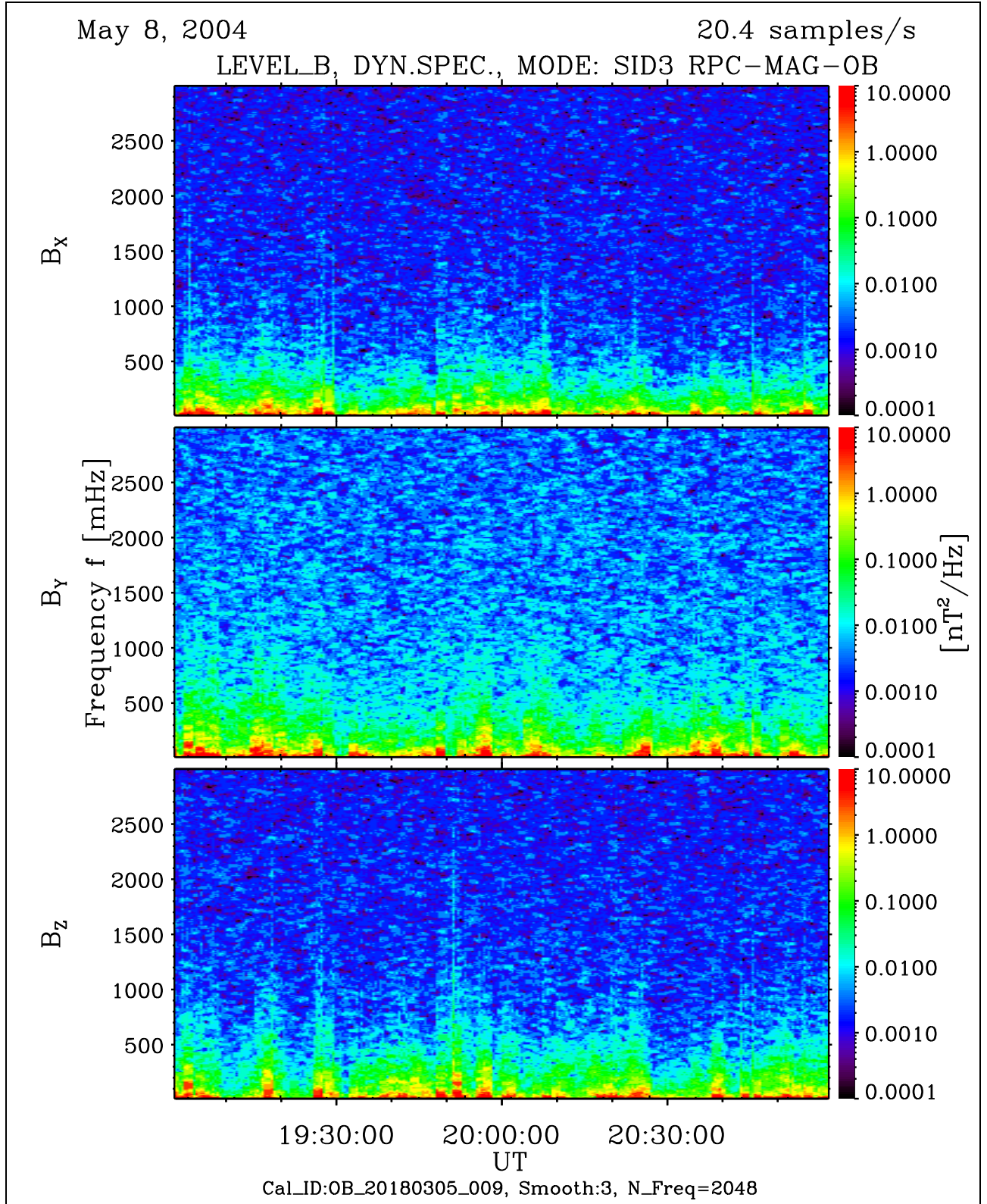


Figure 25: File: RPCMAG040508T0900\_CLB\_OB\_M3\_DS1e-2\_3000\_009

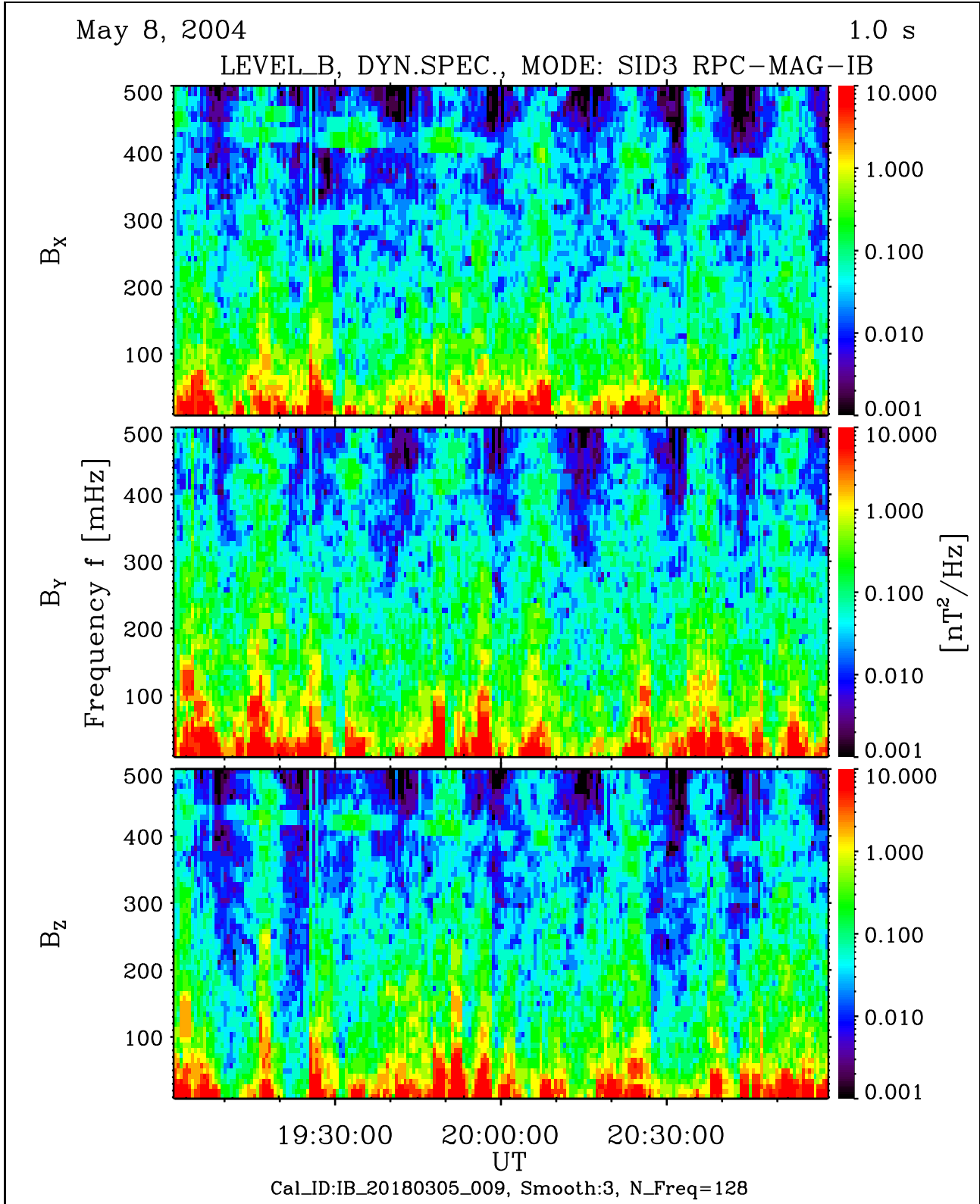


Figure 26: File: RPCMAG040508T0900\_CLB\_IB\_M3\_DS1e-2\_3000\_009

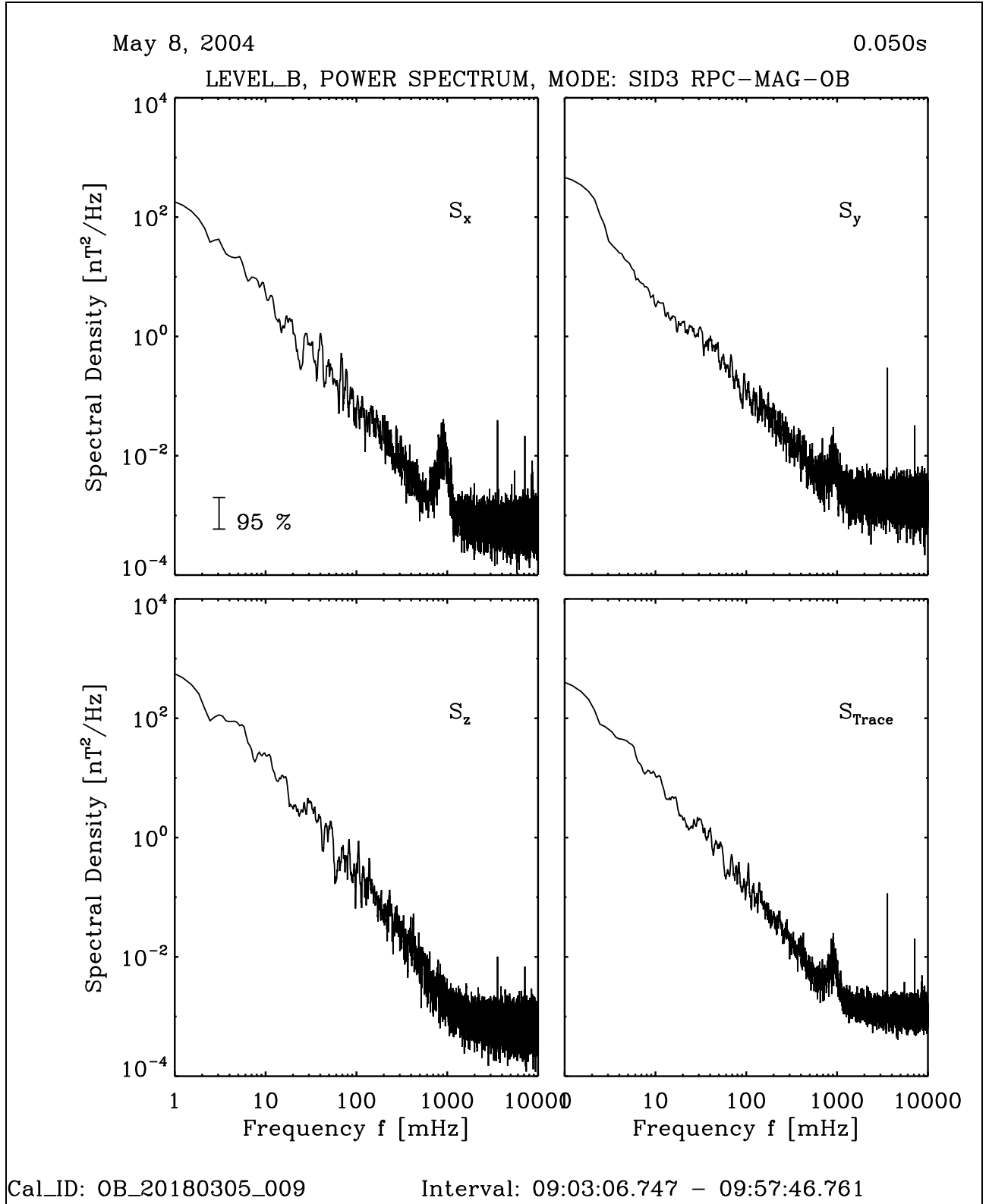


Figure 27: File: RPCMAG040508T0900\_CLB\_OB\_M3\_PS1\_10000\_009

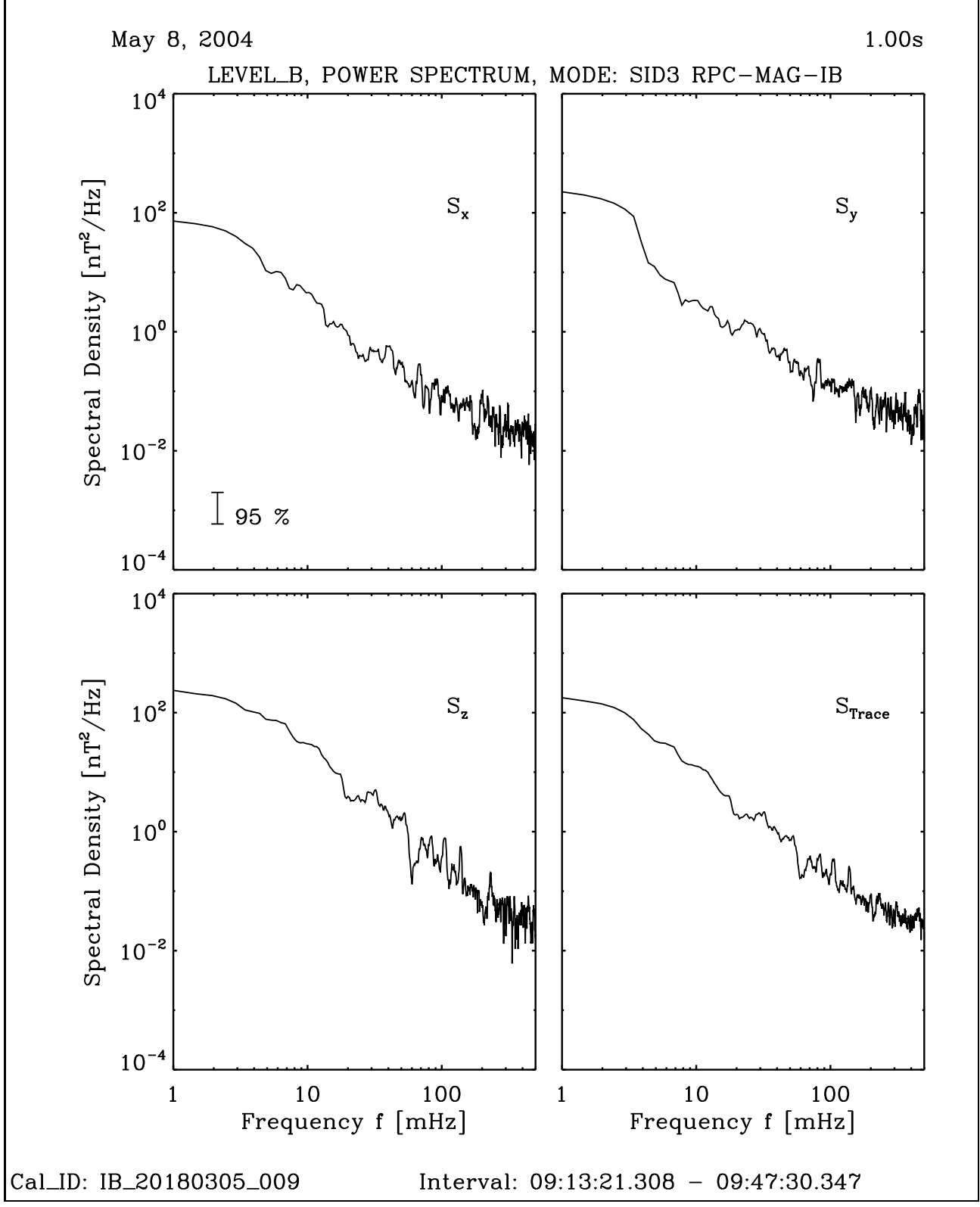


Figure 28: File: RPCMAG040508T0900\_CLB\_IB\_M3\_PS1\_10000\_009

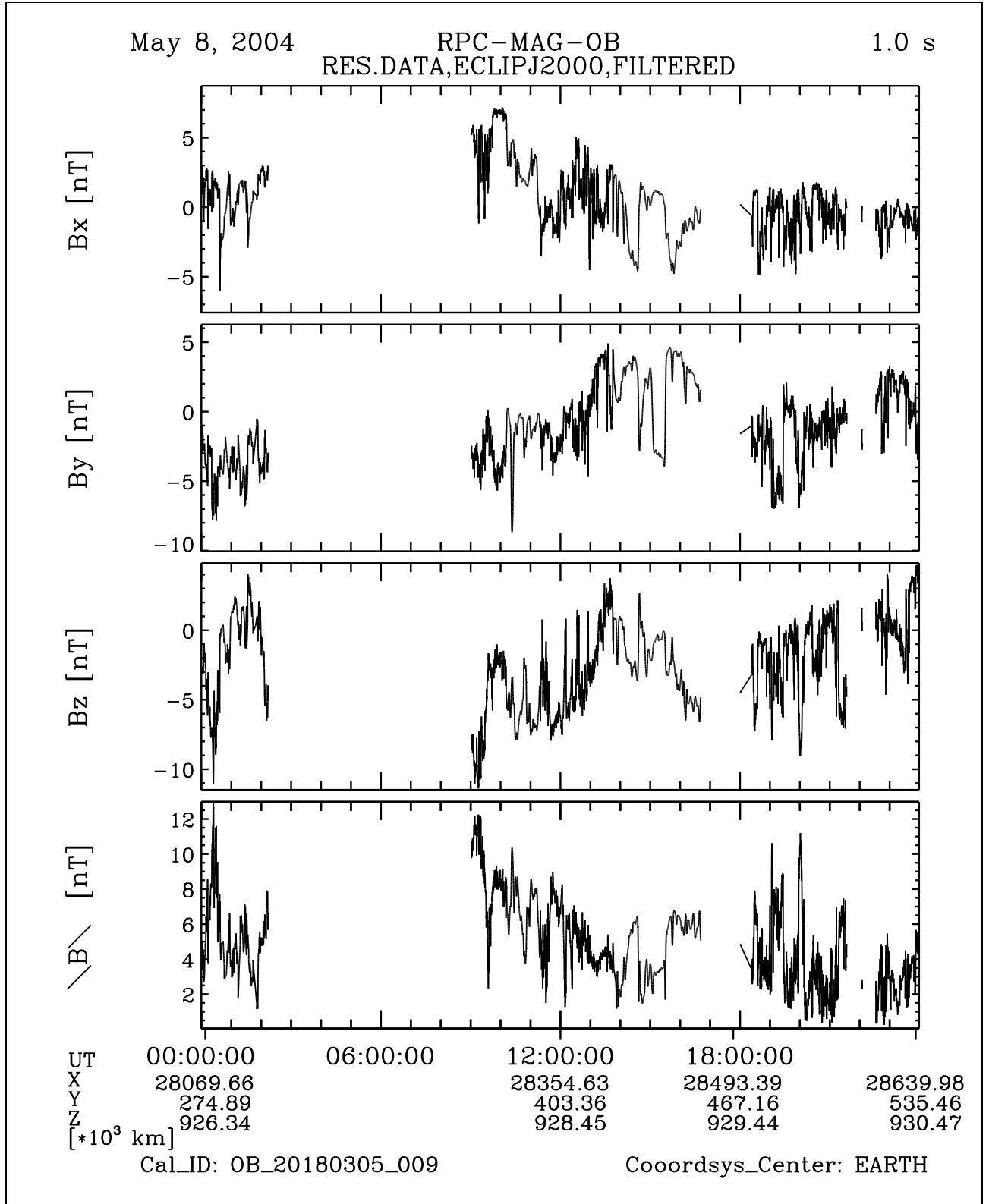


Figure 29: File: RPCMAG040508\_CLG\_OB\_A1\_T0000\_2359\_009

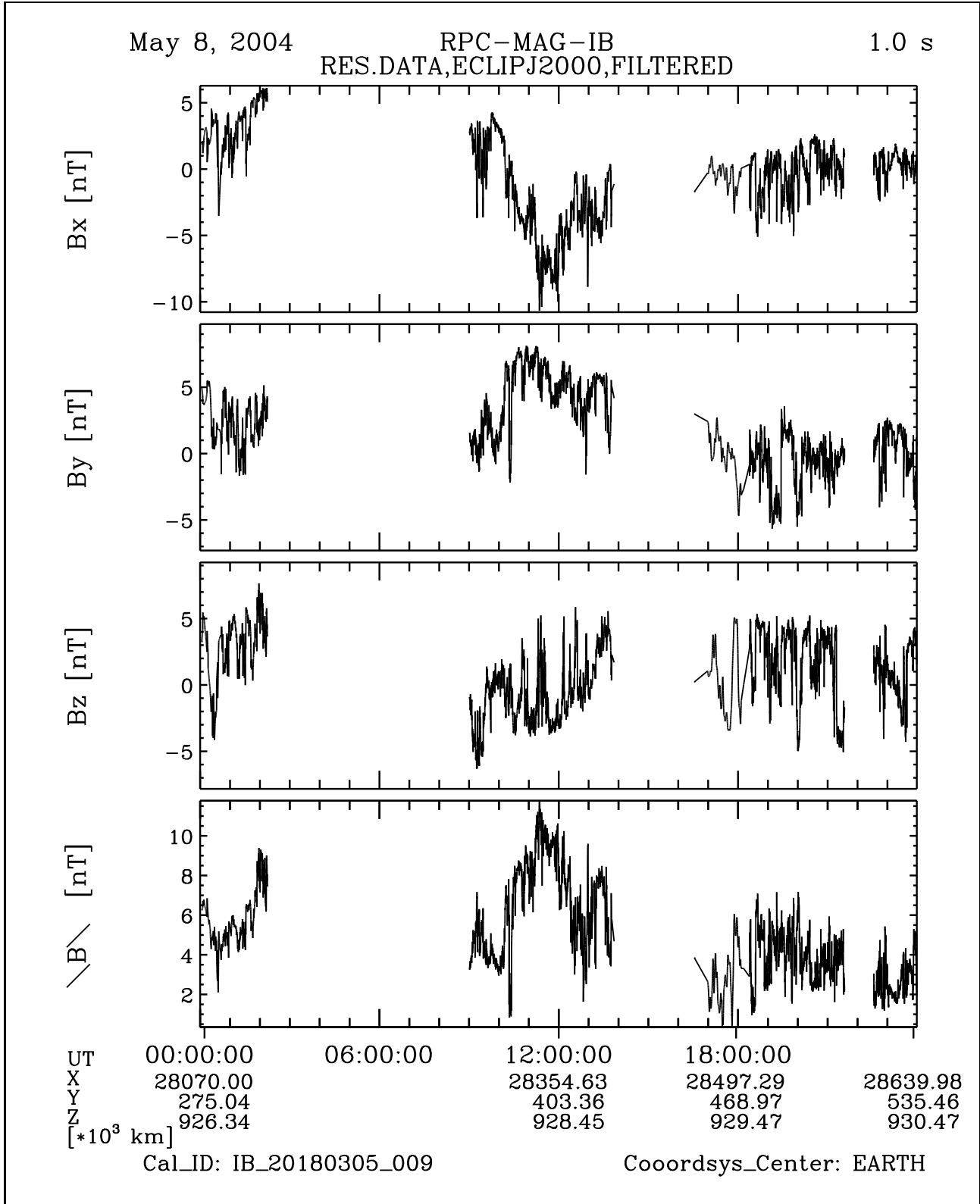


Figure 30: File: RPCMAG040508\_CLG\_IB\_A1\_T0000\_2359\_009



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### 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 and 1 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.

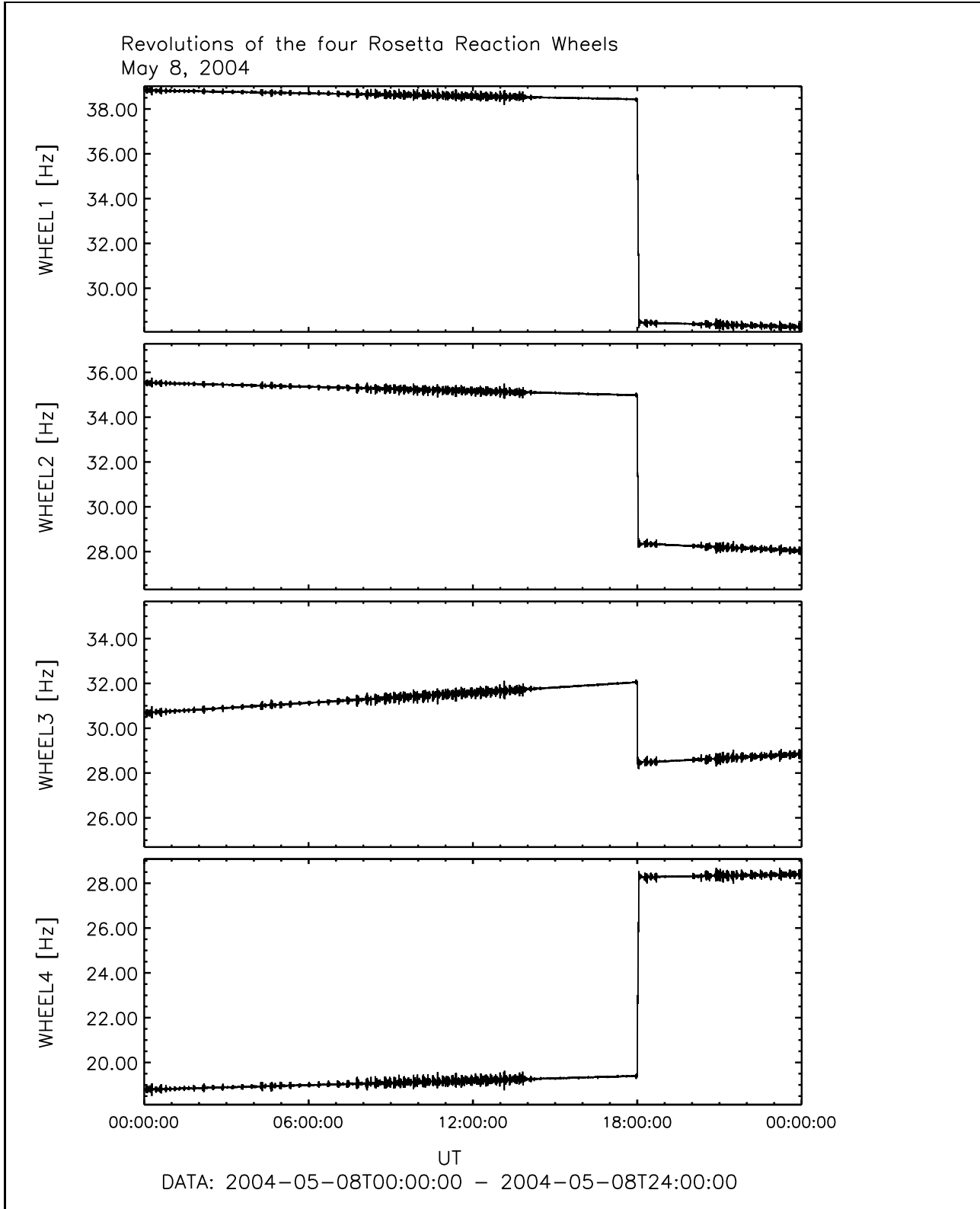


Figure 31: File: wheels\_Hz2004-05-08T00-00

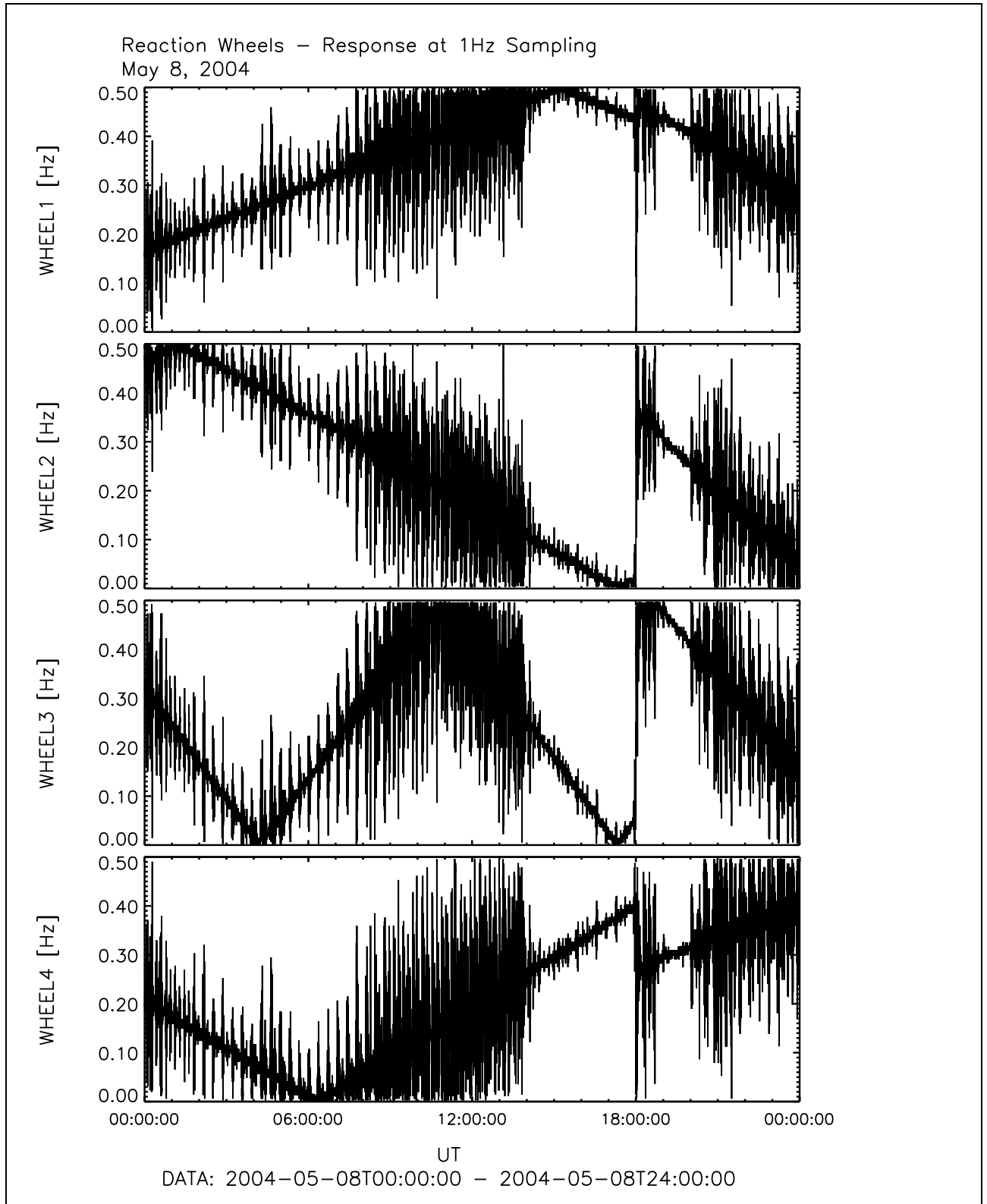


Figure 32: File: wheels\_1Hz\_Sampling2004-05-08T00-00

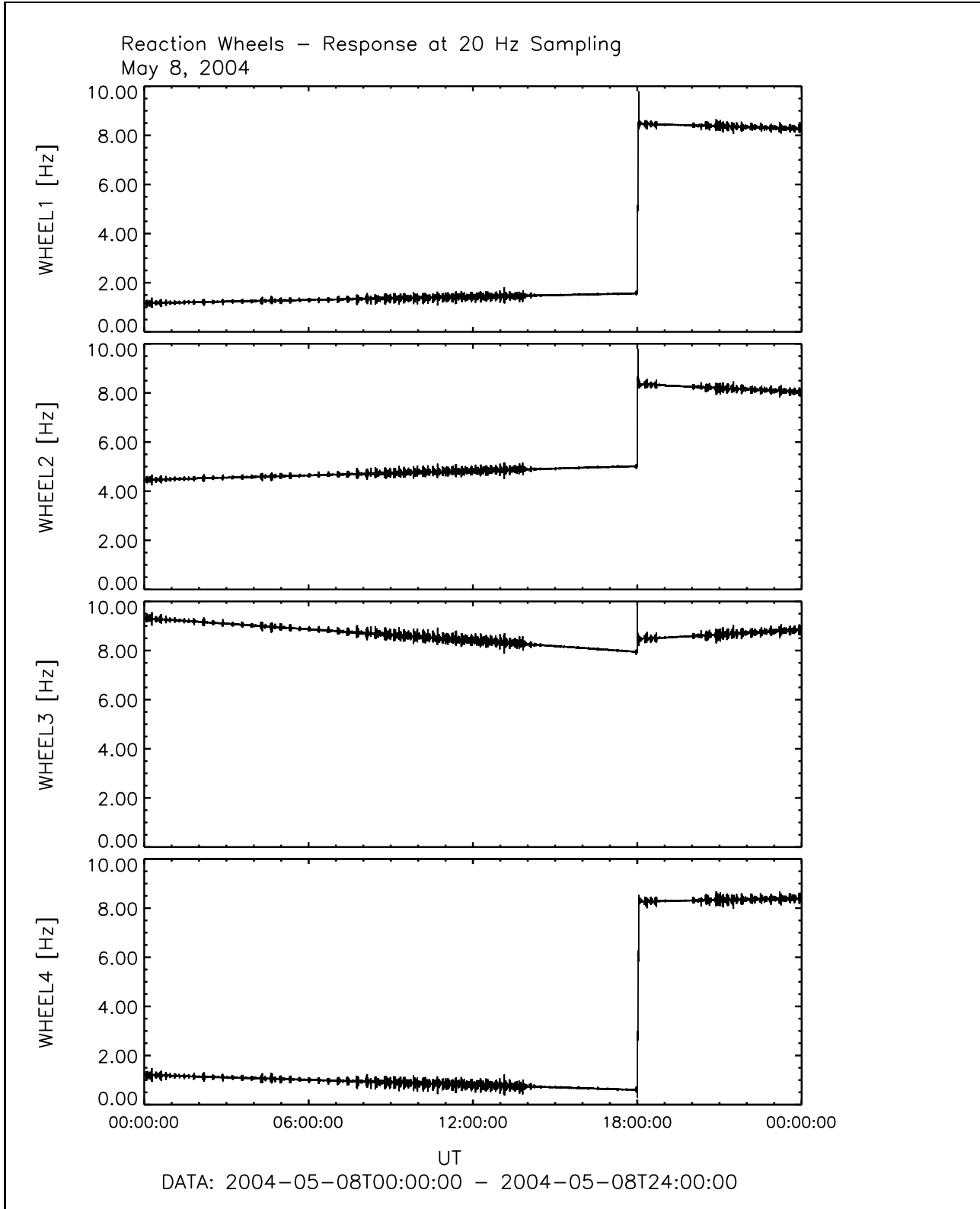


Figure 33: File: wheels\_20Hz\_Sampling2004-05-08T00-00

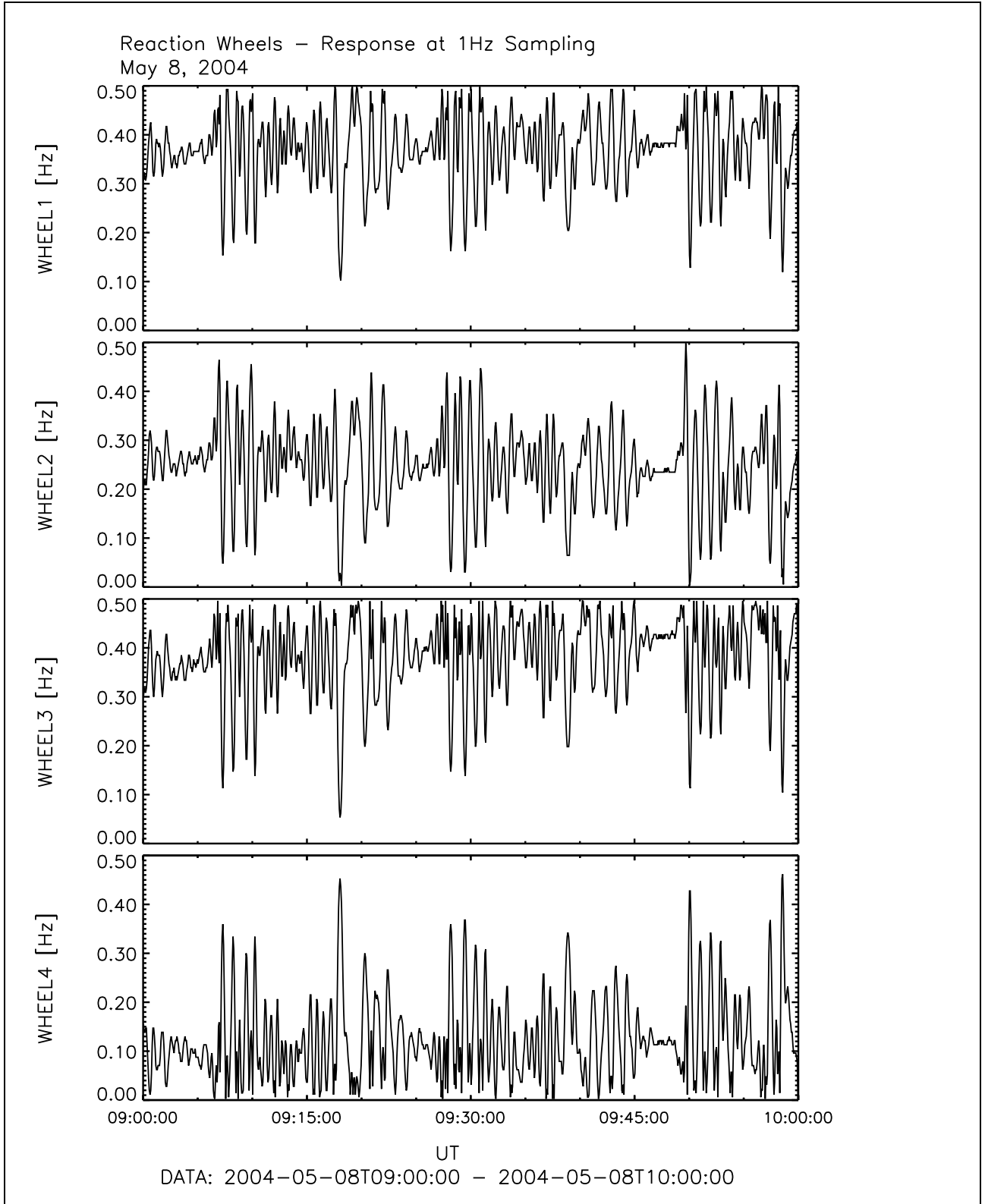


Figure 34: File: wheels\_1Hz\_Sampling2004-05-08T09-00

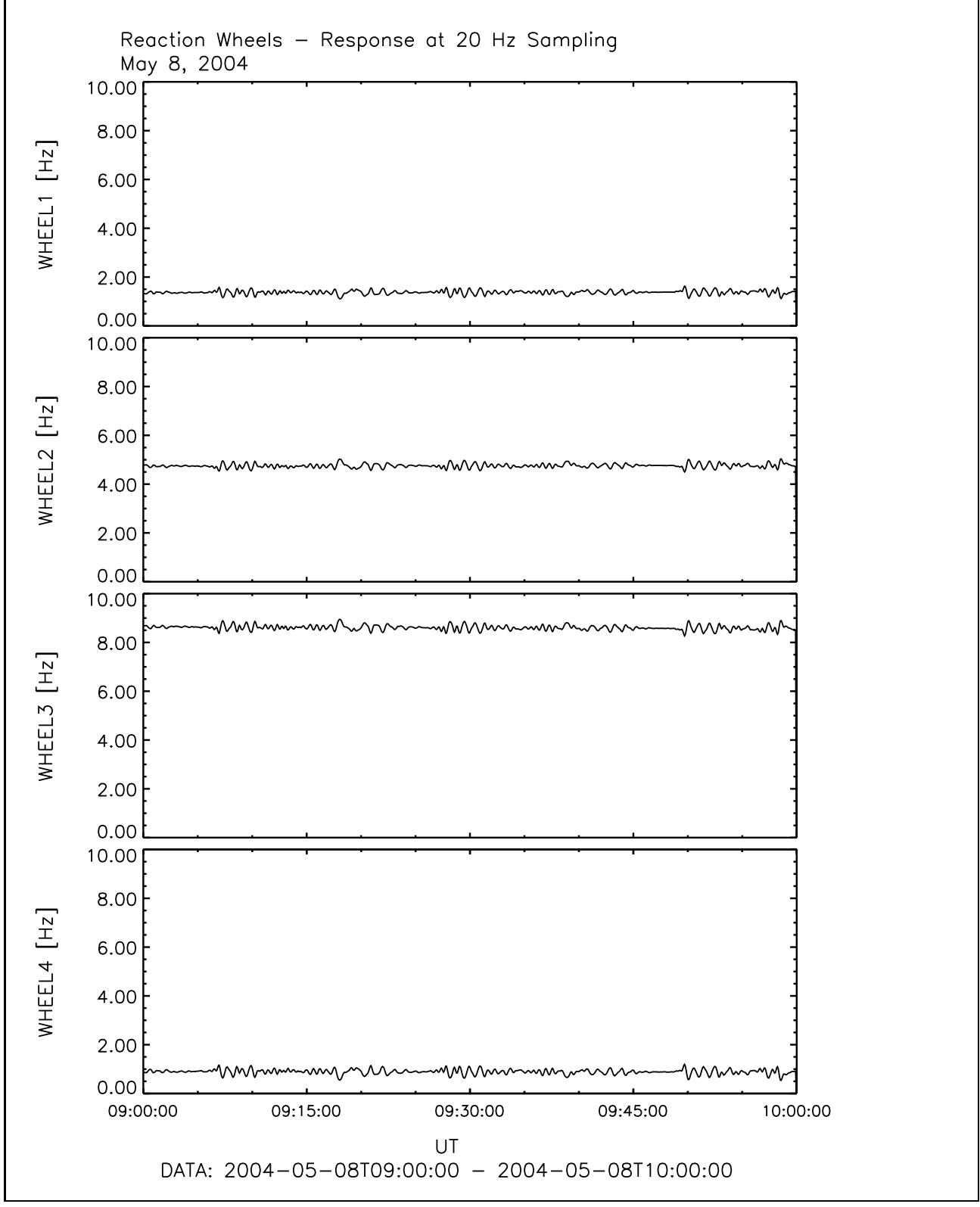


Figure 35: File: wheels\_20Hz\_Sampling2004-05-08T09-00

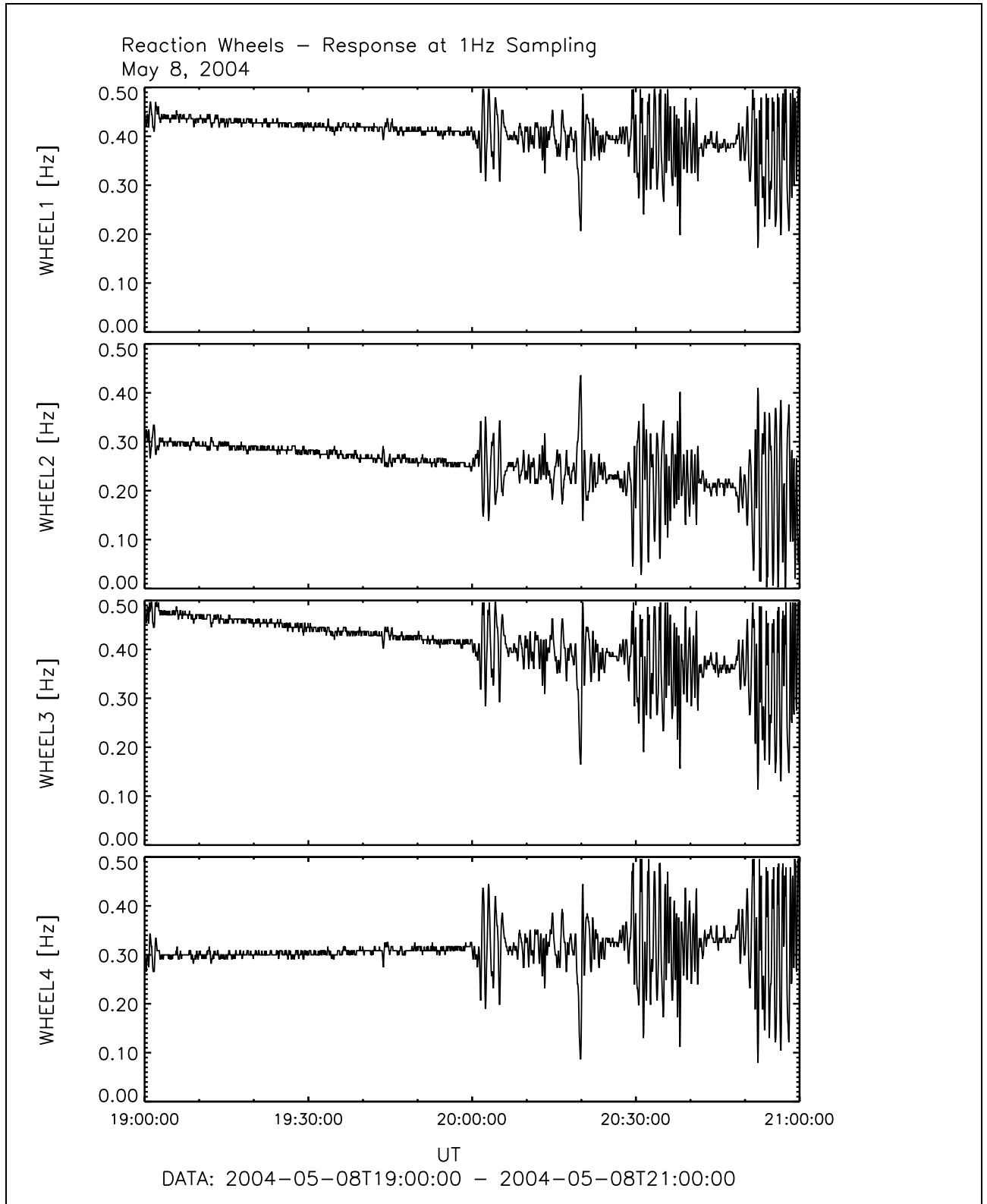


Figure 36: File: wheels\_1Hz\_Sampling2004-05-08T19-00

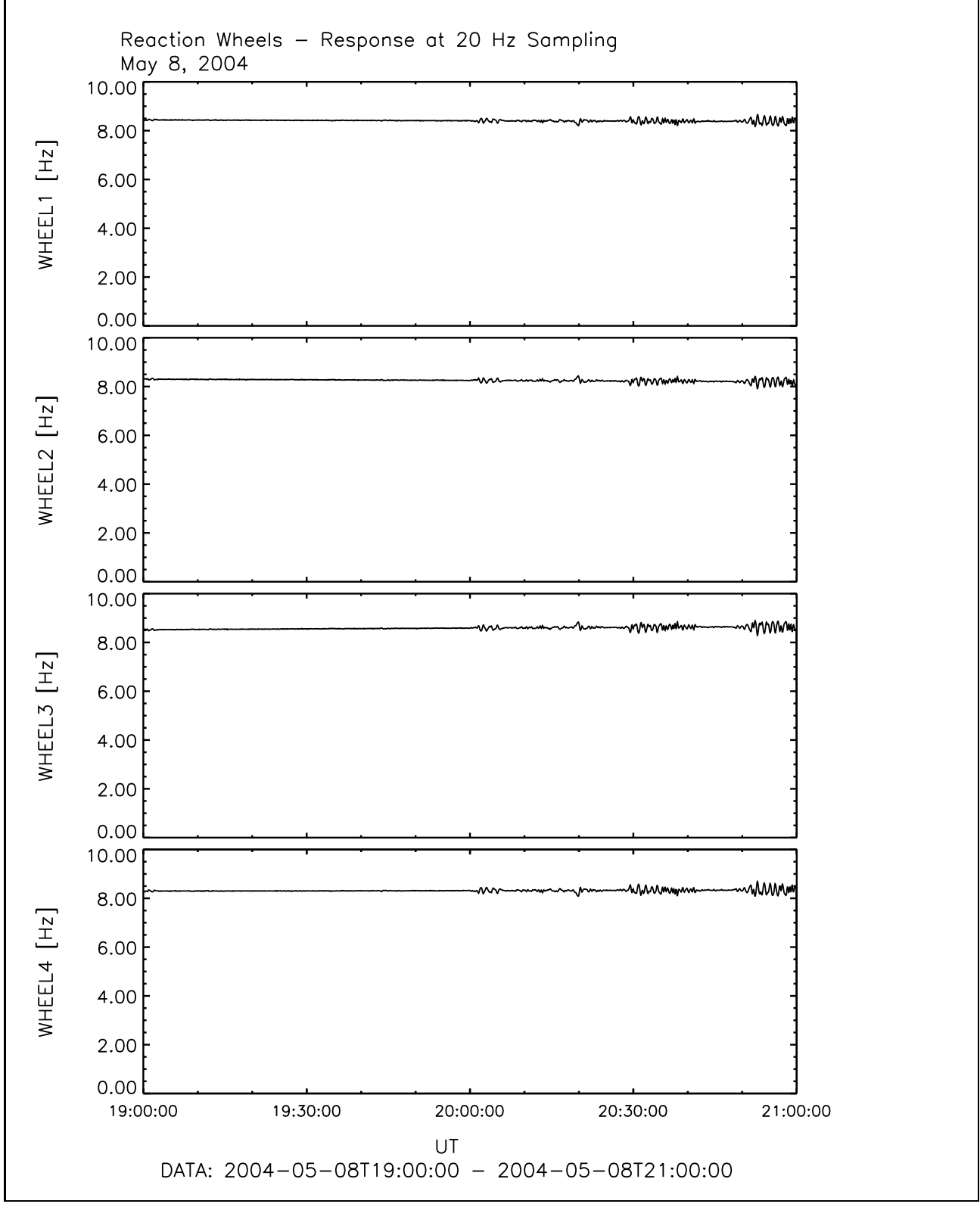


Figure 37: File: wheels\_20Hz\_Sampling2004-05-08T19-00



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## 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

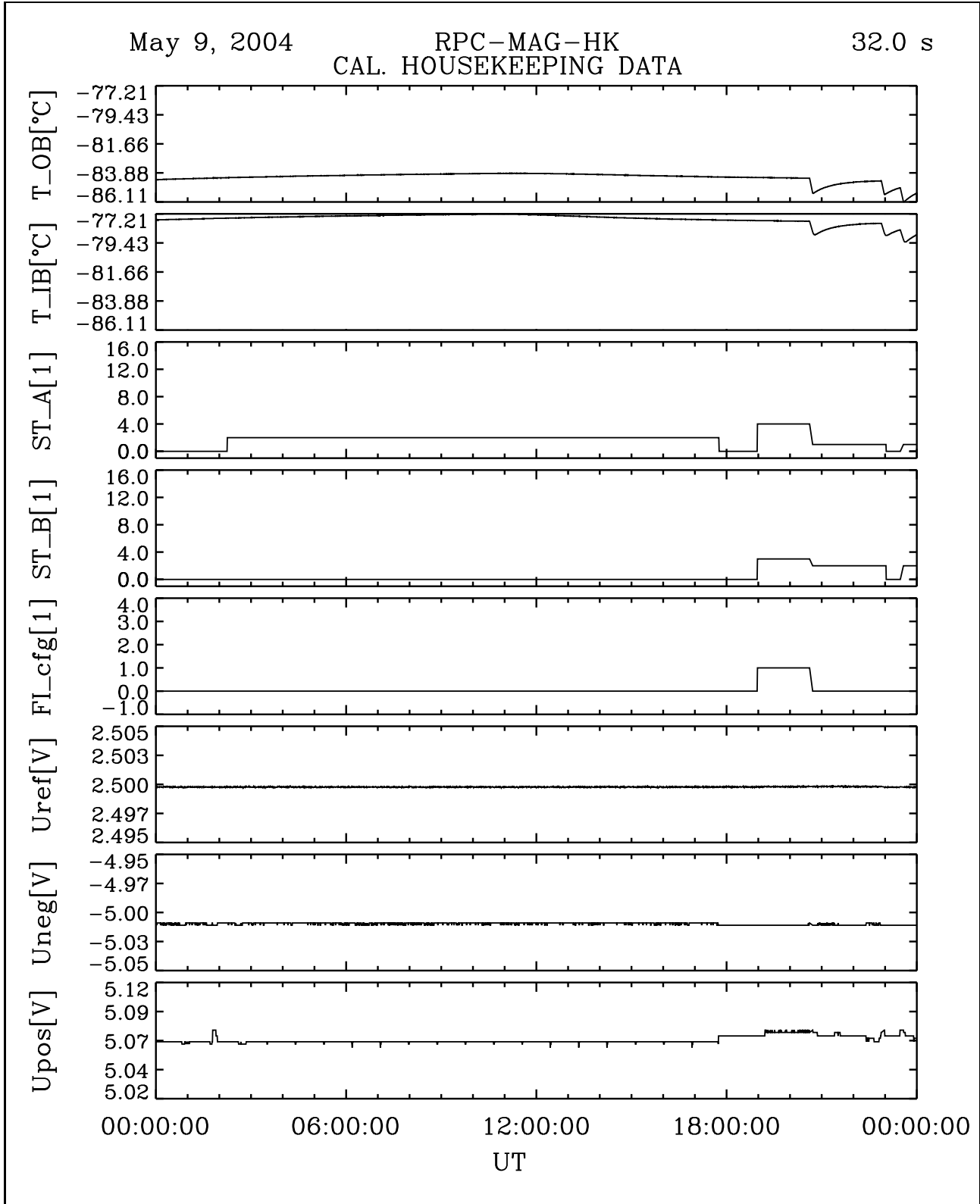


Figure 38: File: RPCMAG040509T0000\_CLA\_HK\_P0000\_2400

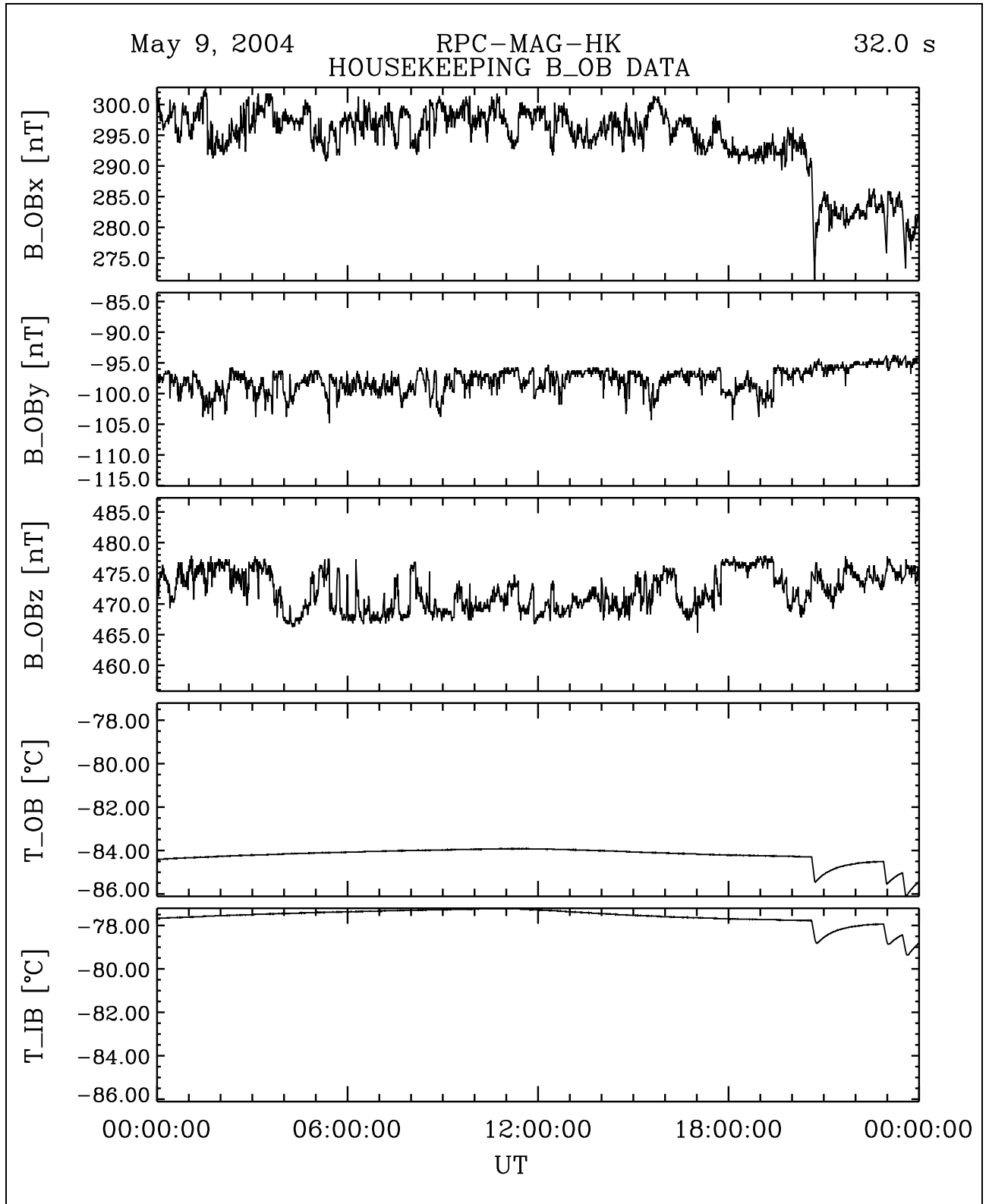


Figure 39: File: RPCMAG040509T0000\_CLA\_HK\_B\_P0000\_2400

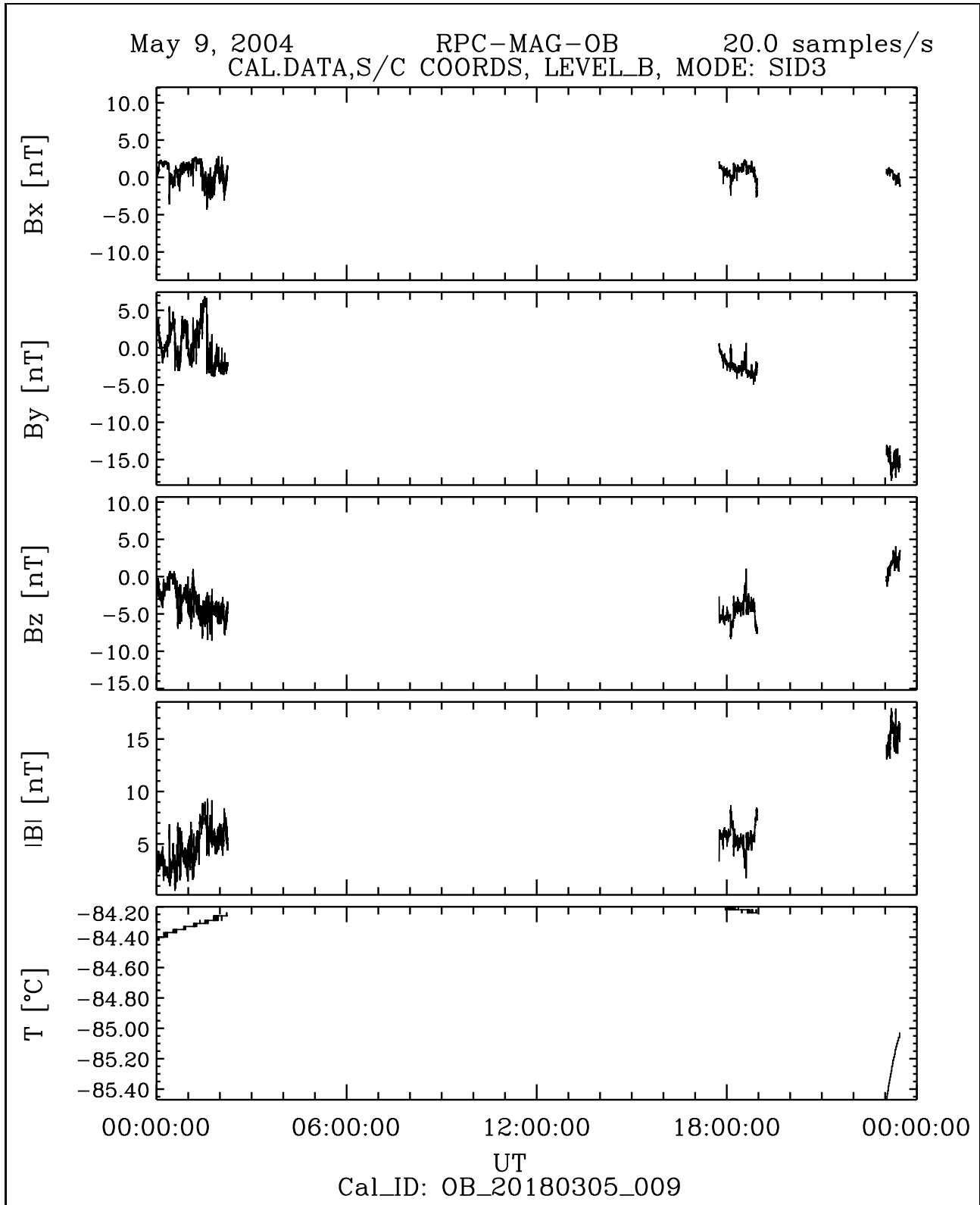


Figure 40: File: RPCMAG040509T0000\_CLB\_OB\_M3\_T0000\_2400\_009

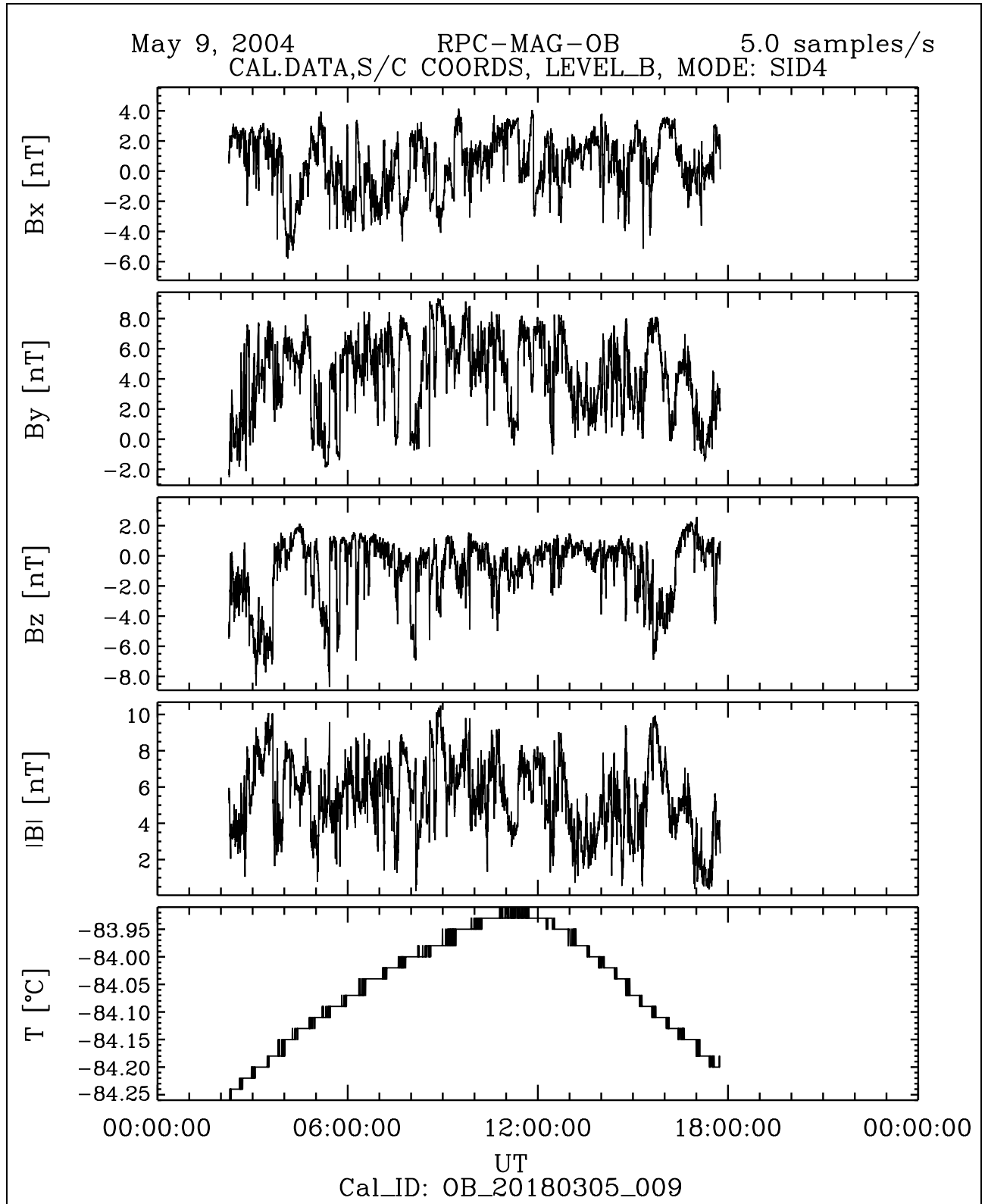


Figure 41: File: RPCMAG040509T0215\_CLB\_OB\_M4\_T0000\_2400\_009

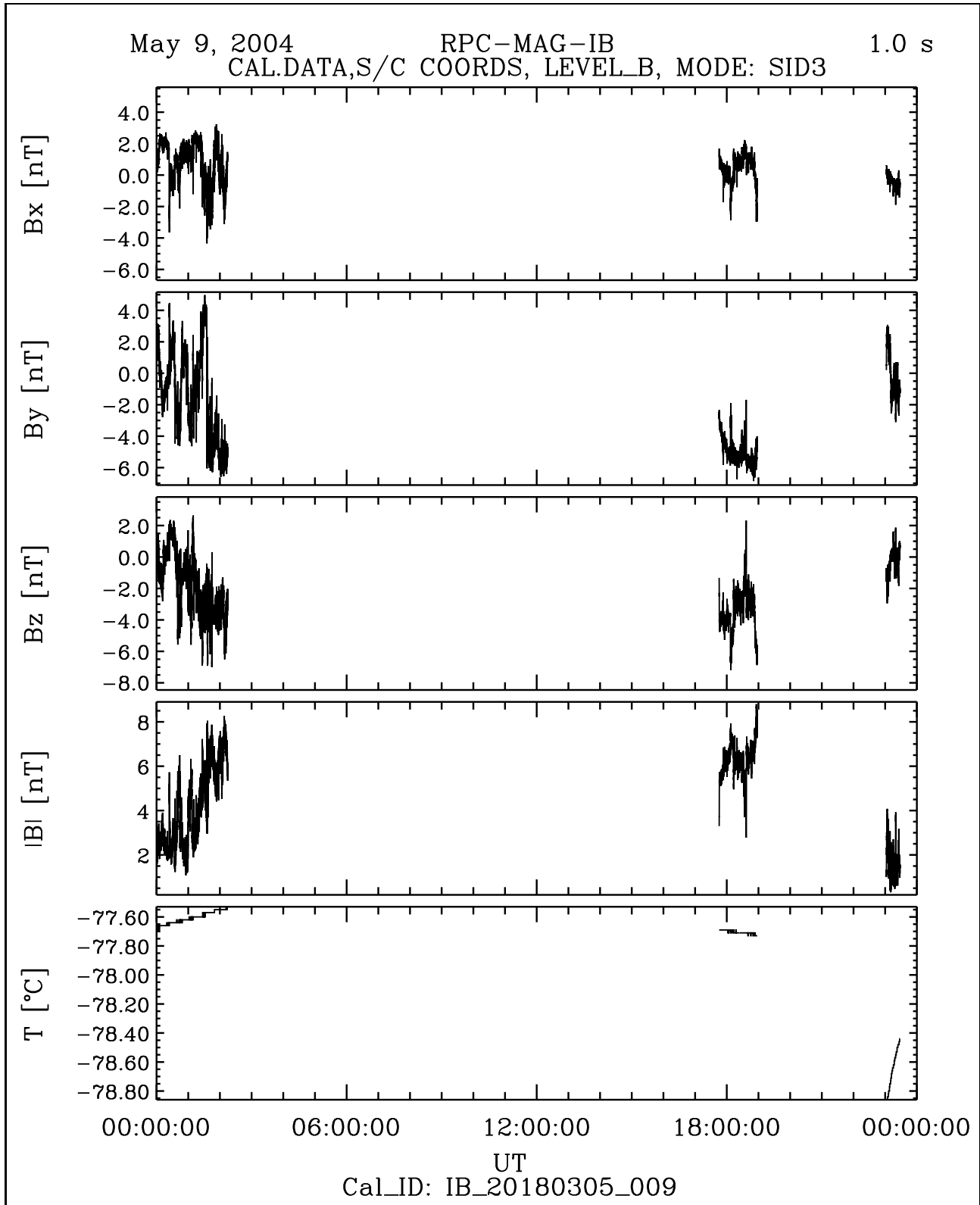


Figure 42: File: RPCMAG040509T0000\_CLB\_IB\_M3\_T0000\_2400\_009

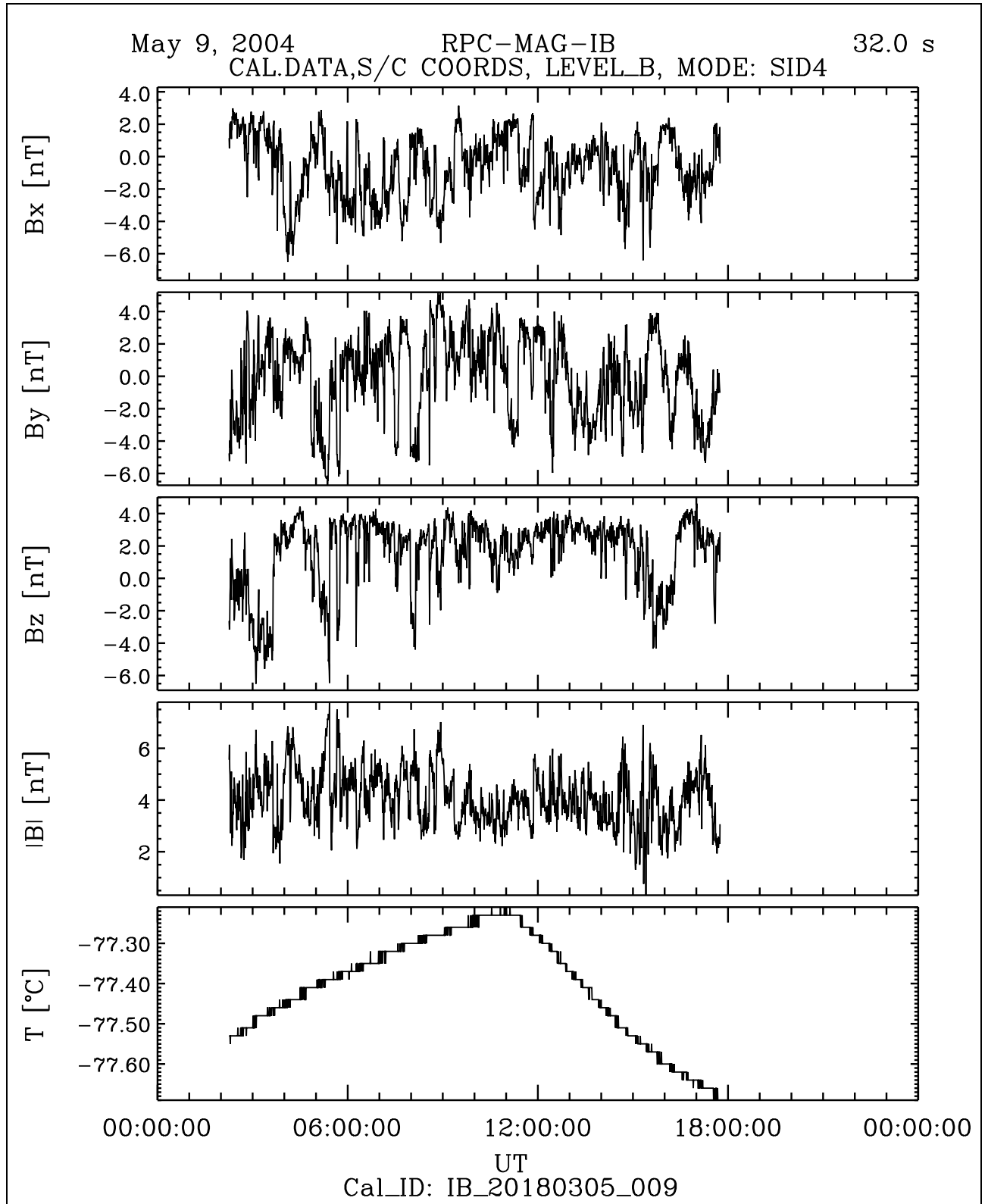


Figure 43: File: RPCMAG040509T0215\_CLB\_IB\_M4\_T0000\_2400\_009

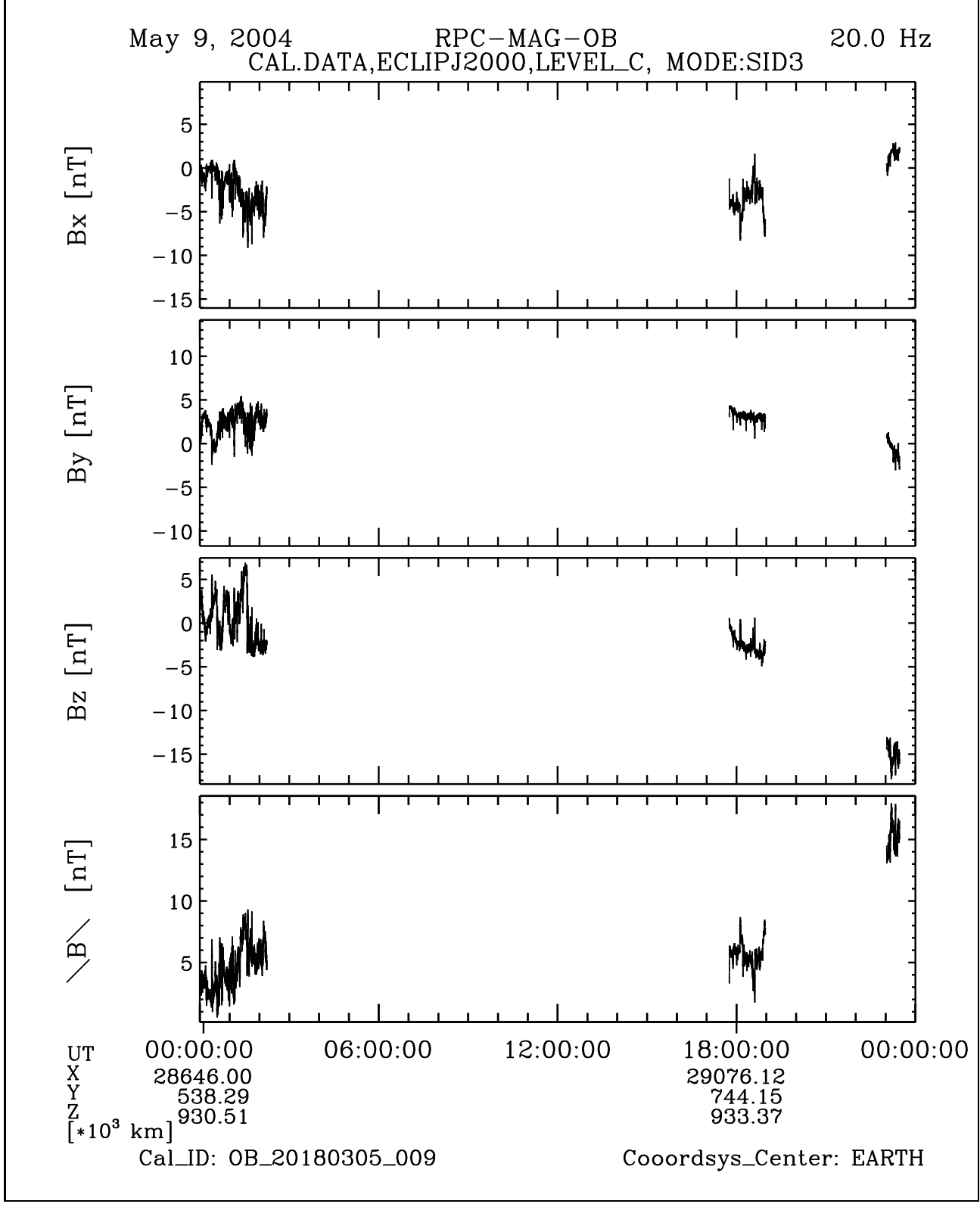


Figure 44: File: RPCMAG040509T0000\_CLC\_OB\_M3\_T0000\_2400\_009



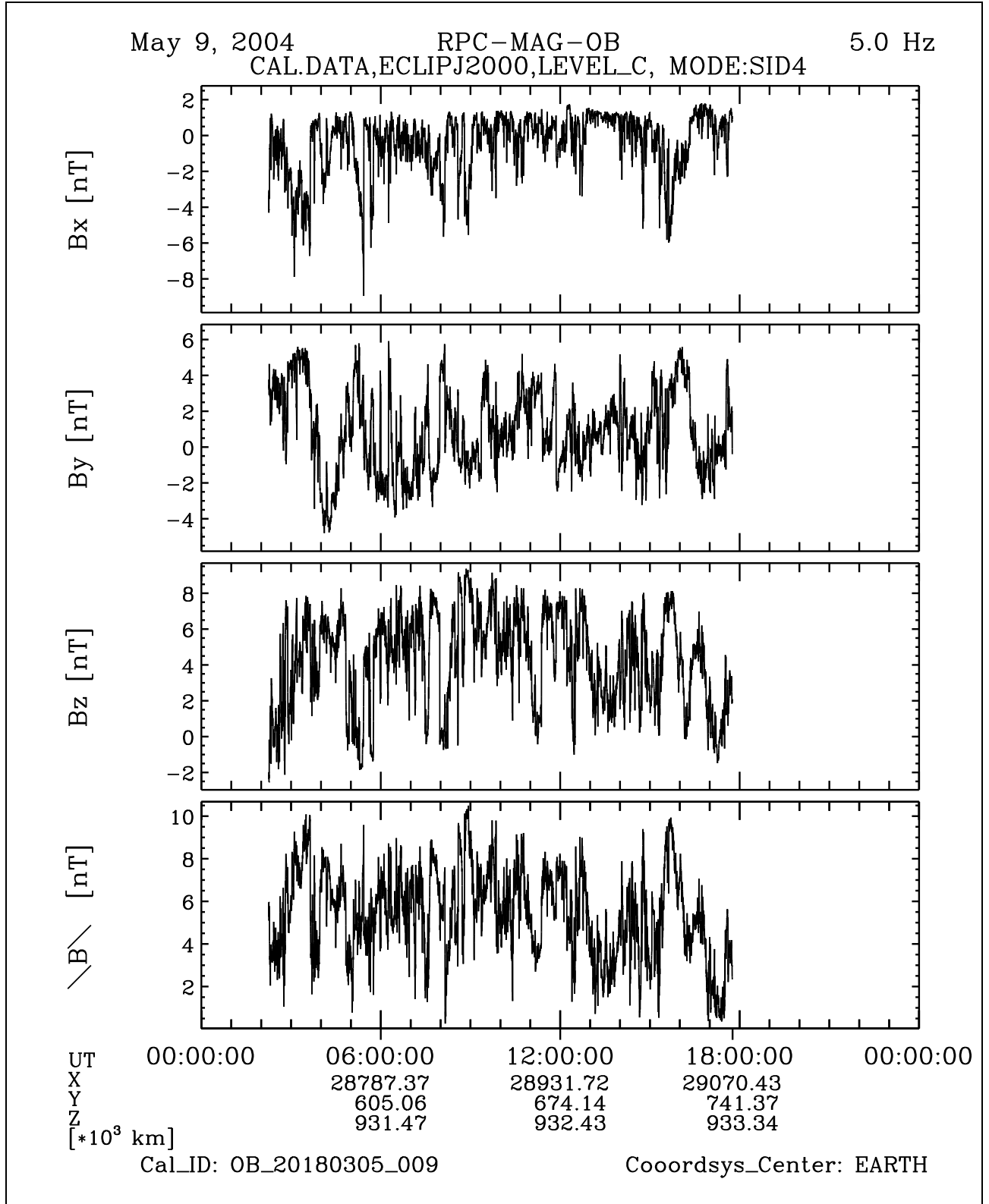


Figure 45: File: RPCMAG040509T0215\_CLC\_OB\_M4\_T0000\_2400\_009

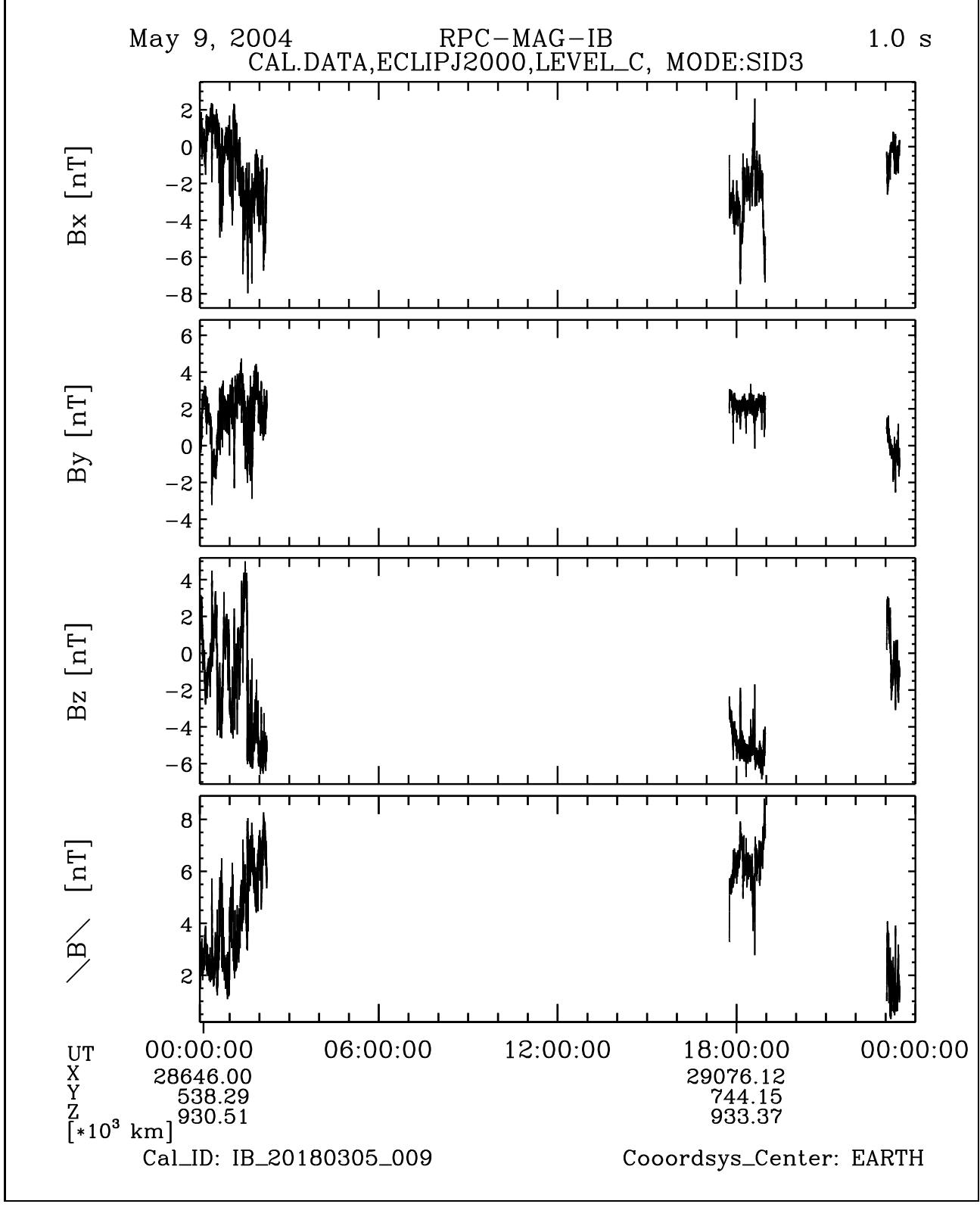


Figure 46: File: RPCMAG040509T0000\_CLC\_IB\_M3\_T0000\_2400\_009

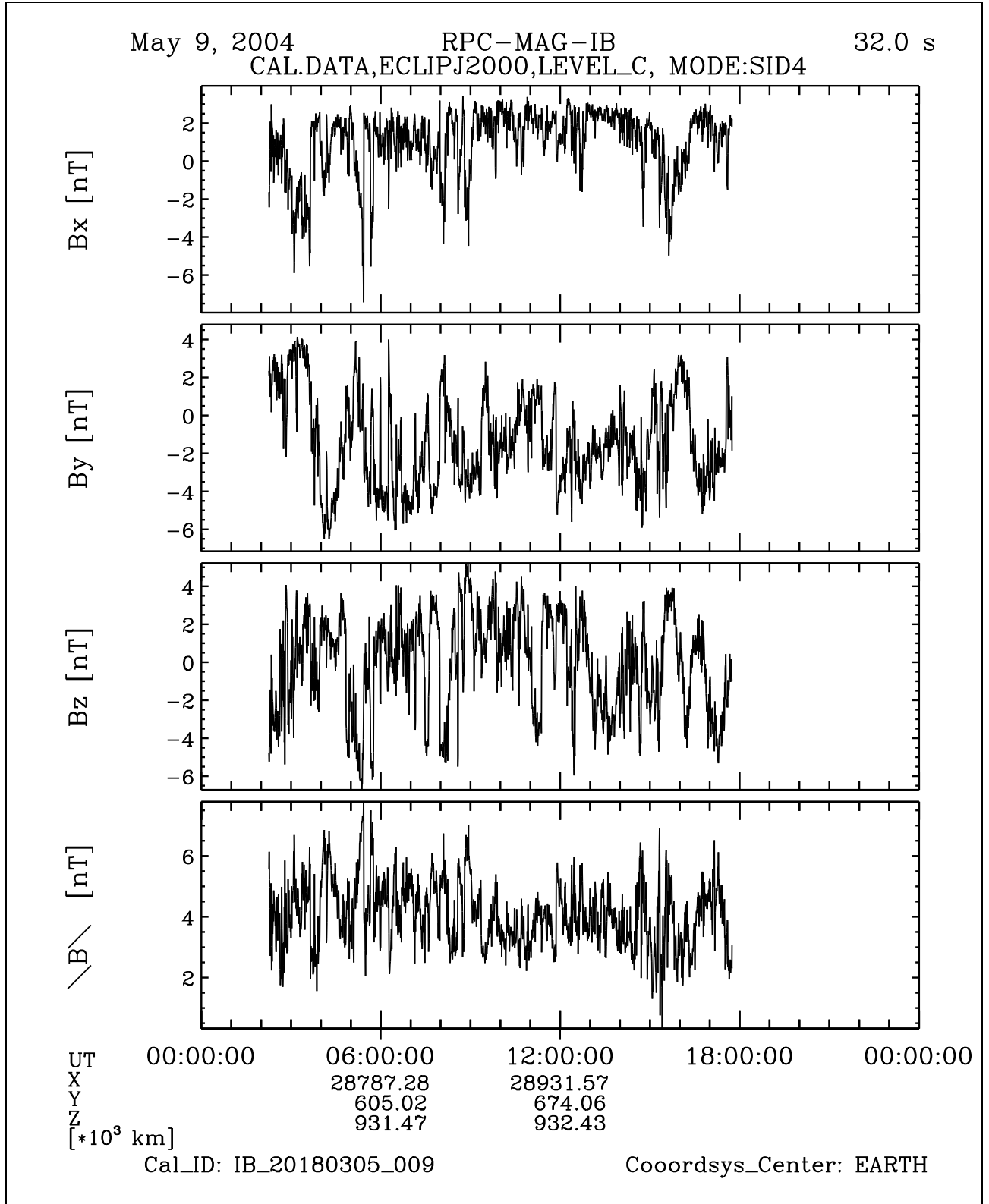


Figure 47: File: RPCMAG040509T0215\_CLC\_IB\_M4\_T0000\_2400\_009

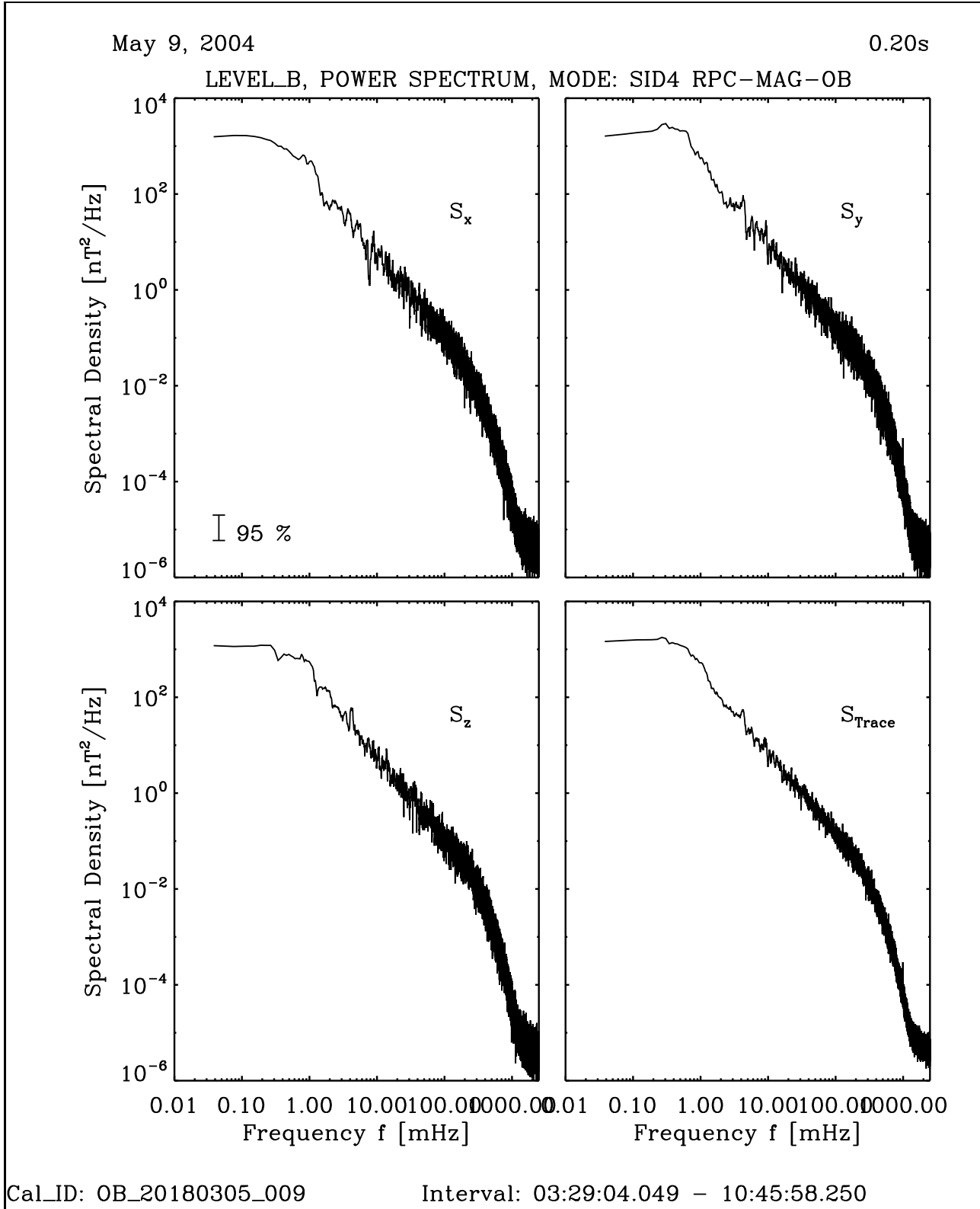


Figure 48: File: RPCMAG040509T0215\_CLB\_OB\_M4\_PS1e-2\_10000\_009

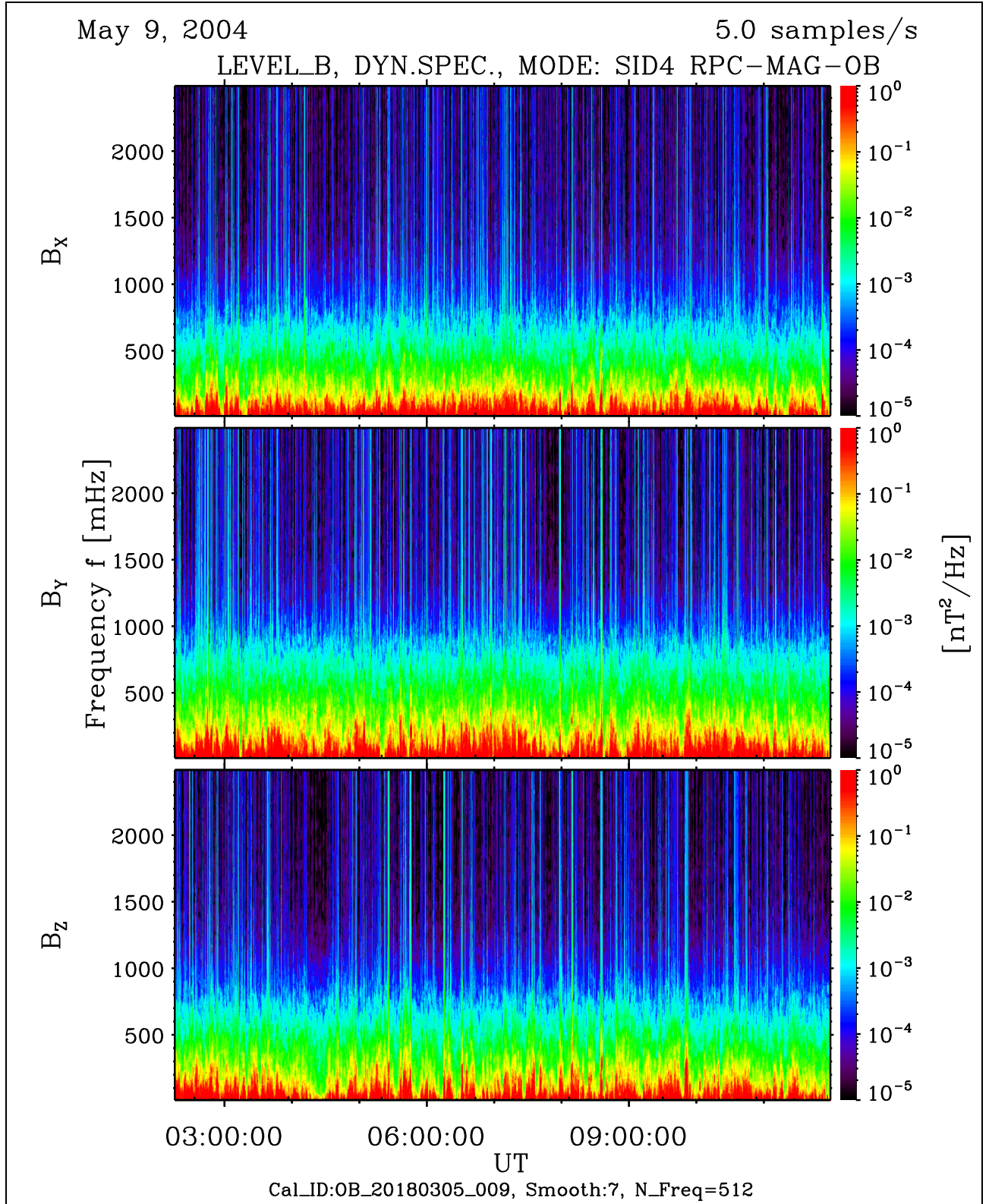


Figure 49: File: RPCMAG040509T0215\_CLB\_OB\_M4\_DS1e-2\_2500\_009

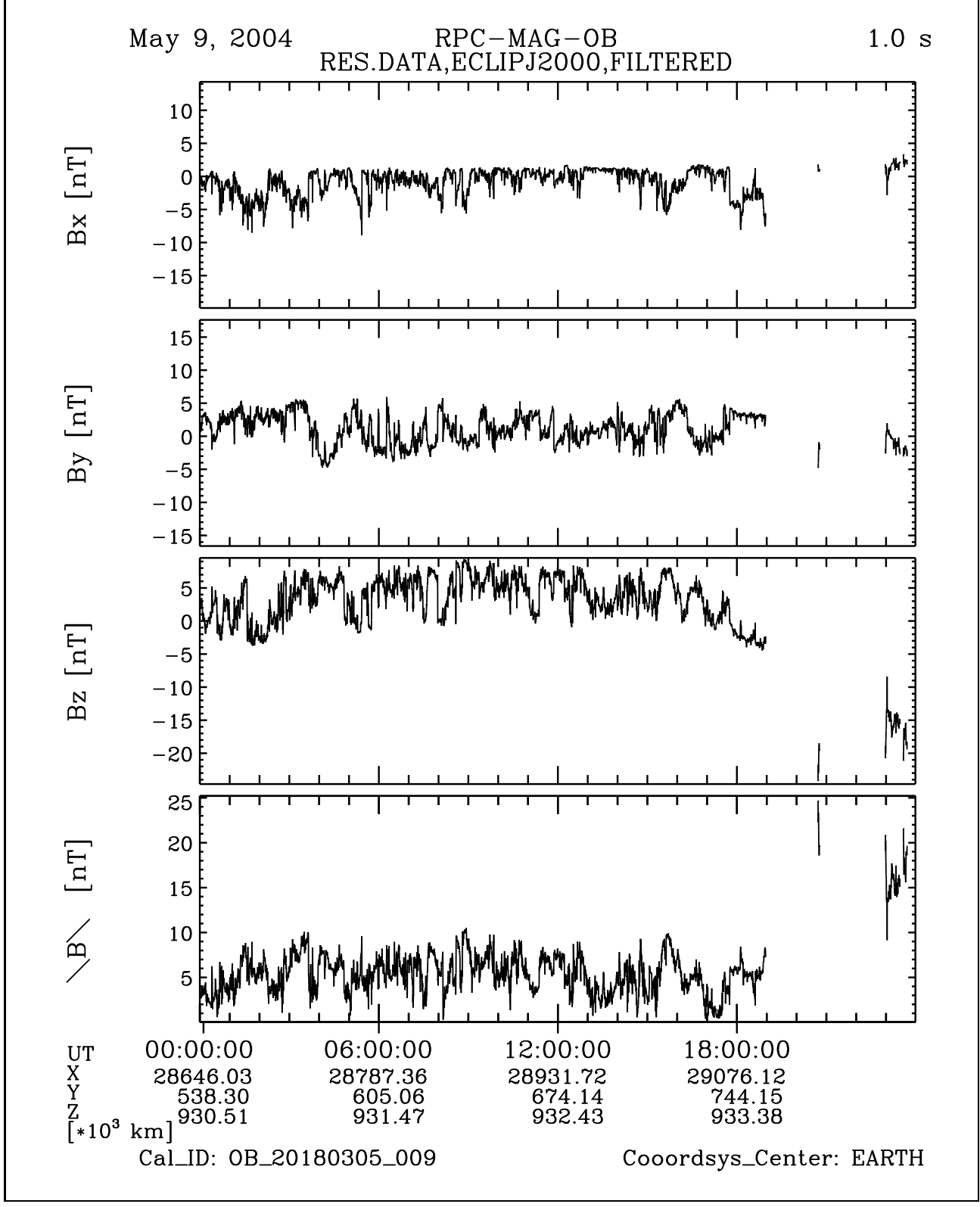


Figure 50: File: RPCMAG040509\_CLG-OB\_A1.T0000\_2359\_009

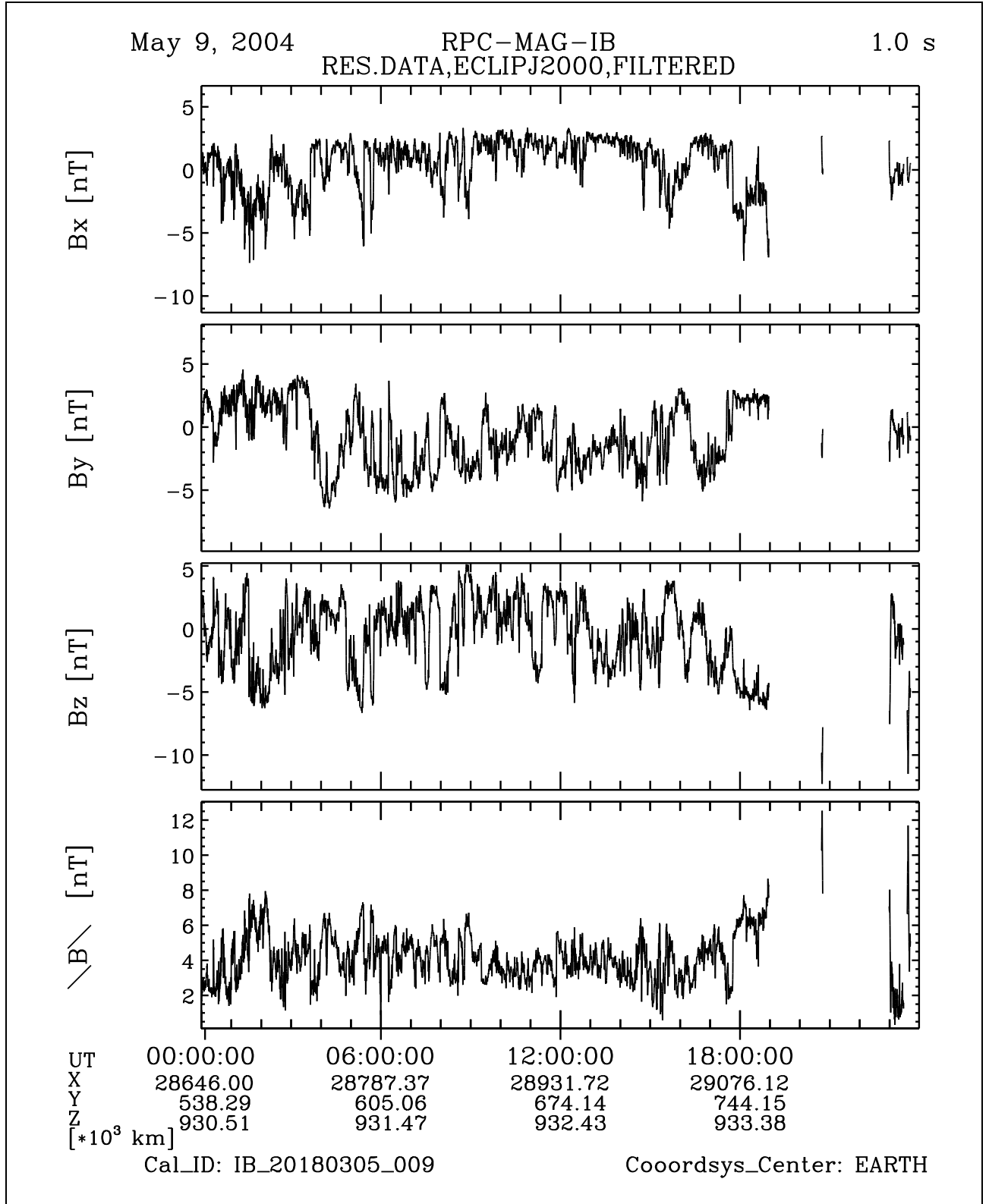


Figure 51: File: RPCMAG040509\_CLG\_IB\_A1\_T0000\_2359\_009

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### 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 and 1 Hz sampling frequency is plotted.



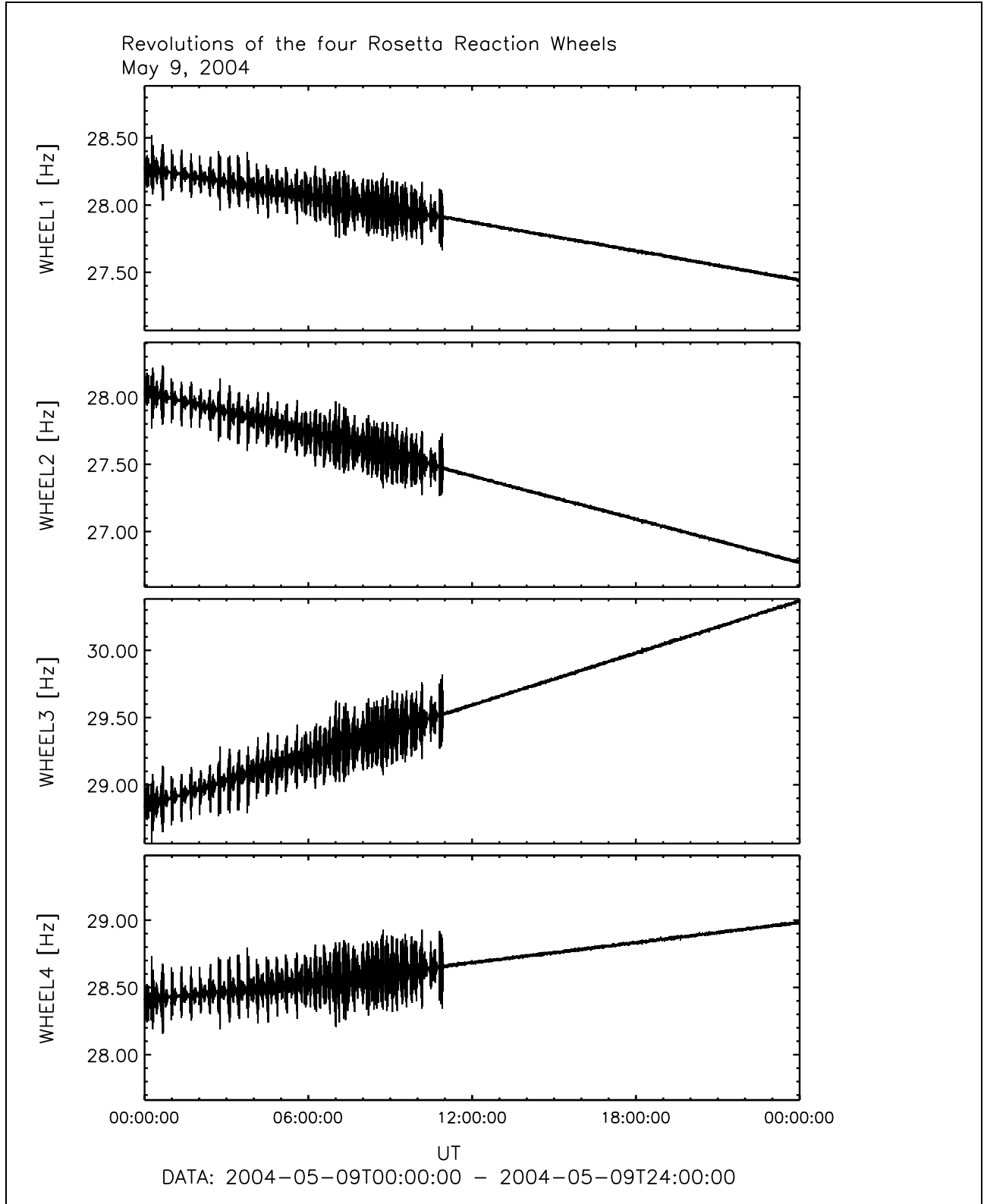


Figure 52: File: wheels\_Hz2004-05-09T00-00

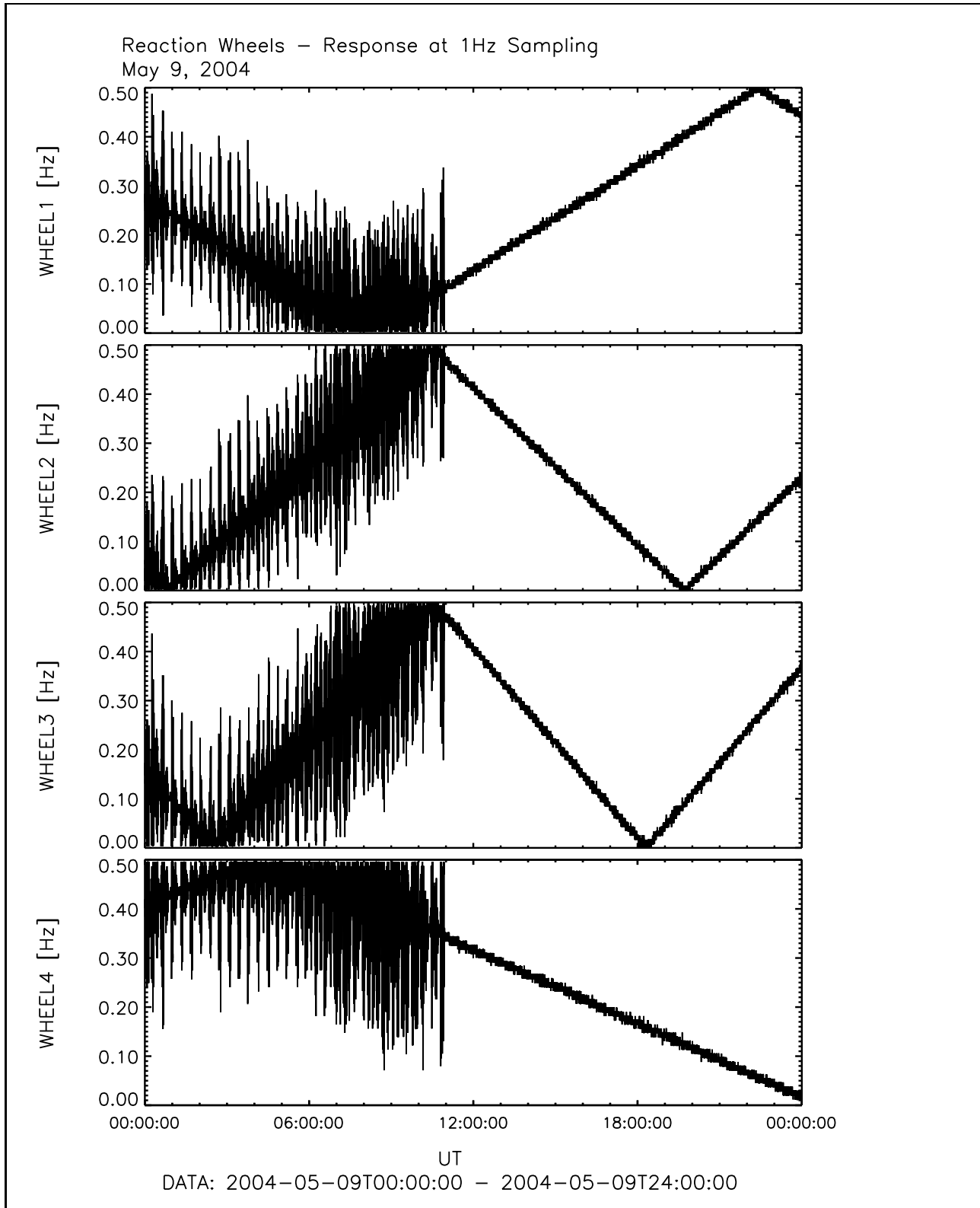


Figure 53: File: wheels\_1Hz\_Sampling2004-05-09T00-00

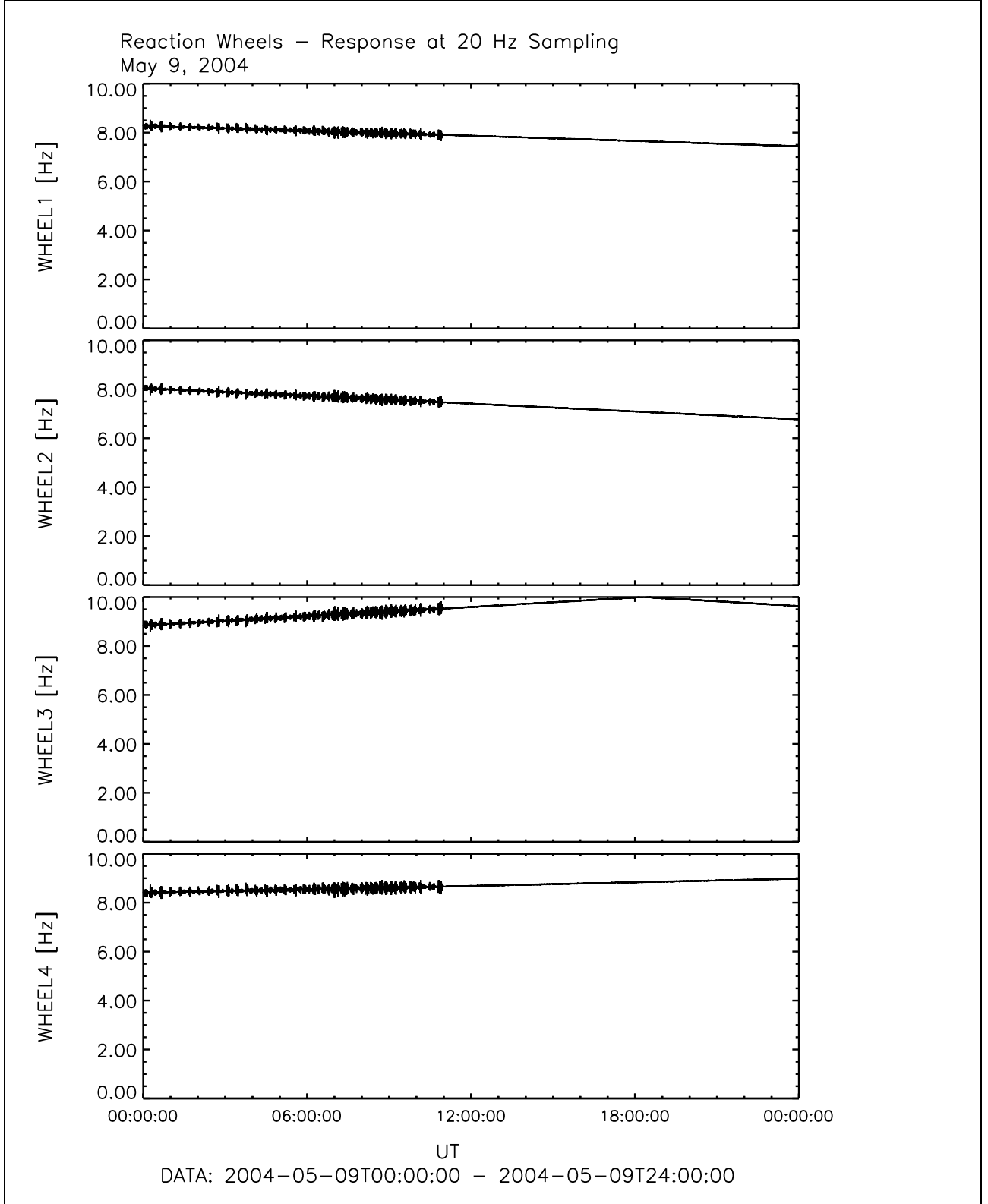


Figure 54: File: wheels\_20Hz\_Sampling2004-05-09T00-00

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## 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

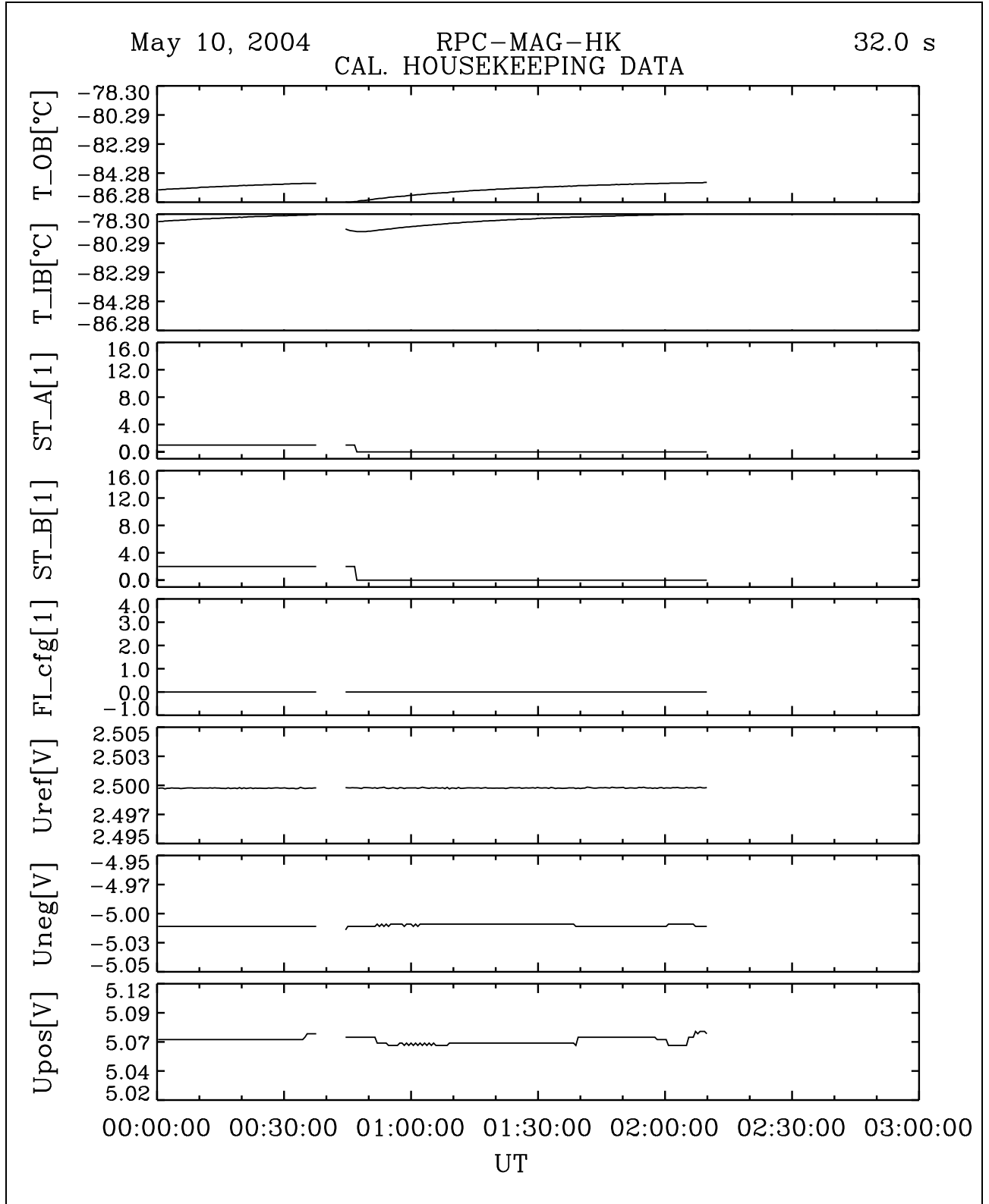


Figure 55: File: RPCMAG040510T0000\_CLA\_HK\_P0000\_0300

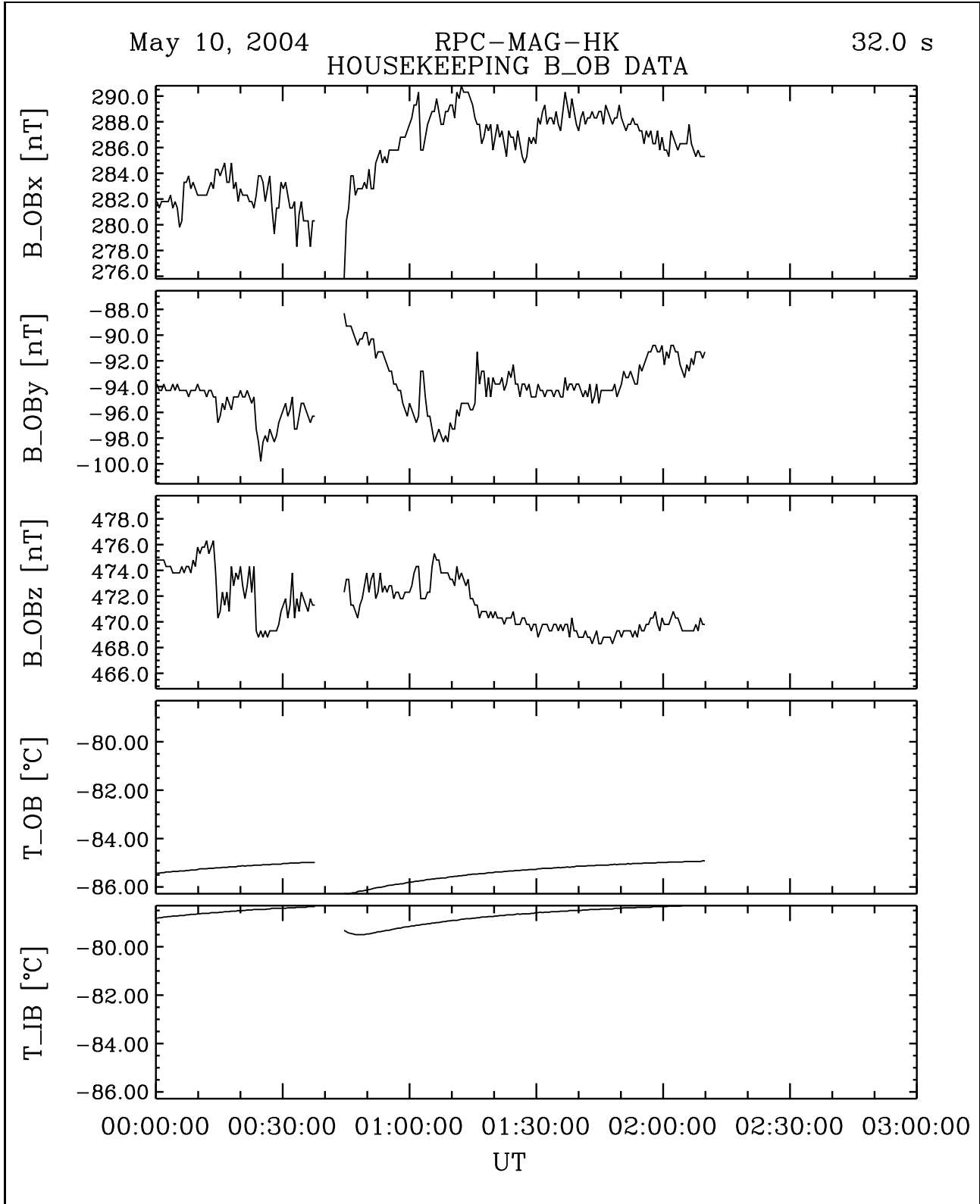


Figure 56: File: RPCMAG040510T0000\_CLA\_HK\_B\_P0000\_0300

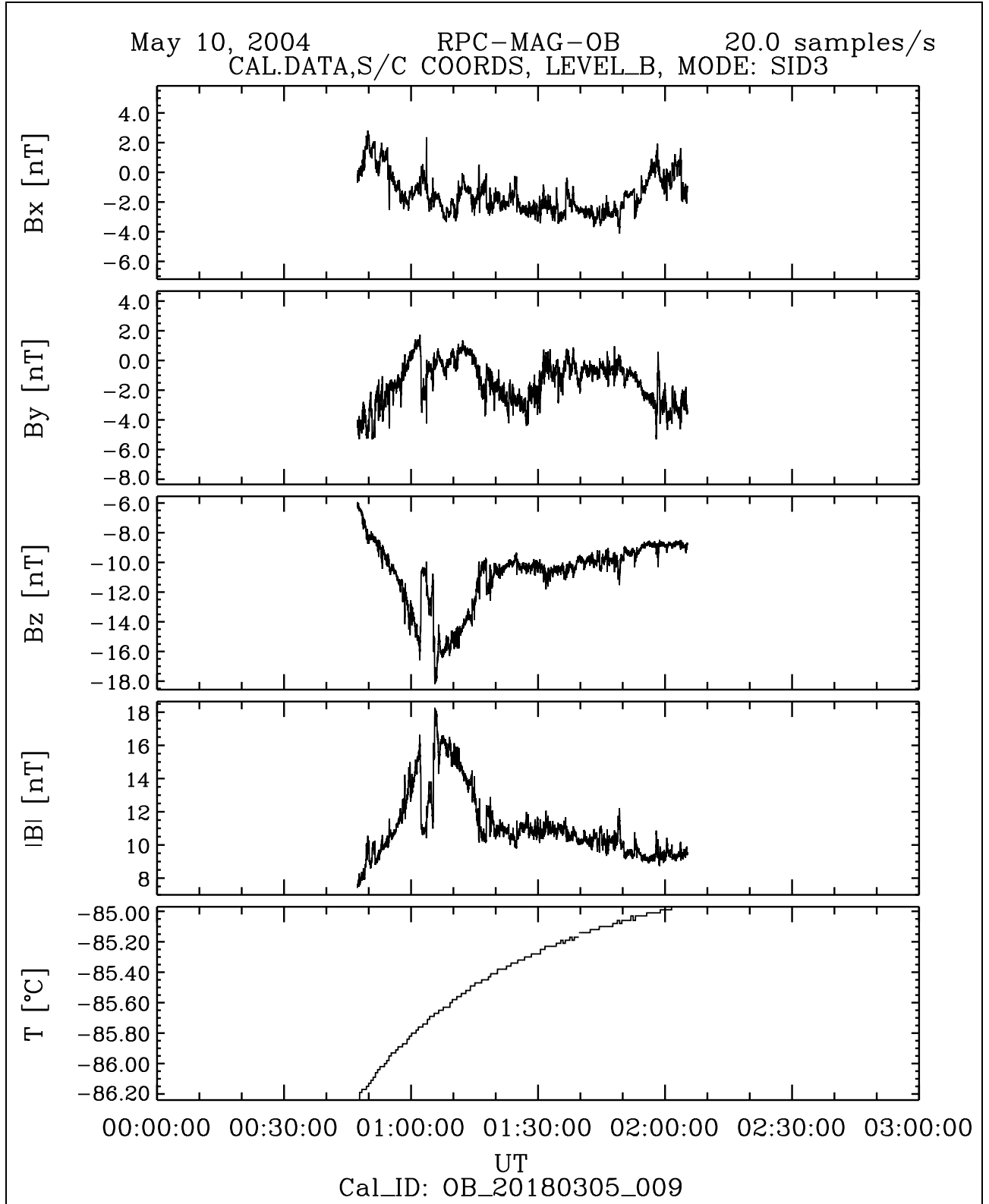


Figure 57: File: RPCMAG040510T0047\_CLB\_OB\_M3\_T0000\_0300\_009

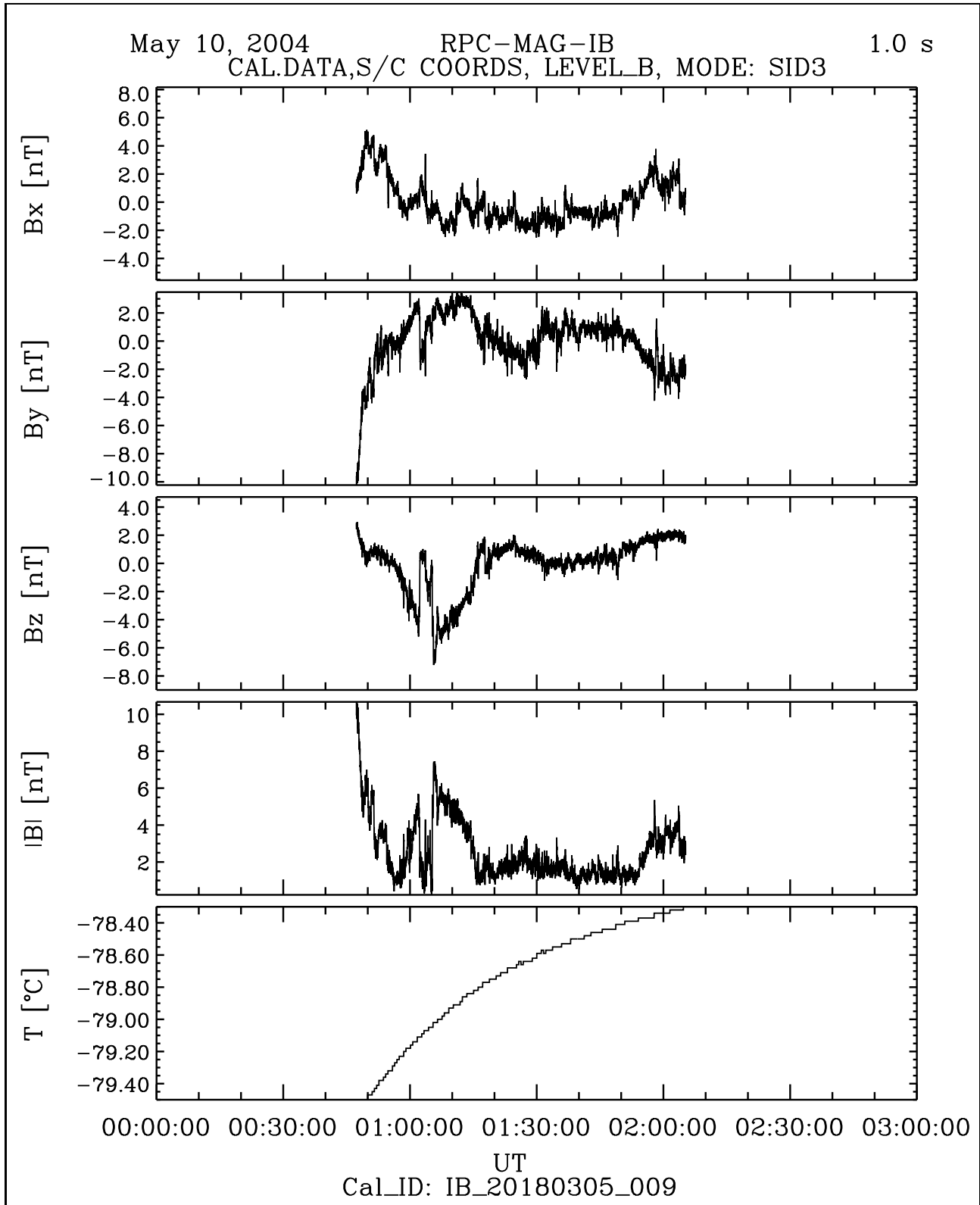


Figure 58: File: RPCMAG040510T0047\_CLB\_IB\_M3\_T0000\_0300\_009



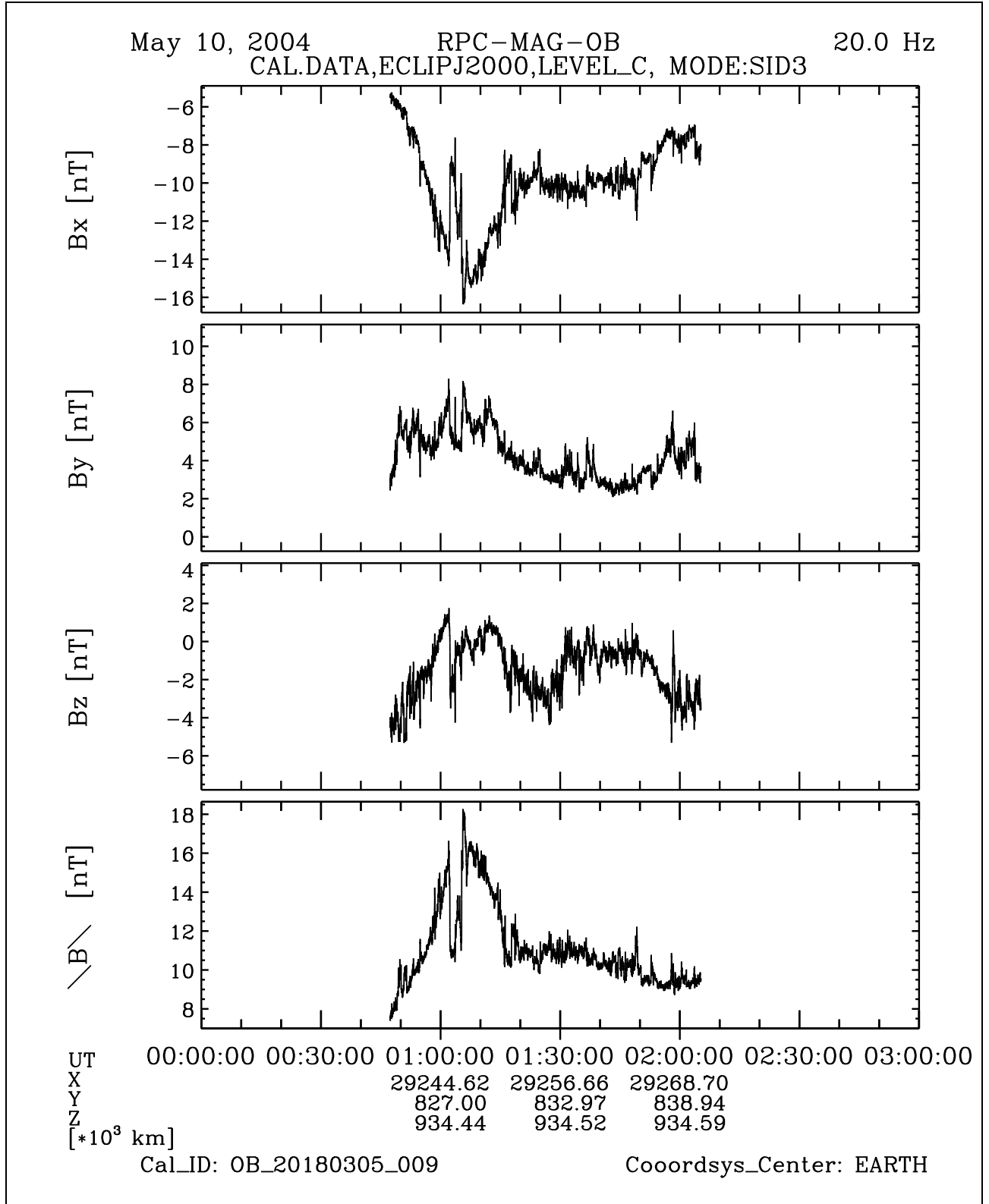


Figure 59: File: RPCMAG040510T0047\_CLC\_OB\_M3\_T0000\_0300\_009

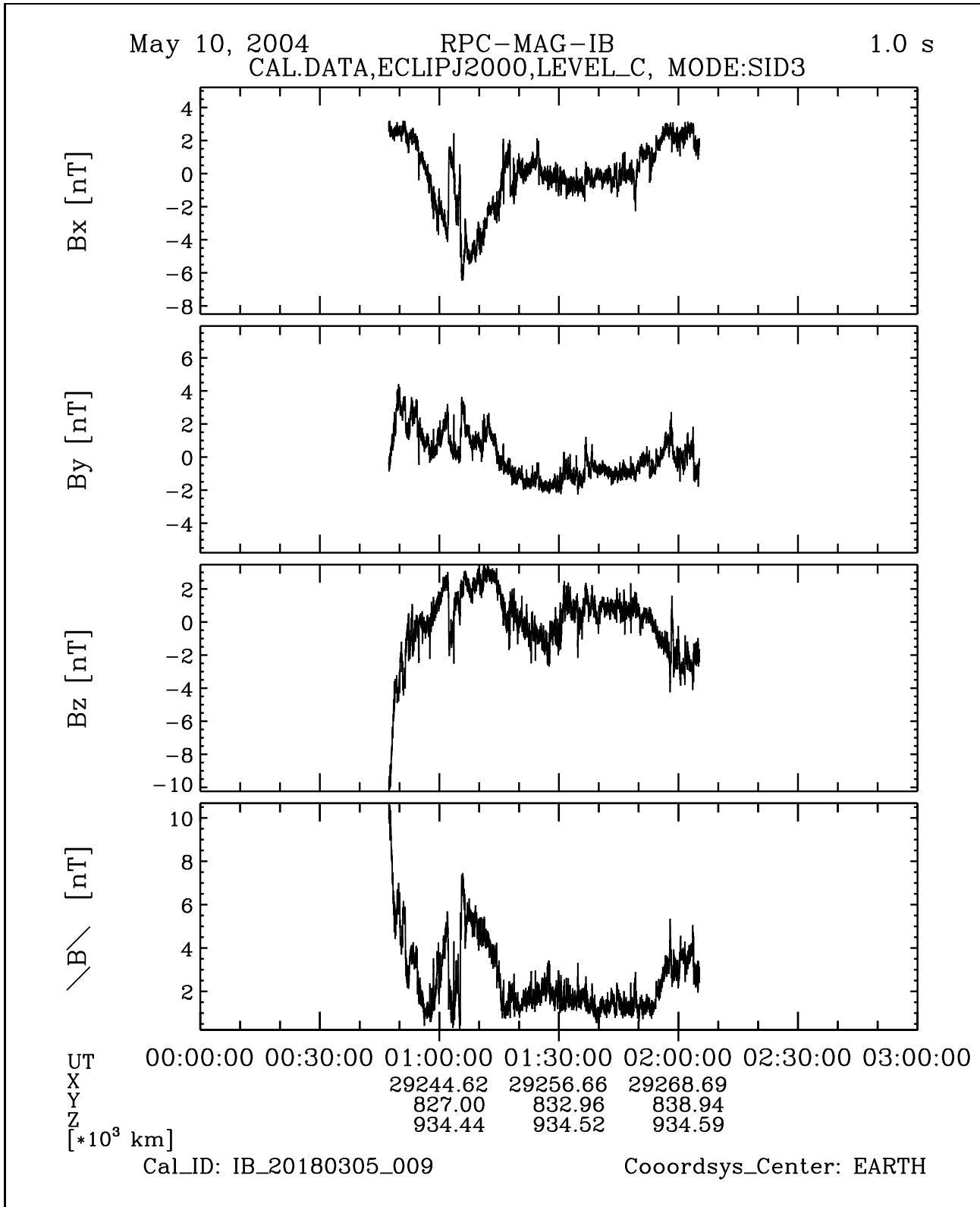


Figure 60: File: RPCMAG040510T0047\_CLC\_IB\_M3\_T0000\_0300\_009

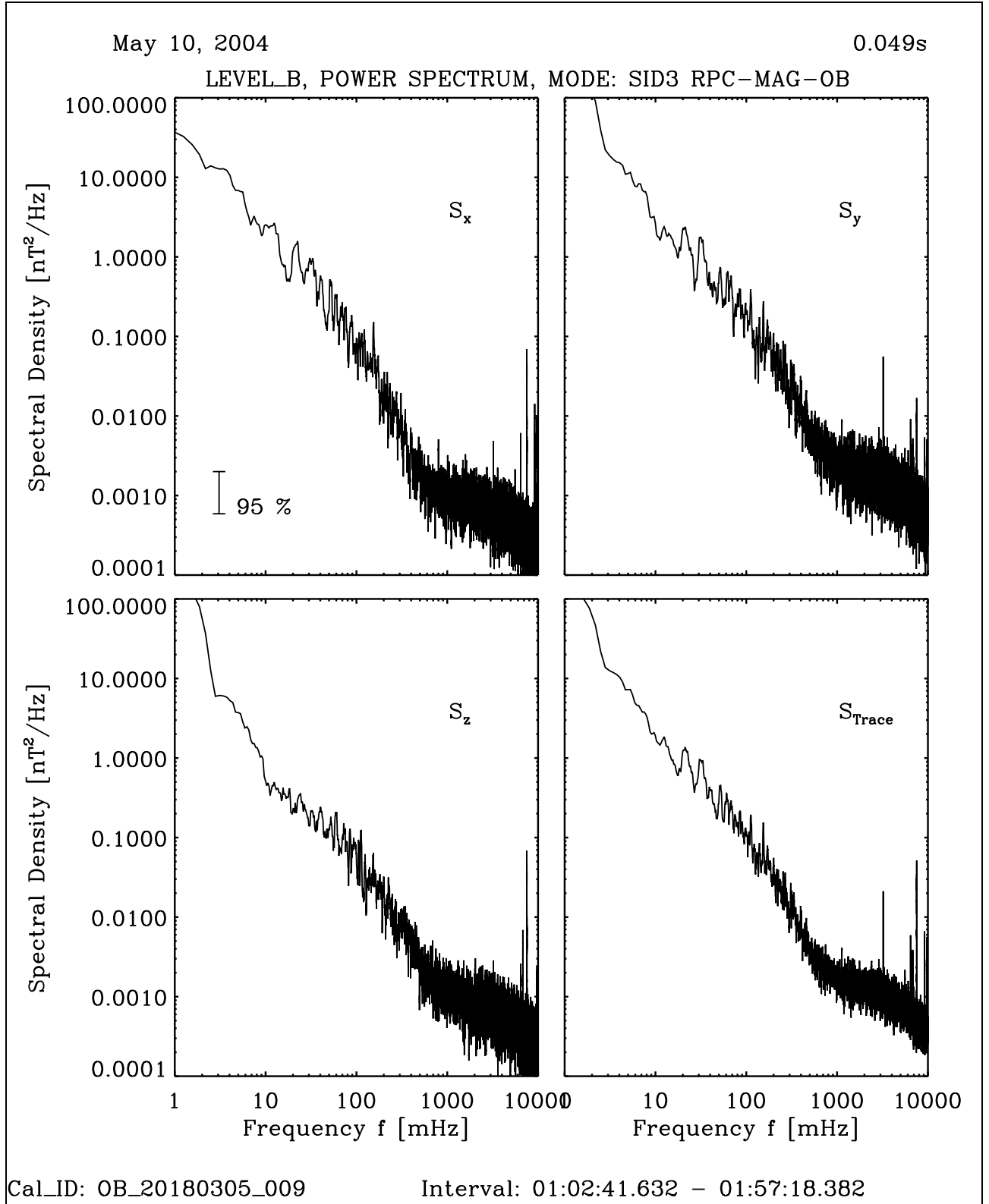


Figure 61: File: RPCMAG040510T0047\_CLB\_OB\_M3\_PS1\_10000\_009

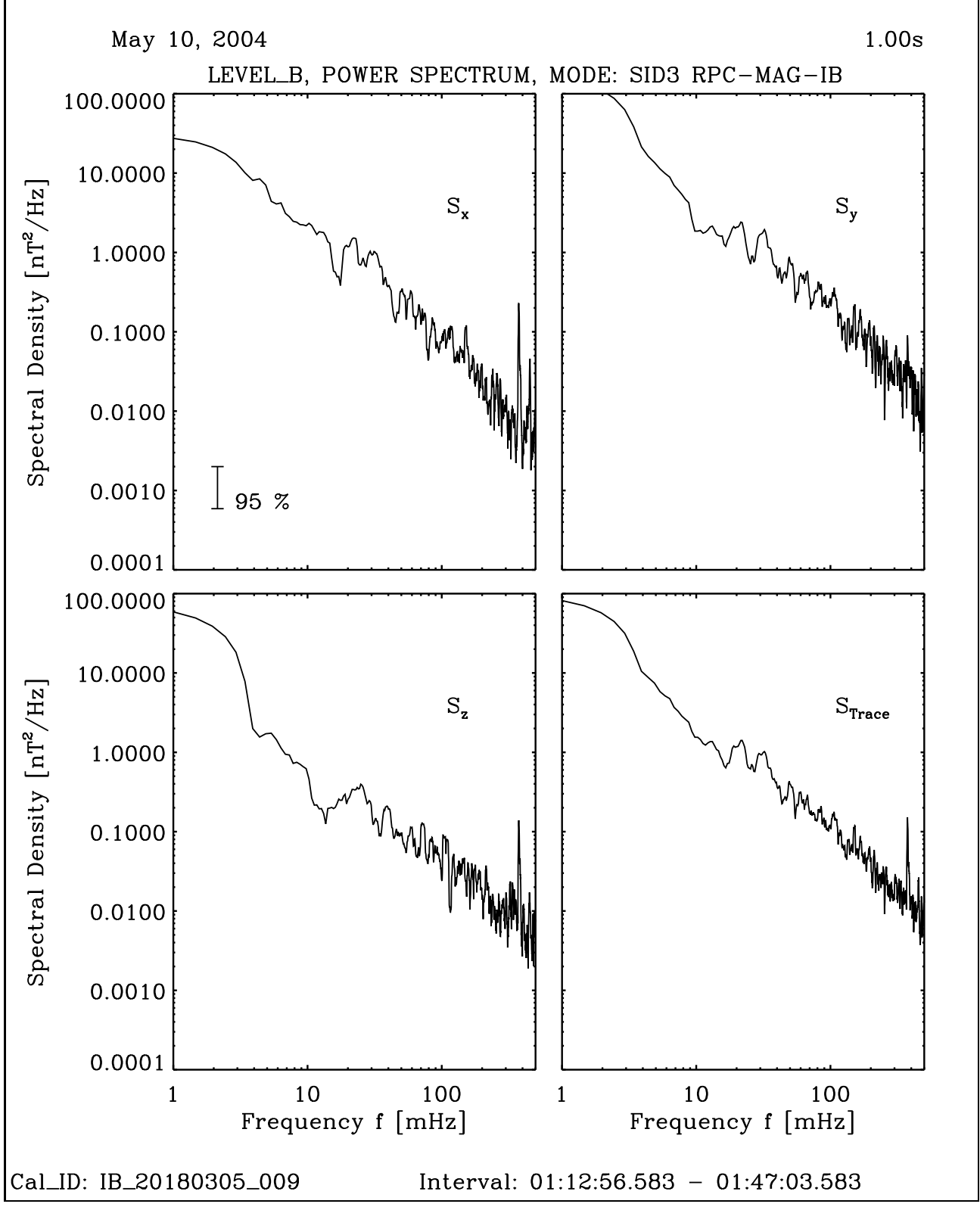


Figure 62: File: RPCMAG040510T0047\_CLB\_IB\_M3\_PS1\_10000\_009

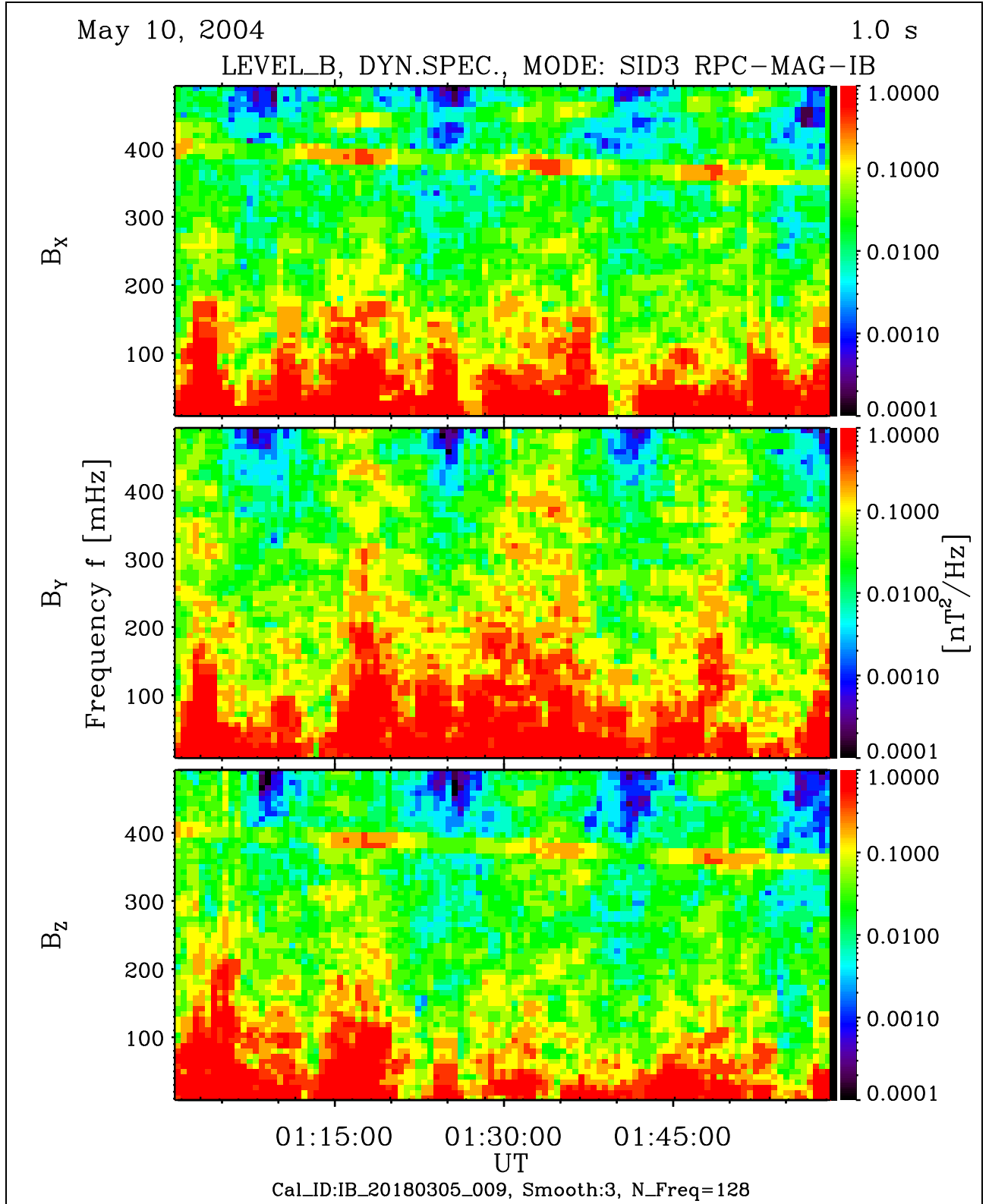


Figure 63: File: RPCMAG040510T0047\_CLB\_IB\_M3\_DS1\_500\_009

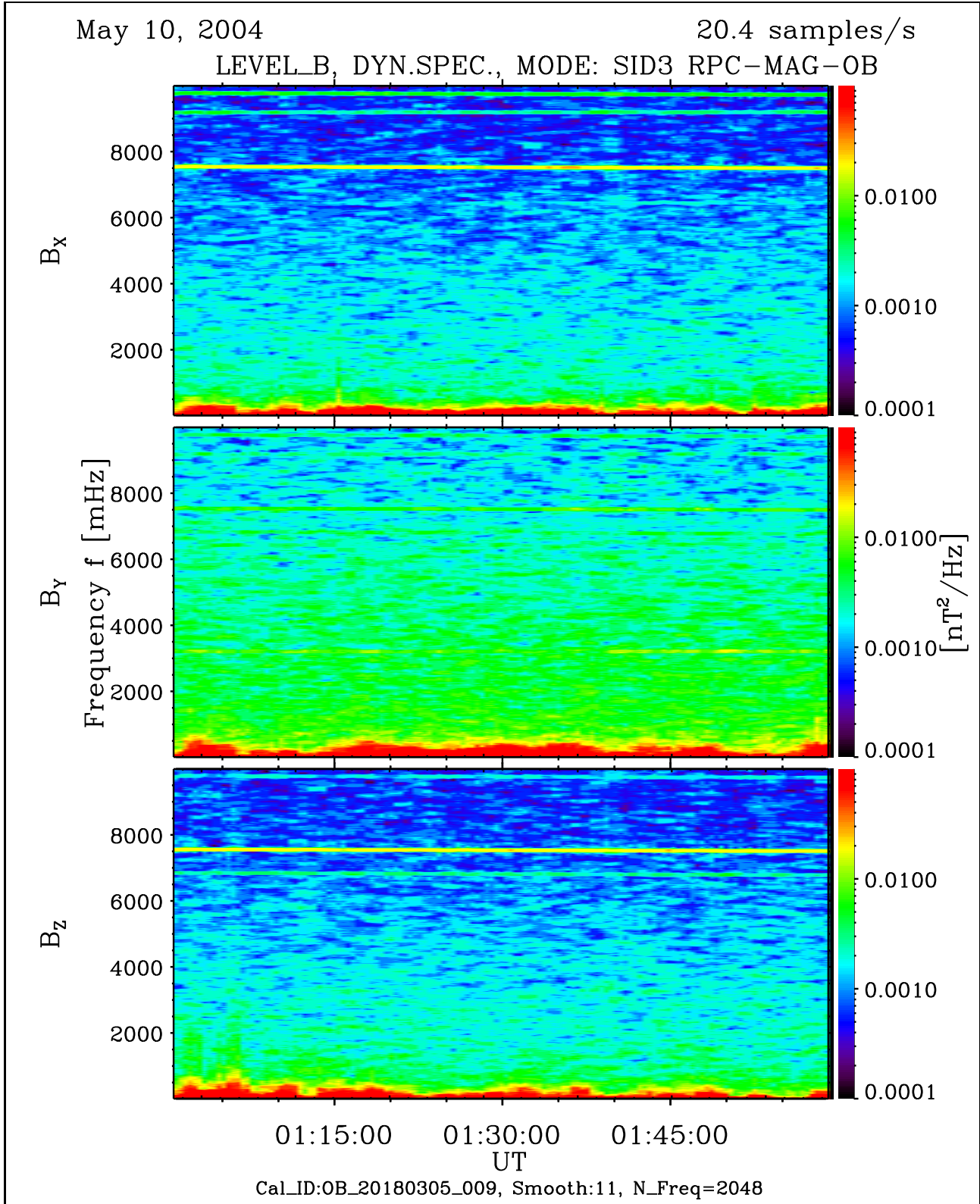


Figure 64: File: RPCMAG040510T0047\_CLB\_OB\_M3\_DS2\_10000\_009

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### 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 and 1 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.

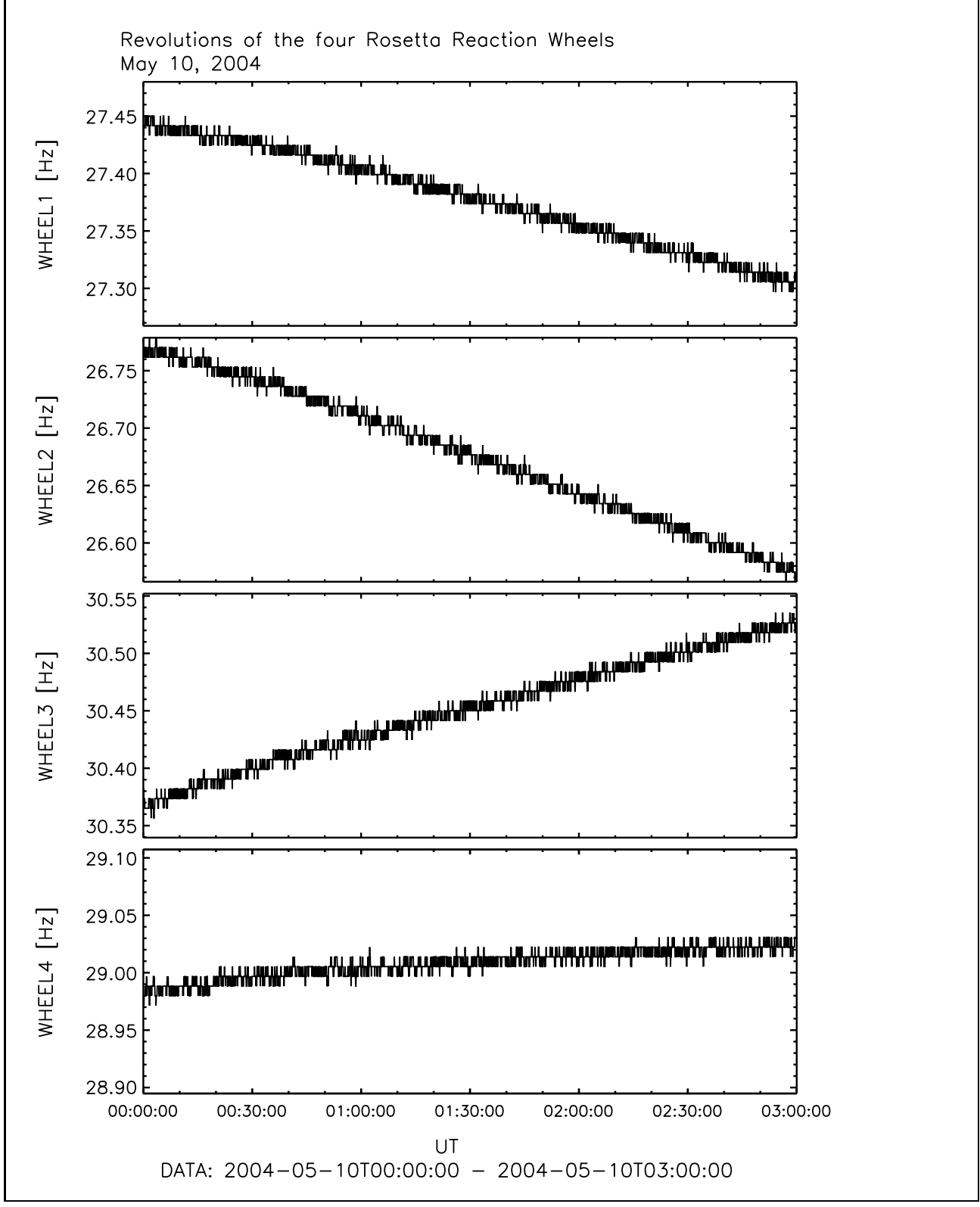


Figure 65: File: wheels\_Hz2004-05-10T00-00



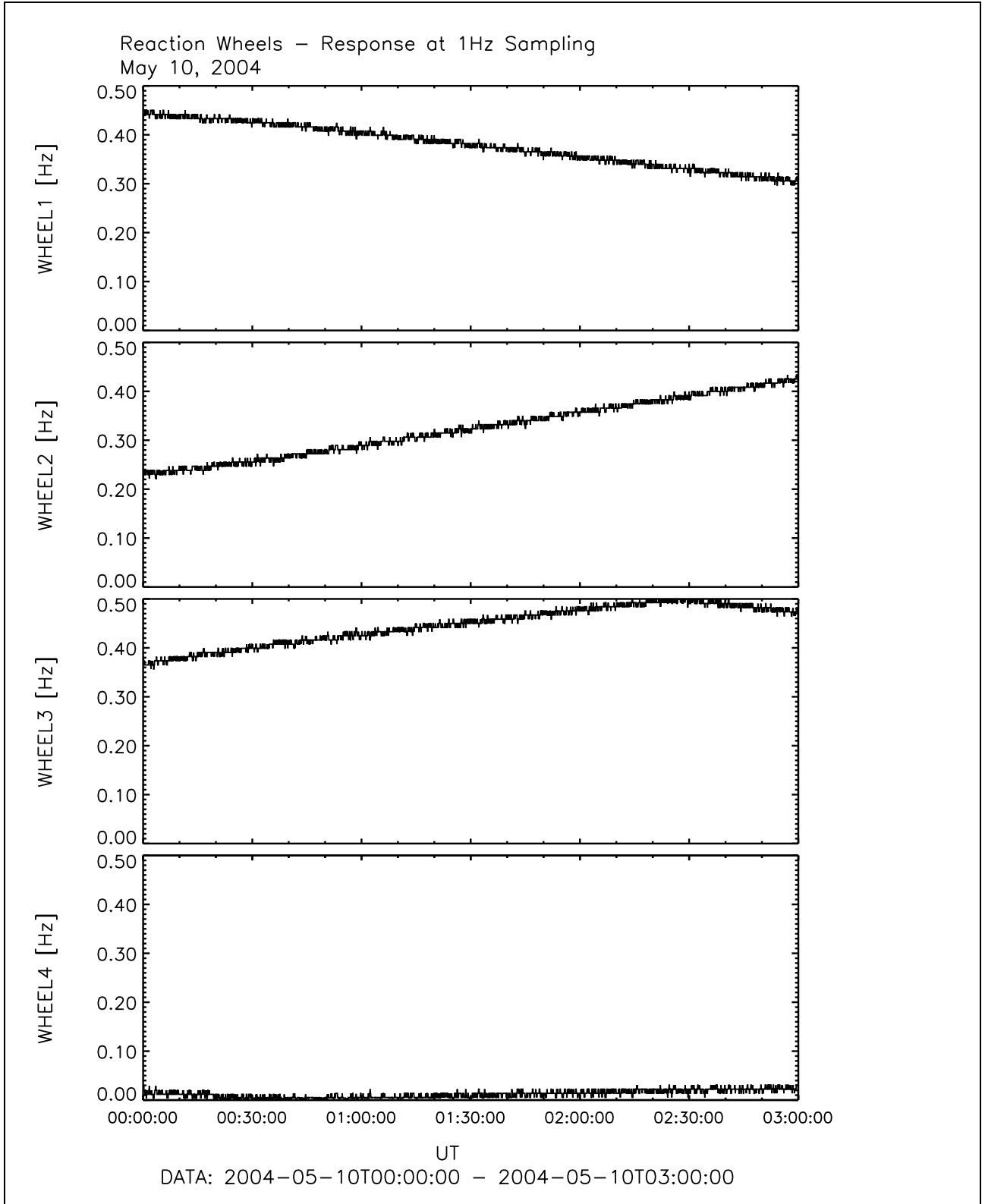


Figure 66: File: wheels\_1Hz\_Sampling2004-05-10T00-00

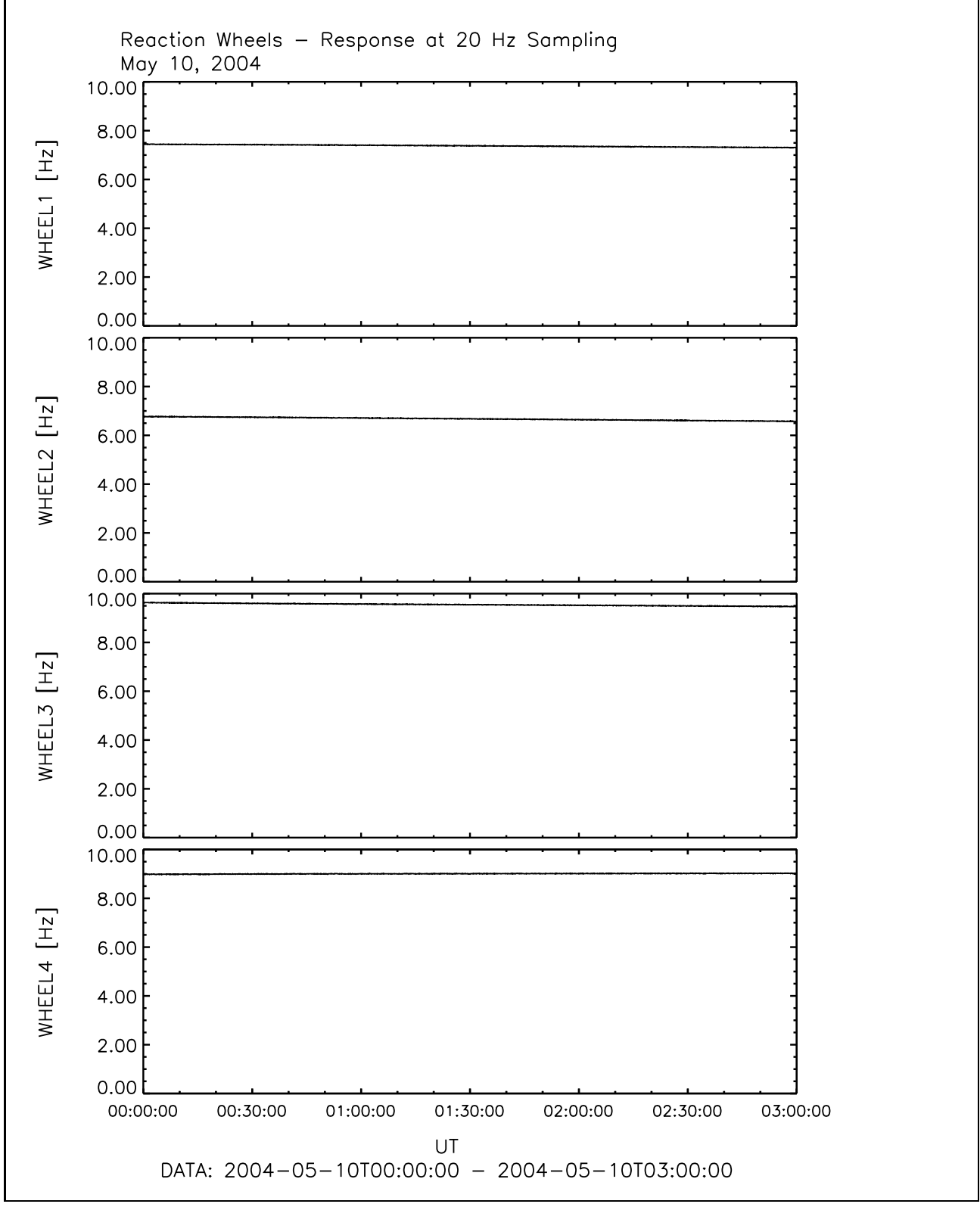


Figure 67: File: wheels\_20Hz\_Sampling2004-05-10T00-00