R O S E T T A

FLIGHT REPORTS
of RPC–MAG

RO–IGEP–TR–0032

Issue: 4 Revision: 2

2019-01-21

OVERVIEW OF
AVAILABLE RPCMAG DATA
AND
DATA QUALITY ASSESSMENT

Mission Phases: EAR3
Time Period: March 2009 - December 2009

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Contents

1 Introduction

This document contains information about all available data and its quality for the time period between March 2009 until December 2009. This covers this Mission Phase EAR3.

This time interval covers the campaigns

- Active Checkout PC10 in September 2009
- Earth Swingby No. 3, ESB3, in November 2009

For every year, month and day where measurement data are available overview plots have been created. The data availability plots show all data calibration levels available. The science modes of the data are distinguished by different colors. For RESAMPLED data the time average interval is listed as well. An overview table of available data completes the data overview.

Additionally for each measurement day two plots of LEVEL_F data (calibrated data in s/c-coordinates) are available.
The first plot ("OB vs. IB") shows

- the data of the OB-Sensor (red trace) and IB-Sensor (black trace)
- the temperatures measured at the related sensor locations.

The second plot ("OB - IB") displays

- the 3 magnetic field differences
  $\Delta B_x = B_{\mathrm{OB,x}} - B_{\mathrm{IB,x}}$
  $\Delta B_y = B_{\mathrm{OB,y}} - B_{\mathrm{IB,y}}$
  $\Delta B_z = B_{\mathrm{OB,z}} - B_{\mathrm{IB,z}}$
- the temperature change rates $\partial T_{\mathrm{OB}}/\partial t$ and $\partial T_{\mathrm{IB}}/\partial t$. Furthermore the upper and lower limits for the threshold rates (see below) are shown in green.

2 Quality assessment using OB & IB relations

For the assessment of the data quality four sets of quality indicators are distinguished in the plots.

- In the "OB vs. IB" plots the absolute differences between OB and IB magnetic field data have been labeled as colored areas. The coding is as follows:

COLOR	QUALITY	CRITERION
GREEN	PERFECT	$\|(B_{OB} - B_{IB}) - <(B_{OB} - B_{IB})>^{t_{interval}}\| < 1nT$
YELLOW	GOOD	$\|(B_{OB} - B_{IB}) - <(B_{OB} - B_{IB})>^{t_{interval}}\| < 2nT$
BLUE	AMPLE	$\|(B_{OB} - B_{IB}) - <(B_{OB} - B_{IB})>^{t_{interval}}\| < 4nT$
ORANGE	POOR	$\|(B_{OB} - B_{IB}) - <(B_{OB} - B_{IB})>^{t_{interval}}\| > 4nT$

  Remark: The assessment is based on logical ANDed conditions, meaning that the stated criteria have to be fulfilled for ALL components simultaneously. If therefore, e.g. only two components are "good" and one is "bad" , the indication will be "bad".

  These data are used for the generation of QUALITY FLAG 1 (cf. section 3). The magnetic field difference reduced by the average of the field difference over the time t_{average} (averaged over one day or a valid data interval if gaps are present on specific days) is used as indicator in order to emphasize the simultaneous recording with two sensors, even if there is a constant shift due to S/C-influences. Using such an indicator the bad data flag will be set, if both sensors show different variations. A constant deviation, however, will not cause any "bad" flagging.

- The second quality flag handles the joined temperature behaviour of the sensors. Intervals where the sensors are not in thermal equilibrium have been marked as violet-striped areas. Thus the "BAD INTERVAL" assessment indicator I_2 for the second flag has been derived from the first derivative of the difference of the sensor temperatures

$$I_2 = \frac{\partial(T_{\text{OB}} - T_{\text{IB}})}{\partial t}$$

  Areas are marked with violet stripes if I_2 exceeds a certain level. This level has been empirically chosen as 0.1 mK/s.

- The third quality flag treats the individual temperature behaviour of the sensors. Phases where the individual sensors are not in thermal equilibrium have been marked as solid violet areas. Thus the "BAD INTERVAL" assessment indicator I_3 of for this feature has been derived from the first derivative of the sensor temperatures

$$I_{3,\text{OB}} = \frac{\partial T_{\text{OB}}}{\partial t}$$
$$I_{3,\text{IB}} = \frac{\partial T_{\text{IB}}}{\partial t}.$$

Areas are marked as solid violet boxes if I_3 exceeds a certain level. This level has been empirically chosen as 0.5 mK/s (depicted as green lines in the last two panels of the "OB - IB" plot).

These data are used for the computation of the two MSBs in QUALITY FLAG 1 (cf. section 3).

- The fourth quality check is based on the relative deviation between the data of the OB and IB sensors. The magnetic field data differences in the "OB - IB" plot are therefore color coded using the following scheme:

COLOR	QUALITY	CRITERION
GREEN	PERFECT	$\|\frac{({}^{B}\mathrm{OB}-{}^{B}\mathrm{IB})-<({}^{B}\mathrm{OB}-{}^{B}\mathrm{IB})>^{t_{interval}}}{{}^{B}\mathrm{OB}}\| < 10\%$
YELLOW	GOOD	$\|\frac{({}^{B}\mathrm{OB}-{}^{B}\mathrm{IB})-<({}^{B}\mathrm{OB}-{}^{B}\mathrm{IB})>^{t_{interval}}}{{}^{B}\mathrm{OB}}\| < 20\%$
BLUE	AMPLE	$\|\frac{({}^{B}\mathrm{OB}-{}^{B}\mathrm{IB})-<({}^{B}\mathrm{OB}-{}^{B}\mathrm{IB})>^{t_{interval}}}{{}^{B}\mathrm{OB}}\| < 50\%$
ORANGE	POOR	$\|\frac{({}^{B}\mathrm{OB}-{}^{B}\mathrm{IB})-<({}^{B}\mathrm{OB}-{}^{B}\mathrm{IB})>^{t_{interval}}}{{}^{B}\mathrm{OB}}\| > 50\%$

This indicator marks the data as "bad" if there is huge relative deviation, happening especially at low fields in the solar wind. It represents a relative conservative assessment flag. Thus if this is "green", one can be rather confident, that the data quality is quite good.

These data are used to build QUALITY FLAG 2 (cf. section 3).

3 Complete Quality Assessment & Quality Flag System

Magnetic field data measured onboard a s/c can be disturbed and influenced by various entities, leading to a decreased level of data quality. Not only the data itself but some auxiliary information has been collected from various sites in a troublesome process and will be used to establish the data flagging system described here. In order to get an idea about the data quality a qualitative and – where possible – a quantitative assessment criterion has to be created. For the RPCMAG data this is achieved by a system of data quality flags which are set at the end of the data processing chain. As the data quality is a time dependent entity, each magnetic field vector needs to be flagged individually. Therefore, each magnetic field vector in the CALIBRATED and RESAMPLED data files gets a flag-string (to be found at the end of each row in the *.TAB files). These flag strings have a length of 11 characters. Each character/position of the string represents a specific property of quality diminishment. Each of these 11 variables is enciphered by an alphanumerical (hexadecimal) code with the general meaning:

VALUE:	MEANING:
x	Property described by flag is unknown, no assessment has been / can be made
0	No disturbance, good quality
1..9,A..F	Specific disturbance/problems, specific codes: see section 3.1, In general higher numbers represent more severe quality diminishments.

The specific flag definition as given in section 3.1 is an open and expandable scheme. For the actual situation known problems are covered, however, more details i.e. subitems can be added if necessary.

3.1 Quality Flags Description

FLAG-STRING POSITION B A 9 8 7 6 5 4 3 2 1	FLAG	DESCRIPTION
- - - - - - - - - - 1	1	RELATION BETWEEN IB AND OB SENSOR (binary coded)
- - - - - - - - - - 1	1	Digit 3 2 1 0 : Value
- - - - - - - - - - 1	1	: x no assessment
- - - - - - - - - - 1	1	0 0 : 0 Difference < 1nT , PERFECT
- - - - - - - - - - 1	1	0 1 : +1 Difference < 2nT , GOOD
- - - - - - - - - - 1	1	1 0 : +2 Difference < 4nT , AMPLE
- - - - - - - - - - 1	1	1 1 : +3 Difference > 4nT , POOR
- - - - - - - - - - 1	1	1 : +4 IB Temperature drifting
- - - - - - - - - - 1	1	1 : +8 OB Temperature drifting
- - - - - - - - - 2 -	2	PERCENTAGE OB / IB DIFFERENCE
- - - - - - - - - 2 -	2	x = no assessment
- - - - - - - - - 2 -	2	0 = deviation < 10 %, PERFECT CORRELATION
- - - - - - - - - 2 -	2	1 = deviation < 20 %, GOOD CORRELATION
- - - - - - - - - 2 -	2	2 = deviation < 50 %, AMPLE CORRELATION
- - - - - - - - - 2 -	2	3 = deviation > 50 %, POOR CORRELATION
- - - - - - - - 3 - -	3	IMPACT OF REACTION WHEELS AND LAP DISTURBANCE
- - - - - - - - 3 - -	3	x = impact not assessed
- - - - - - - - 3 - -	3	0 = probably no disturbance
- - - - - - - - 3 - -	3	1 = disturbance eliminated during data analysis
- - - - - - - - 3 - -	3	2 = disturbance possible
- - - - - - - - 3 - -	3	3 = disturbance not clear
- - - - - - - - 3 - -	3	4 = data disturbed, cleaned CLH data available
- - - - - - - - 3 - -	3	5 = data disturbed, elimination not possible
- - - - - - - 4 - - -	4	VARIOUS DISTURBANCE EFFECTS
- - - - - - - 4 - - -	4	x = no assessment
- - - - - - - 4 - - -	4	0 = no other problems detected
- - - - - - - 4 - - -	4	1 = severe heater impact at EAR1 eliminated
- - - - - - - 4 - - -	4	2 = severe heater impact at EAR1,about 2nTpp PWM
- - - - - - - 4 - - -	4	3 = S/C 28 V Power failure
- - - - - - - 4 - - -	4	4 = dT/dt > threshold, no thermal equilibrium
- - - - - - - 4 - - -	4	5 = data disturbed by AC-signal, origin at S/C
- - - - - - - 4 - - -	4	6 = data noisy due to power on failure
- - - - - - - 4 - - -	4	7 = ADC latch-up:bit error.Final data corrected!
- - - - - - - 4 - - -	4	8 = sensor saturated due to huge external field
- - - - - - - 4 - - -	4	9 = sensor saturated, instrument power on failed
- - - - - - 5 - - - -	5	LANDER HEATER STATUS (binary coded)
- - - - - - 5 - - - -	5	digit 3 2 1 0 :Value
- - - - - - 5 - - - -	5	: x no assessment
- - - - - - 5 - - - -	5	1 : +1 MSS1 off/on (0/1)
- - - - - - 5 - - - -	5	1 : +2 MSS2 off/on (0/1)
- - - - - - 5 - - - -	5	1 : +4 HIB1 off/on (0/1)
- - - - - - 5 - - - -	5	1 : +8 HIB2 off/on (0/1)
- - - - - 6 - - - - -	6	LANDER P/L STATUS (binary coded)
- - - - - 6 - - - - -	6	digit 3 2 1 0 :Value
- - - - - 6 - - - - -	6	: x no assessment
- - - - - 6 - - - - -	6	1 : +1 COSAC off/on (0/1)
- - - - - 6 - - - - -	6	1 : +2 COSAC active (0/1)
- - - - - 6 - - - - -	6	1 : +4 PTOLEMY off/on (0/1)
- - - - - 6 - - - - -	6	1 : +8 PTOLEMY active (0/1)

- - - - 7 - - - - - - -	7	LANDER STATUS (binary coded)
- - - - 7 - - - - - - -	7	digit 3 2 1 0 :Value
- - - - 7 - - - - - - -	7	: x no assessment
- - - - 7 - - - - - - -	7	1 : +1 Lander detached/attached (0/1)
- - - - 7 - - - - - - -	7	2 : +2 ROMAP data available (0/1)
- - - - 7 - - - - - - -	7	4 : +4 LANDER on/off (0/1)
- - - - 7 - - - - - - -	7	8 : +8 Separation ongoing (0/1)
- - - 8 - - - - - - - -	8	BOOM DEPLOYMENT:
- - - 8 - - - - - - - -	8	x = no assessment
- - - 8 - - - - - - - -	8	0 = boom deployed
- - - 8 - - - - - - - -	8	1 = boom stowed
- - - 8 - - - - - - - -	8	2 = boom deployment ongoing. Data only valid
- - - 8 - - - - - - - -	8	in instrument coordinates
- - - 8 - - - - - - - -	8	3 = pyros fired for boom release
- - 9 - - - - - - - - -	9	IMPACT OF WHEEL OFFLOADING MANOEUVRE (WOL)
- - 9 - - - - - - - - -	9	x = no assessment
- - 9 - - - - - - - - -	9	0 = WOL not active
- - 9 - - - - - - - - -	9	1 = WOL active, no disturbance visible
- - 9 - - - - - - - - -	9	2 = Start of WOL not visible
- - 9 - - - - - - - - -	9	3 = End of WOL not visible
- - 9 - - - - - - - - -	9	4 = WOL completely visible
- A - - - - - - - - - -	A	IMPACT OF ORBITAL CORRECTION MANOEUVRE (OCM)
- A - - - - - - - - - -	A	x = no assessment
- A - - - - - - - - - -	A	0 = OCM not active
- A - - - - - - - - - -	A	1 = OCM active, no disturbance visible
- A - - - - - - - - - -	A	2 = Jump visible (in B and/or dB/dt)
- A - - - - - - - - - -	A	3 = Comb-disturbance visible (in B and/or dB/dt)
- A - - - - - - - - - -	A	4 = Jump and comb visible
- A - - - - - - - - - -	A	5 = no data during OCM
B - - - - - - - - - - -	B	PLASMA ENVIRONMENT
B - - - - - - - - - - -	B	x = no assessment
B - - - - - - - - - - -	B	0 = Cavity
B - - - - - - - - - - -	B	1 = pure solar wind
B - - - - - - - - - - -	B	2 = cometary influenced solar wind
B - - - - - - - - - - -	B	3 = pure cometary environment, sw not present
B - - - - - - - - - - -	B	4 = Earth swing-by
B - - - - - - - - - - -	B	5 = Mars swing-by
B - - - - - - - - - - -	B	6 = Steins fly-by
B - - - - - - - - - - -	B	7 = Lutetia fly-by

3.2 Quality decreasing Entities

- Offset/residual-field related Effects – Quality Flag 1 and 2
  It's a known fact that the quality of magnetic field measurements is inter alia strongly dependent on the

  - sensor offset
  - s/c residual-field

  The sensor offset is a temperature dependent entity, which has been calibrated on ground in a limited temperature range. Using inflight data it was possible to create an improved temperature offset-model for an extended temperature range. Thus, the sensor offset can be calibrated if the sensor is in thermal equilibrium. In phases of fast changing temperatures (e.g. a fly-by with a fast varying pointing) the actual offset might not be computed correctly. Therefore data might drift during such phases.

  Additionally the s/c residual field affects the magnetic field measurements strongly. Changes in the s/c residual field (either drifts or jumps) occur quite often due to varying payload or s/c-subsystem activities. Reasons are varying currents, moving magnetic parts or temperature effects acting on spacecraft parts and causing magnetic properties to be changed.
  The magnetic cleanliness requirements for the ROSETTA s/c were far from the requirements applied to e.g. the CLUSTER spacecrafts. Therefore, a very limited magnetic cleanliness program yielded a relatively noisy and "magnetically dirty" ROSETTA satellite which generates the disturbances seen in the magnetic field data during flight.

- Correlation between Inboard (IB) and Outboard (OB) Sensor – Quality Flag 1,2,4
  Under ideal conditions the IB and OB sensor measure the same field. This perfect situation can, however, be declined by different effects:

  - different temperature dynamics (e.g. due to different shadowing and different solar irradiation) cause different offset behavior of both sensors.
  - due to different locations the sensors measure the disturbing sources of the s/c in different ways. Therefore, changing s/c fields produce different impacts at the locations of the sensors and cause the correlation between the sensor data to be decreased.
  - often the real offset of the sensors is not as important as a good common AC-behavior. Thus, the short term "high frequent" behavior can be acceptable where as the long term behavior is poor due to offset or s/c residual-field drifts. This possible characteristics can be reflected by the flagging system.

  The different thermal behavior of the sensors is characterized using the either the combined indicator I_2 defined in section 2:

$$I_2 = \frac{\partial(T_{\mathrm{OB}} - T_{\mathrm{IB}})}{\partial t}$$

and also the individual temperature change rates

$$I_{3,\mathrm{OB}} = \frac{\partial T_{\mathrm{OB}}}{\partial t}$$
$$I_{3,\mathrm{IB}} = \frac{\partial T_{\mathrm{IB}}}{\partial t}.$$

They are used do obtain a quantitative measure of the thermal behavior. If I_2 exceeds the threshold level of $\frac{0.1\mathrm{mK}}{\mathrm{s}}$ (empirically chosen) the data in the overview plots will be marked by violet-stripes, indicating that the thermal equilibrium is not reached, and that the time series of both sensors can show different trends. In this case Bit 4 of Quality Falg 4 will be set.
If individual indicators I_3 exceed a threshold of $\frac{0.5\mathrm{mK}}{\mathrm{s}}$ the data will be marked by solid-violet boxes and Bit 2 (IB) and /or Bit 3 (OB) of quality flag 1 will be set.

- Reaction Wheels (RW) – Quality Flag 3
The 4 reaction wheels of the ROSETTA s/c generate varying magnetic fields due to the rotating magnetic material. The changing frequency is known; if burst mode data are present, the disturbance can in general be eliminated by transformation of the data into the frequency domain and damping the affected frequencies down to background noise. The AC disturbance caused by the RWs is in the order of 3 nT. Due to the nature of the occurring frequencies data measured in normal mode are in general not disturbed. In case of disturbance, however, elimination is hardly possible due to the amplitude and bandwidth of the disturbance, which covers the full spectral range of the wanted signal.

- LAP disturbance – Quality Flag 3
The LAP disturbance occurs at constant frequencies of 3.2 Hz or 3.6 Hz. The mechanism of creating this disturbance is unknown to the LAP-team, but as it appears at a constant level (about 1 nT) and constant frequencies, the elimination can be done quite easily during the purging of the reaction wheel impact. Purged data can be found in CLH data.

- Various disturbance effects by other impacts – Quality Flag 4
Various effects are imaginable causing the magnetic field data quality to be not optimal. Using data collected during the past years of the ROSETTA mission lots of disturbers could be identified. However, often the situation on the s/c was so complex, especially at the "high activity" times during the fly-bys, that neither the disturbers could be identified individually nor the disturbing signals were very clear. In these case the disturbance is obvious, a flag indicating that the data are not clean is necessary, but the real polluter can not be named. Currently defined categories for such case are:

  – data disturbed by pulses originated in s/c

  – data disturbed by AC signals originated in s/c

A second set of problems relates to the RPCMAG instrument itself:

  – data noisy due to "power on" failure
  – data not computable due to thermistor failure
  – sensor saturated due to huge external field
  – sensor saturated, instrument power on sequence failed

It happened once in the mission that the "power on" command was received by PIU but not executed by MAG. A reboot of the system solved the problem. Such a behavior can occur very sporadically (it is very unlikely) due to critical link timing issues; in this case, PIU sends TM data, which are just random noise.

It might happen that a sensor thermistor breaks (extremely unlikely). Then temperature data is not available and the temperature offset-model cannot by applied, i.e. calibrated data cannot be produced in the standard way.

The sensor is designed for a field limit of about ±16000 nT. Therefore, the instrument got saturated for some minutes during the Earth flybys due to the high external field. These circumstances can be indicated by the flag system as well.

It might also happen (once in the mission) that the instrument suffers a latch up during the "power on" sequence causing the ADCs to send 0xFFFFF (pretending saturation). This can be indicated by a flag as well. The solution for these cases is also rebooting the MAG instrument.

- Lander: Heater Currents and P/L activation – Quality Flag 5 and 6
  During mission phases where the ROSETTA Lander PHILAE was operated, disturbances caused by various heaters of PHILAE P/L instruments were detected. Those heaters were operated continuously or pulsed (PWM) with periods in the order of a few seconds to minuts. The flowing currents caused magnetic signatures in the order of 2 nT. For certain mission phases these disturbances could semi-manually be eliminated.

- Lander – Quality Flag 7
  The Lander and the wiring concept of the ROSETTA - PHILAE system causes many disturbances as long as PHILAE is connected to ROSETTA. Therefore, all data will be flagged, if PHILAE is present and especially if it is activated. The separation of PHILAE on November 12, 2014 caused a field jump of about 20 nT. The exact jump is taken into account for the final data calibration model of the RPCMAG data.

- Boom Deployment – Quality Flag 8
  During the commissioning phase in March 2004 the magnetometer boom was deployed, changing its orientation from the stowed position to the final deployed orientation. The whole procedure took about 2 hours. During this time interval the

residual magnetic field of the s/c measured by the moving RPCMAG sensors changed dramatically (a few hundred nT), as the distance to the disturbing sources located on the s/c changed. In the deployed boom orientation, which is stable since that time, the residual-field and the disturbance/noise level caused by the s/c is much less than in the stowed boom orientation (Therefore the sensors are mounted on the boom ...!).

- Orbit correction (OCM) and Wheel Offloading (WOL) Manoeuvres –
  Quality Flag 9 and A.
  The major attitude changes of ROSETTA are performed using thrusters comprising magnetic valves. Once the thrusters are activated, the movable valve magnets cause also shifts in the magnetic fields recorded with the RPCMAG sensors. Therefore, all these manoeuvre times are flagged in detail in different way, reflecting different disturbances. The disturbance can either be just field shifts or even periodic pulses (626 mHz). The disturbance level is up to 6 nT and can be present up to 20 minutes for the big manoeuvres.

All the effects discussed above can diminish the data quality. If this happens in any way, an appropriate flag (described in the table above) will be set.

Furthermore a final quality Flag (Flag B) has been created to describe the plasma/celestial environment a the actual time. Thus, phases as cavity, solar wind, cometary influenced solar wind or the swing-bys at Earth and Mars can easily be identified.

3.3 WARNING for Data User

All effects described above lead to disturbed data which can only partly be improved by sophisticated software. Thus the quality flags of the magnetic field vectors should be observed carefully to avoid misinterpretation of contaminated data.

All data have been processed on best effort base, nevertheless mistakes might slip in always. The data processing is done mostly automatically whereas the quality assessment can only be performed semi-automatically or manually. If a quality flag of a value $\neq 0$ is set, it does not automatically mean that the data are not usable for scientific purposes. One just should be careful and use these data with keen mind.

4 2009

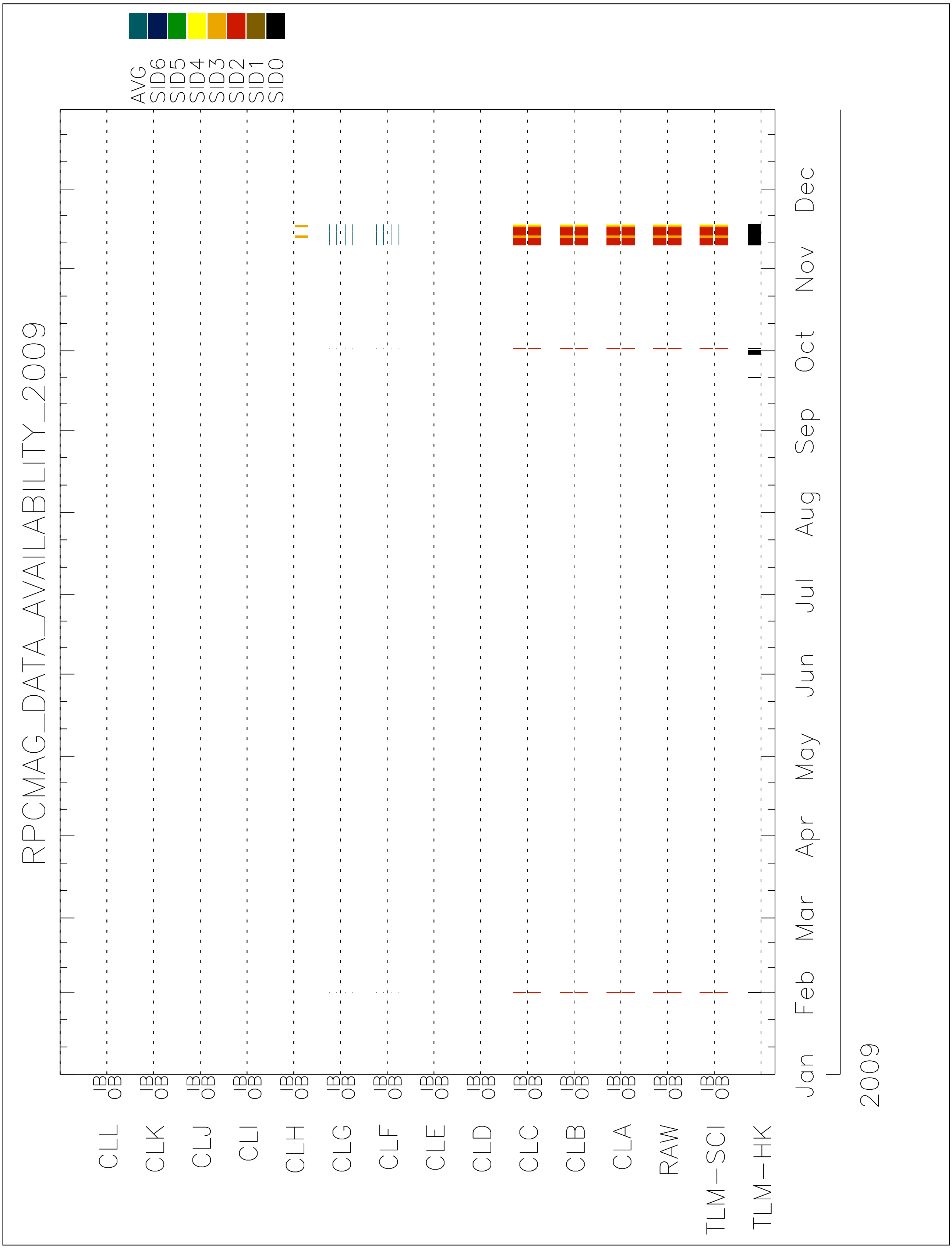


Figure 1: Overview 2009

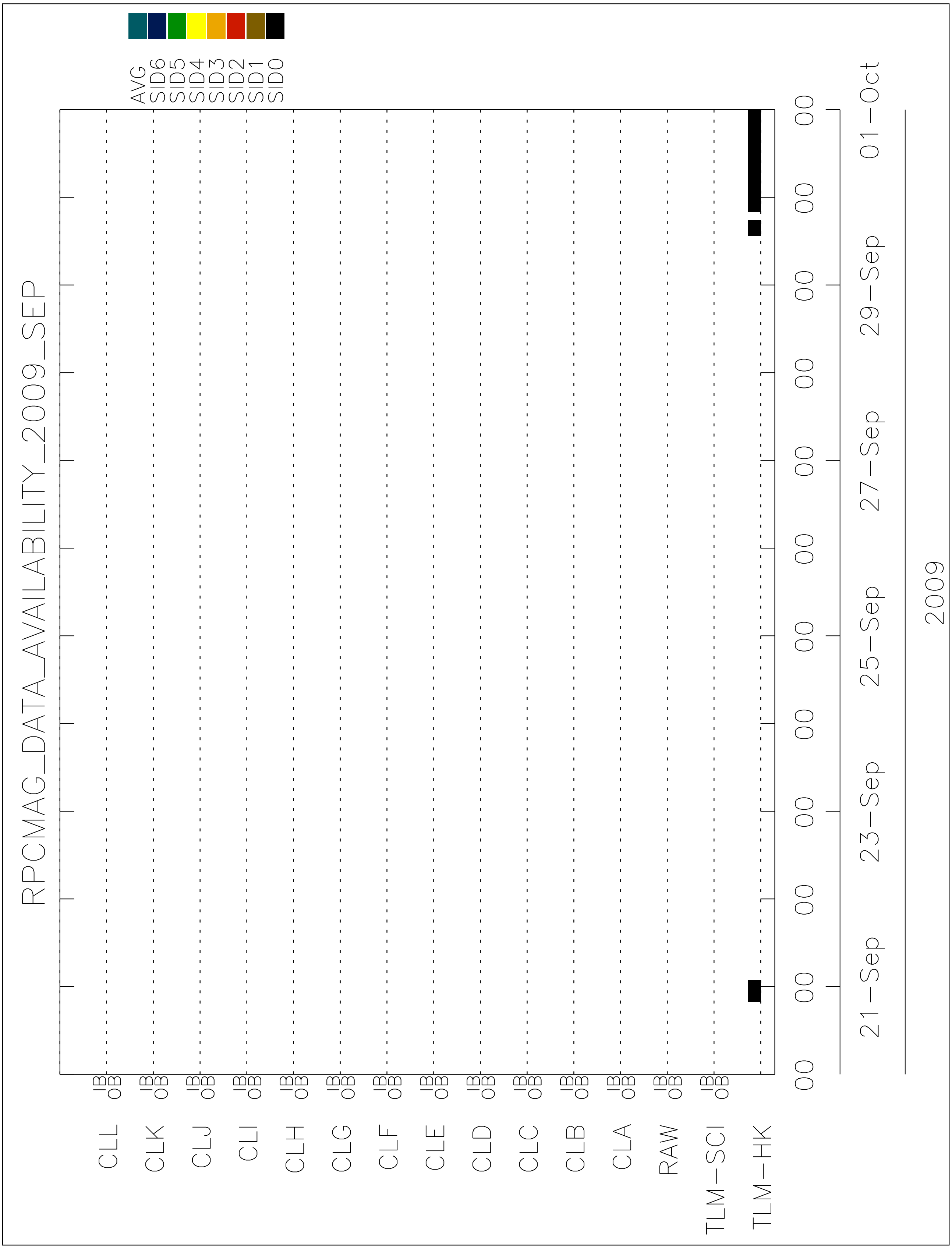


Figure 2: Overview September 2009

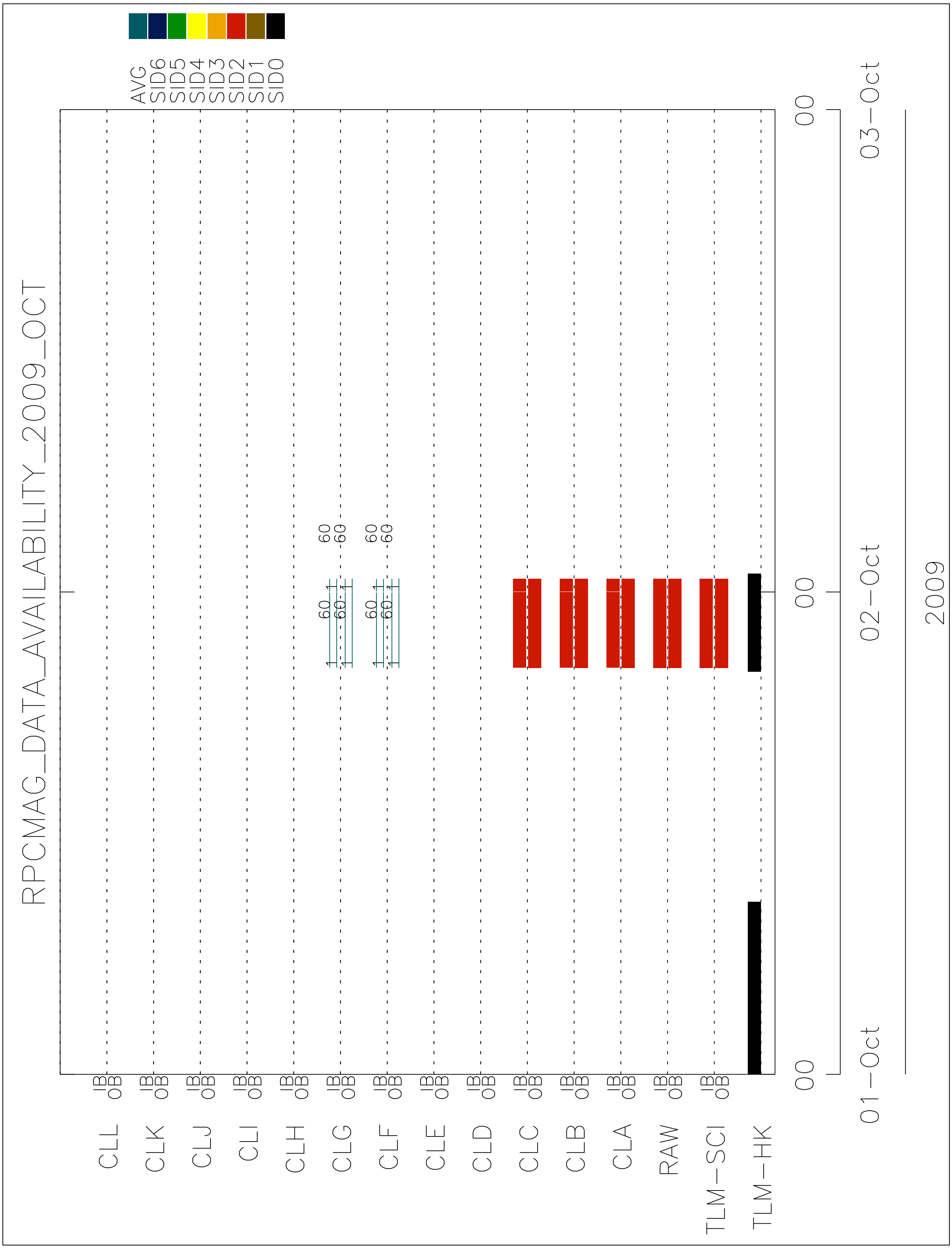
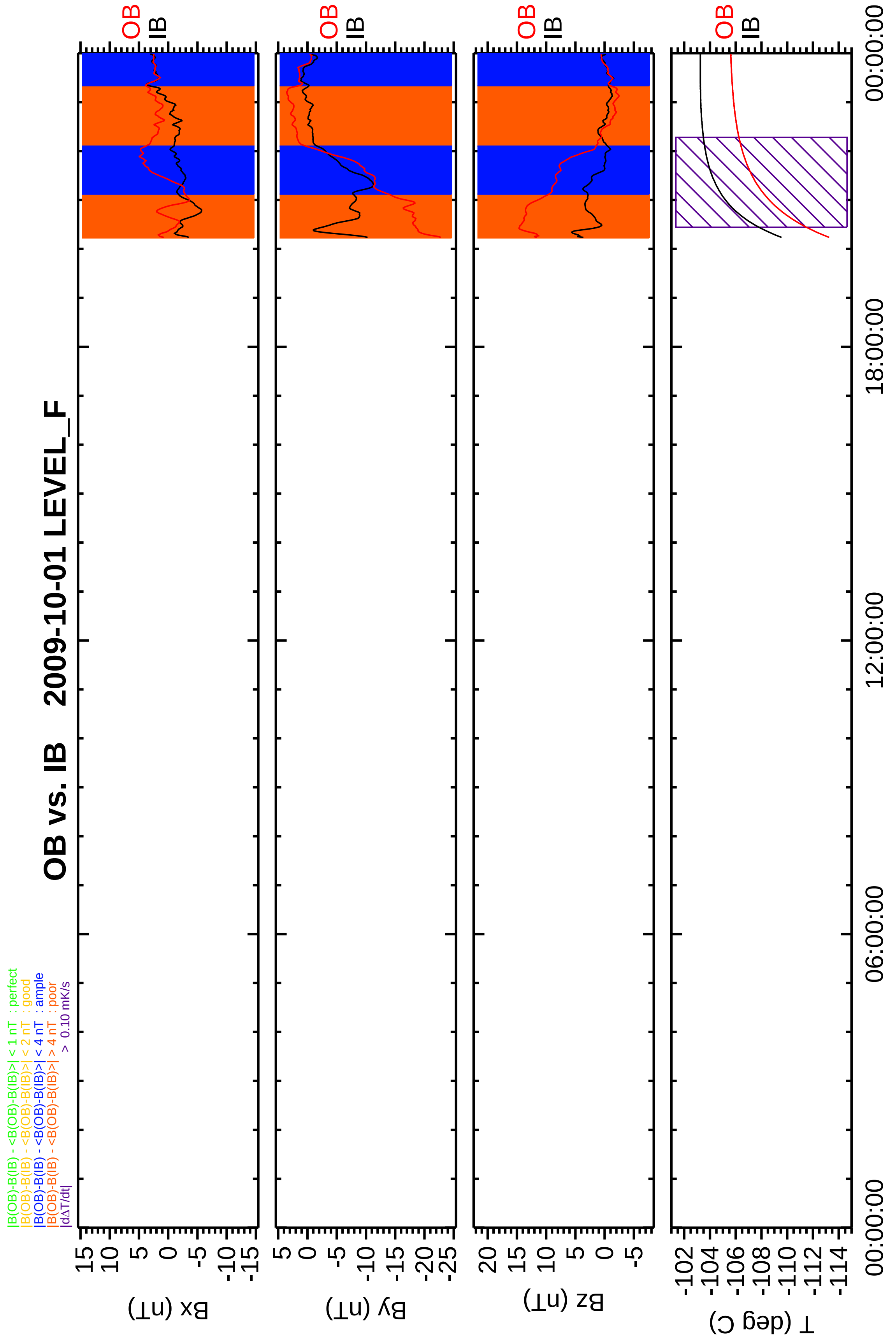
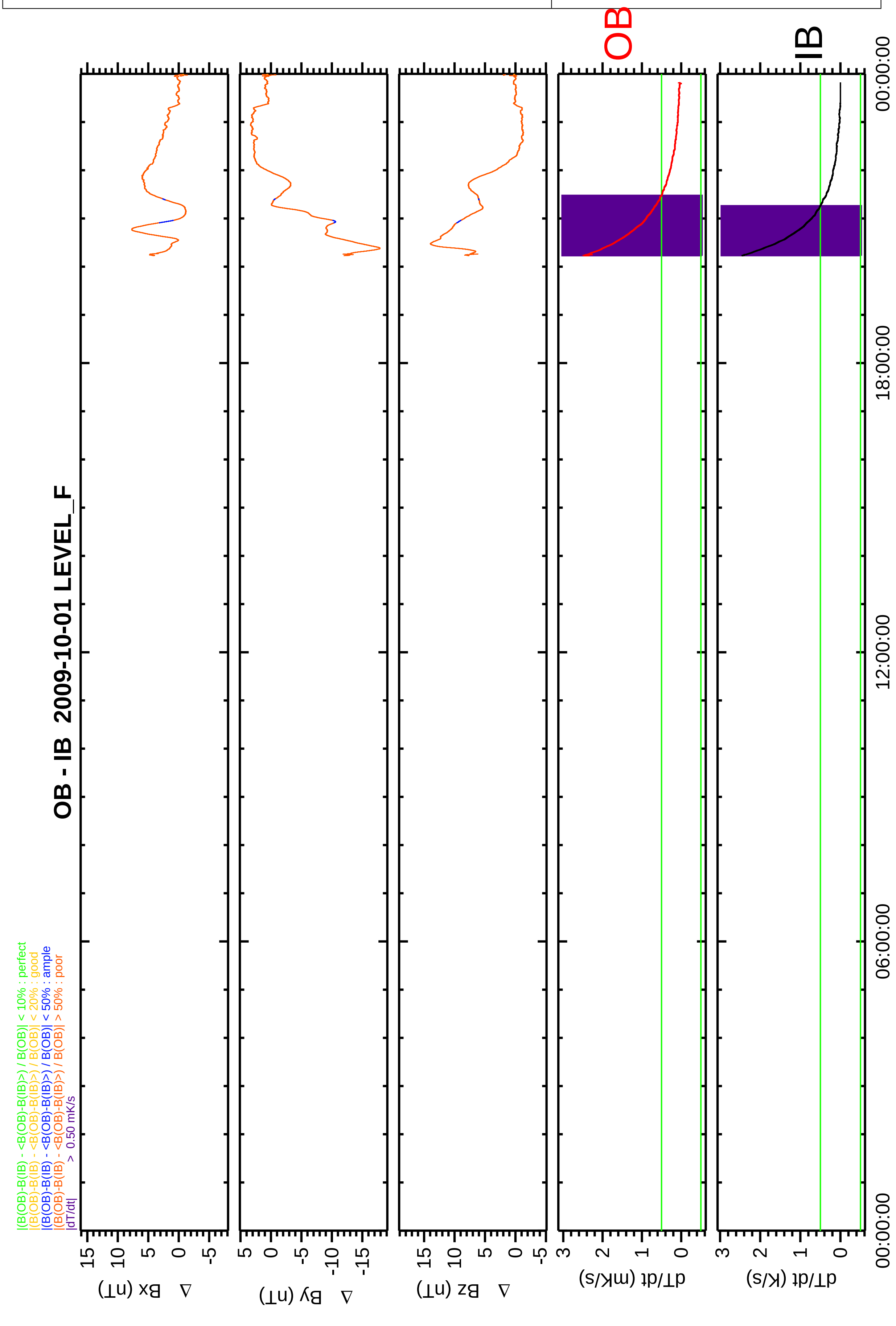


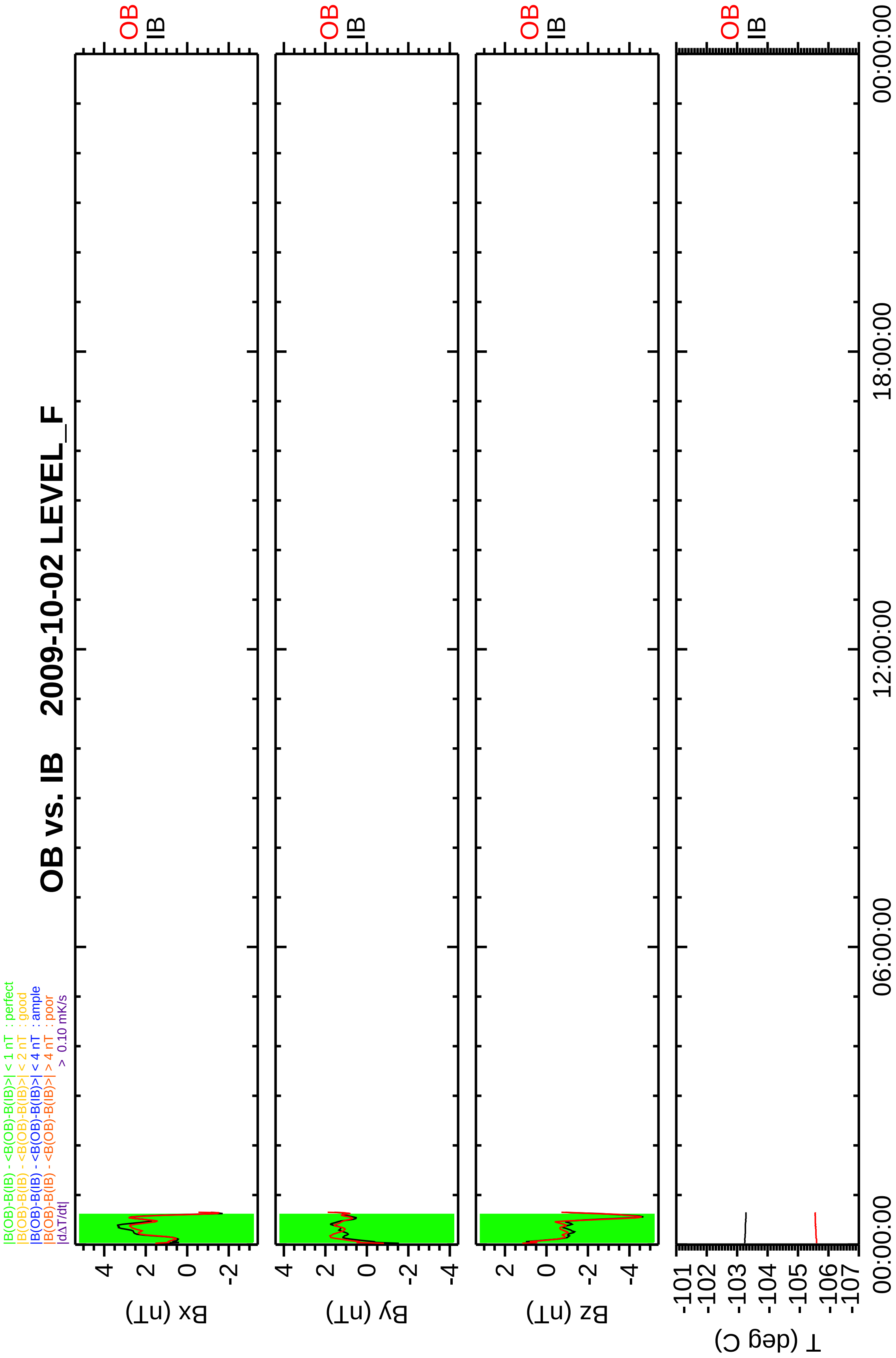
Figure 3: Overview October 2009

DATE	LEVEL	AVERAGE [s]	SENSOR
2009-10-01	CLF	1	OB
2009-10-01	CLG	1	OB
2009-10-01	CLG	1	IB
2009-10-01	CLF	1	IB
2009-10-01	CLF	60	OB
2009-10-01	CLG	60	OB
2009-10-01	CLG	60	IB
2009-10-01	CLF	60	IB
2009-10-02	CLG	1	OB
2009-10-02	CLF	1	OB
2009-10-02	CLG	1	IB
2009-10-02	CLF	1	IB
2009-10-02	CLF	60	OB
2009-10-02	CLG	60	OB
2009-10-02	CLG	60	IB
2009-10-02	CLF	60	IB

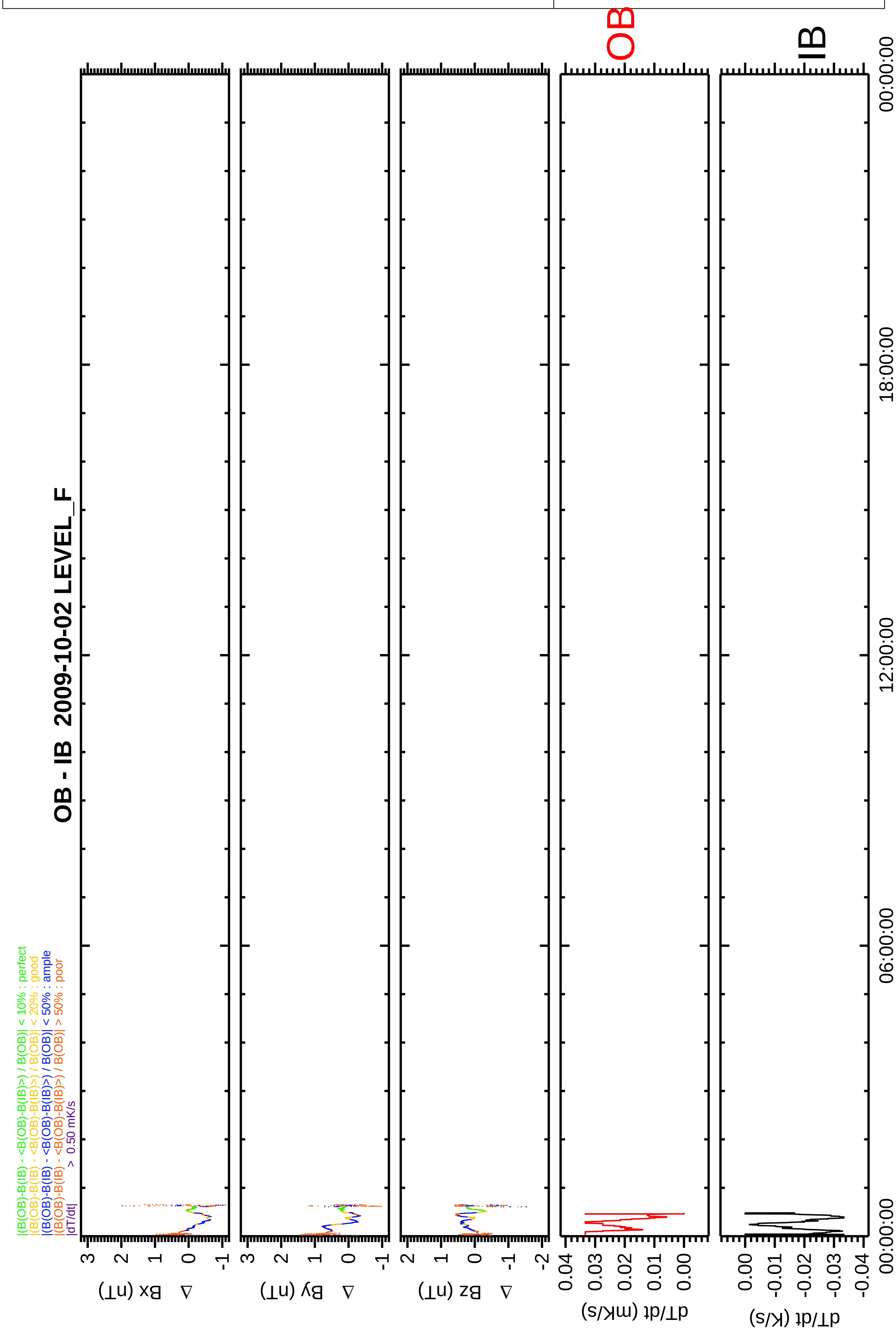


OB vs. IB 2009-10-01 LEVEL_F
|B(OB)-B(IB) - <B(OB)-B(IB)>| < 1 nT : perfect
|B(OB)-B(IB) - <B(OB)-B(IB)>| < 2 nT : good
|B(OB)-B(IB) - <B(OB)-B(IB)>| < 4 nT : ample
|B(OB)-B(IB) - <B(OB)-B(IB)>| > 4 nT : poor
|dΔT/dt| > 0.10 mK/s
OB
IB
Bx (nT)
By (nT)
Bz (nT)
T (deg C)
00:00:00
06:00:00
12:00:00
18:00:00
00:00:00


OB - IB 2009-10-01 LEVEL_F
|(B(OB)-B(IB) - <B(OB)-B(IB)>) / B(OB)| < 10% : perfect
|(B(OB)-B(IB) - <B(OB)-B(IB)>) / B(OB)| < 20% : good
|(B(OB)-B(IB) - <B(OB)-B(IB)>) / B(OB)| < 50% : ample
|(B(OB)-B(IB) - <B(OB)-B(IB)>) / B(OB)| > 50% : poor
|dT/dt| > 0.50 mK/s
Δ Bx (nT)
Δ By (nT)
Δ Bz (nT)
dT/dt (mK/s)
dT/dt (K/s)
OB
IB
00:00:00
06:00:00
12:00:00
18:00:00
00:00:00



OB vs. IB 2009-10-02 LEVEL_F
|B(OB)-B(IB) - <B(OB)-B(IB)>| < 1 nT : perfect
|B(OB)-B(IB) - <B(OB)-B(IB)>| < 2 nT : good
|B(OB)-B(IB) - <B(OB)-B(IB)>| < 4 nT : ample
|B(OB)-B(IB) - <B(OB)-B(IB)>| > 4 nT : poor
|dΔT/dt| > 0.10 mK/s
OB
IB
Bx (nT)
By (nT)
Bz (nT)
T (deg C)
00:00:00
06:00:00
12:00:00
18:00:00
00:00:00



OB - IB 2009-10-02 LEVEL_F
|(B(OB)-B(IB) - <B(OB)-B(IB)>) / B(OB)| < 10% : perfect
|(B(OB)-B(IB) - <B(OB)-B(IB)>) / B(OB)| < 20% : good
|(B(OB)-B(IB) - <B(OB)-B(IB)>) / B(OB)| < 50% : ample
|(B(OB)-B(IB) - <B(OB)-B(IB)>) / B(OB)| > 50% : poor
|dT/dt| > 0.50 mK/s
Δ Bx (nT)
Δ By (nT)
Δ Bz (nT)
dT/dt (mK/s)
dT/dt (K/s)
OB
IB
00:00:00
06:00:00
12:00:00
18:00:00
00:00:00

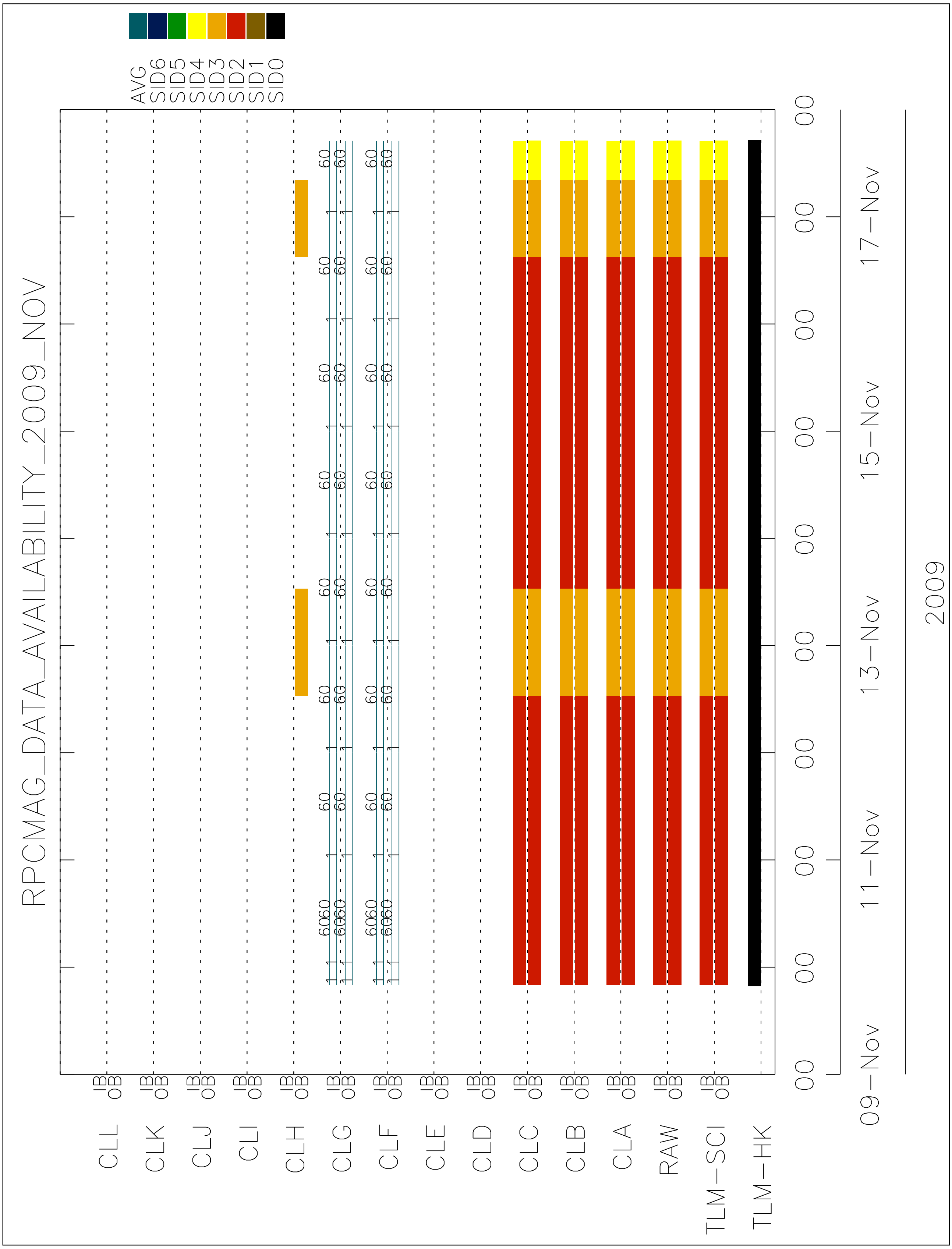
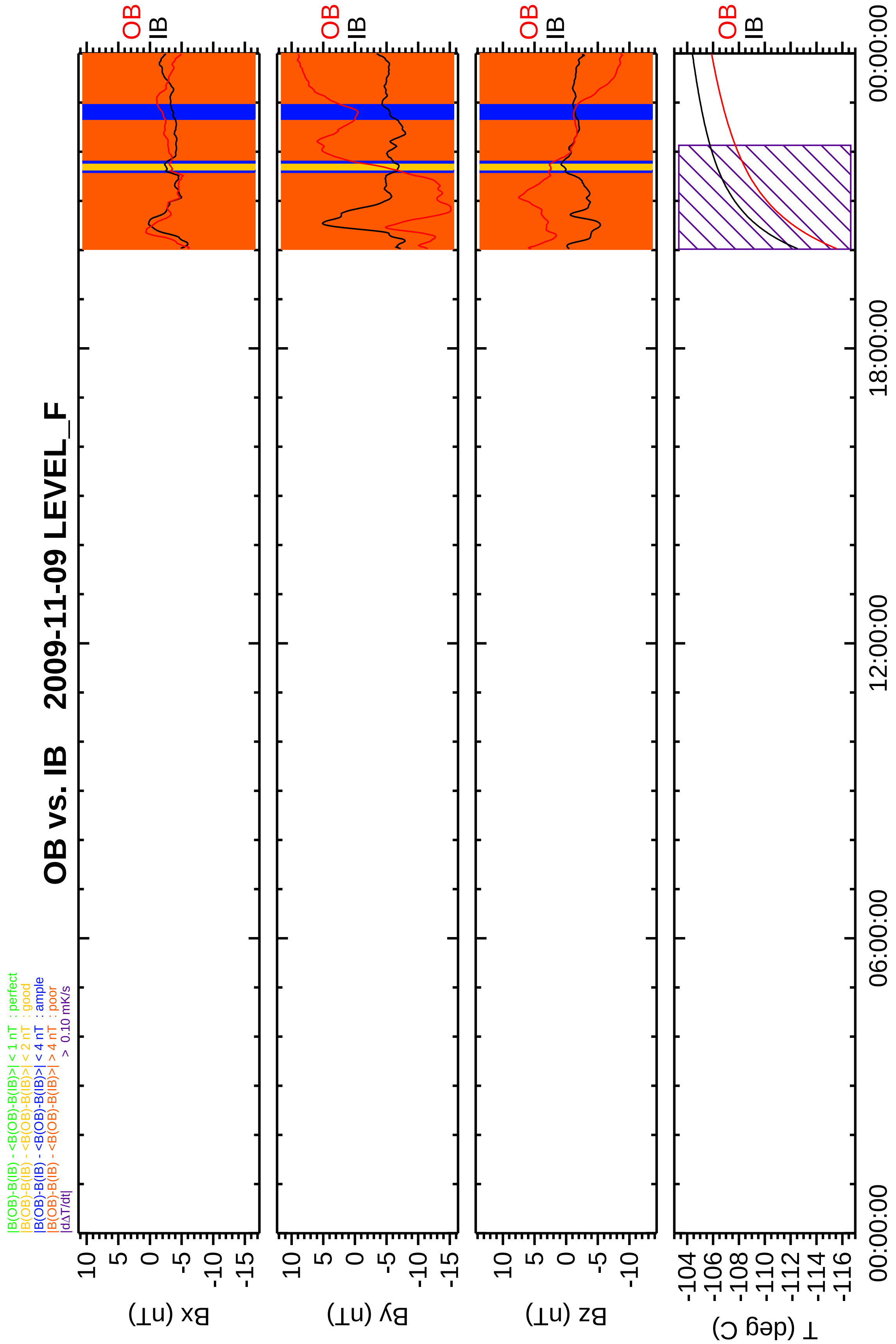


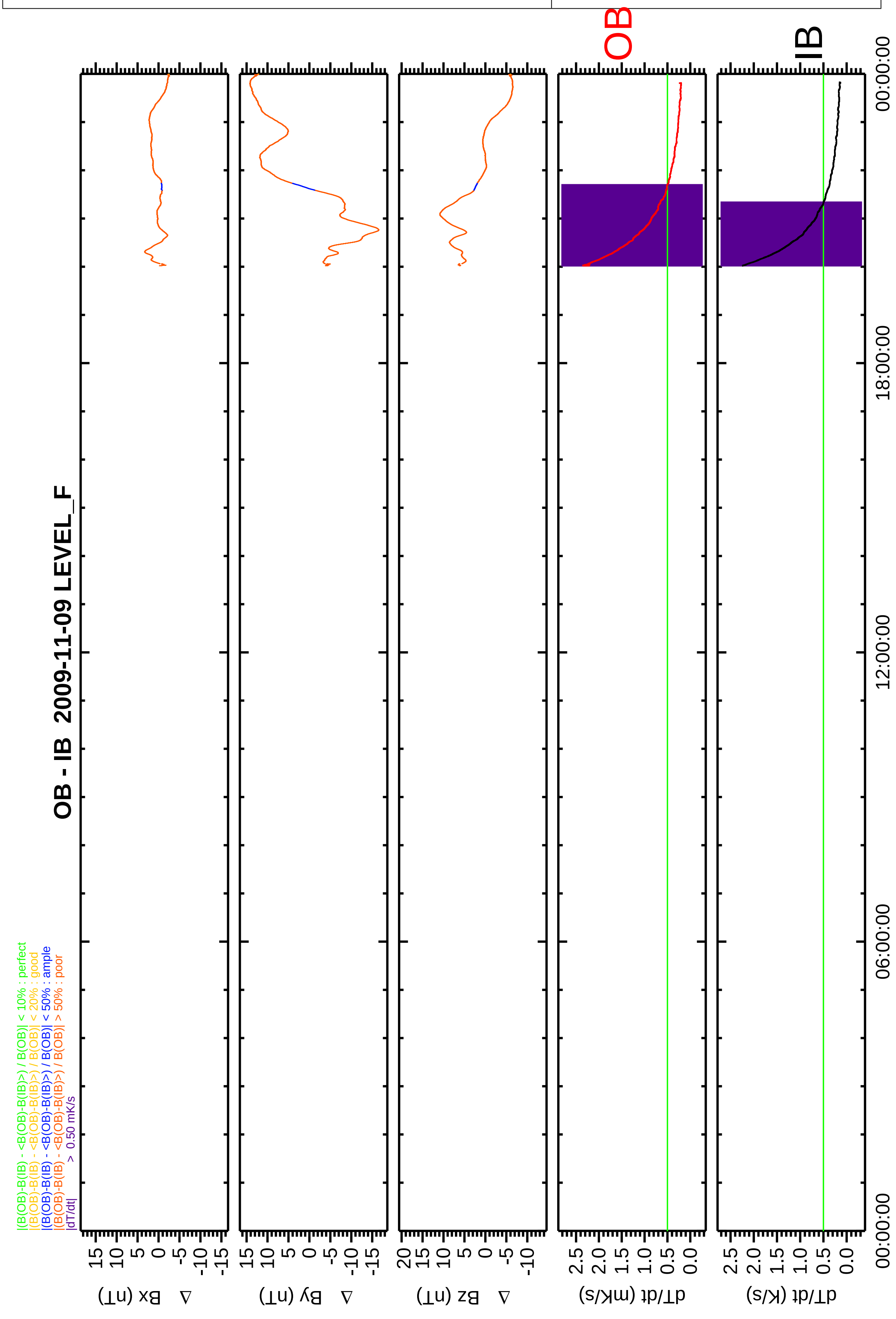
Figure 4: Overview November 2009

DATE	LEVEL	AVERAGE [s]	SENSOR
2009-11-09	CLF	1	OB
2009-11-09	CLG	1	OB
2009-11-09	CLF	1	IB
2009-11-09	CLG	1	IB
2009-11-09	CLG	60	OB
2009-11-09	CLF	60	OB
2009-11-09	CLG	60	IB
2009-11-09	CLF	60	IB
2009-11-10	CLG	1	OB
2009-11-10	CLF	1	OB
2009-11-10	CLF	1	IB
2009-11-10	CLG	1	IB
2009-11-10	CLF	60	OB
2009-11-10	CLG	60	OB
2009-11-10	CLF	60	IB
2009-11-10	CLG	60	IB
2009-11-11	CLG	1	OB
2009-11-11	CLF	1	OB
2009-11-11	CLG	1	IB
2009-11-11	CLF	1	IB
2009-11-11	CLF	60	OB
2009-11-11	CLG	60	OB
2009-11-11	CLG	60	IB
2009-11-11	CLF	60	IB
2009-11-12	CLG	1	OB
2009-11-12	CLF	1	OB
2009-11-12	CLG	1	IB
2009-11-12	CLF	1	IB
2009-11-12	CLG	60	OB
2009-11-12	CLF	60	OB
2009-11-12	CLF	60	IB
2009-11-12	CLG	60	IB
2009-11-13	CLF	1	IB
2009-11-13	CLG	1	IB
2009-11-13	CLF	1	OB
2009-11-13	CLG	1	OB
2009-11-13	CLF	60	IB
2009-11-13	CLG	60	IB
2009-11-13	CLF	60	OB
2009-11-13	CLG	60	OB
2009-11-14	CLF	1	OB
2009-11-14	CLG	1	OB
2009-11-14	CLF	1	IB
2009-11-14	CLG	1	IB
2009-11-14	CLF	60	OB

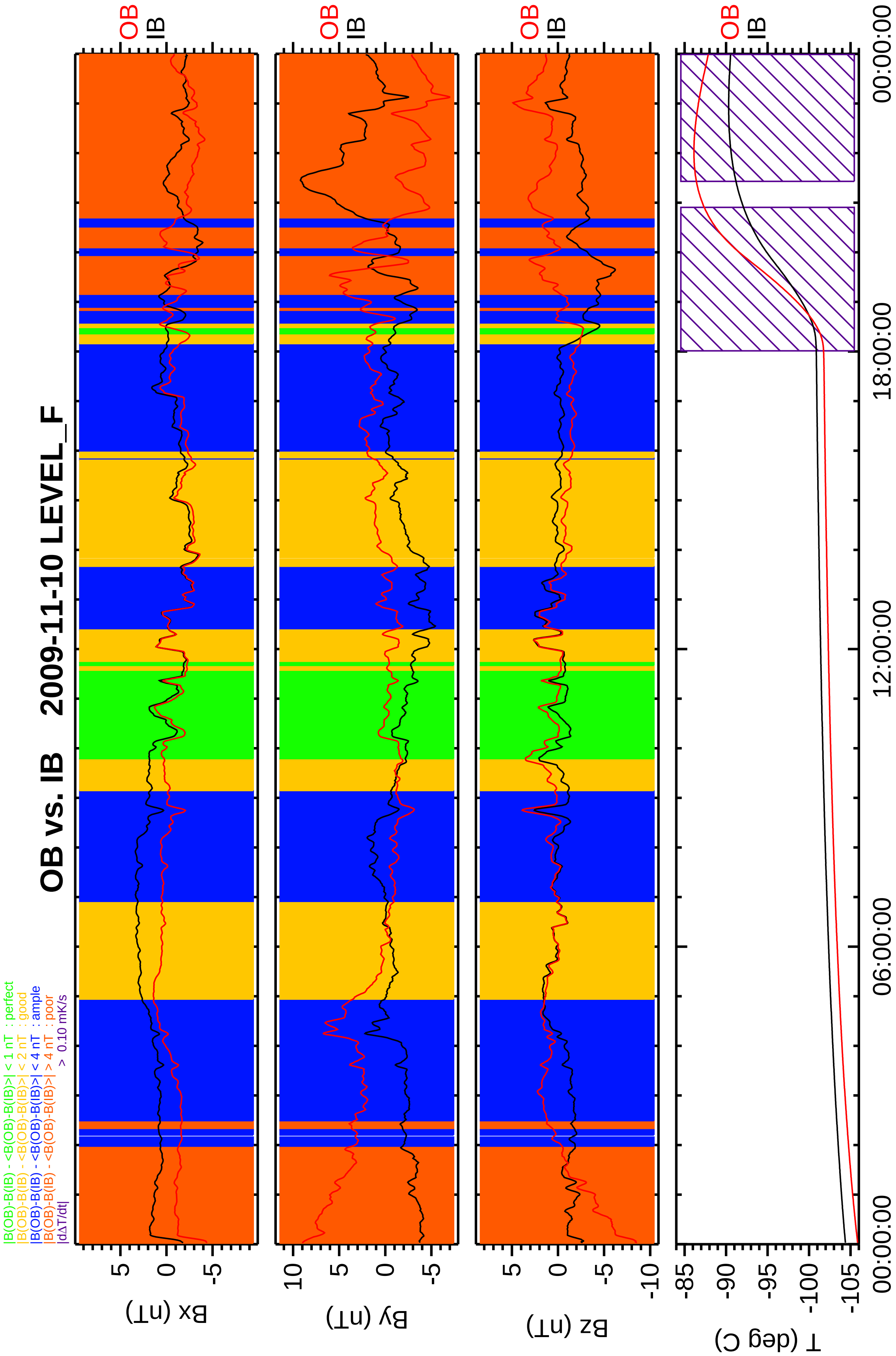
DATE	LEVEL	AVERAGE [s]	SENSOR
2009-11-14	CLG	60	OB
2009-11-14	CLG	60	IB
2009-11-14	CLF	60	IB
2009-11-15	CLG	1	OB
2009-11-15	CLF	1	OB
2009-11-15	CLF	1	IB
2009-11-15	CLG	1	IB
2009-11-15	CLF	60	OB
2009-11-15	CLG	60	OB
2009-11-15	CLG	60	IB
2009-11-15	CLF	60	IB
2009-11-16	CLF	1	OB
2009-11-16	CLG	1	OB
2009-11-16	CLF	1	IB
2009-11-16	CLG	1	IB
2009-11-16	CLG	60	OB
2009-11-16	CLF	60	OB
2009-11-16	CLG	60	IB
2009-11-16	CLF	60	IB
2009-11-17	CLG	1	IB
2009-11-17	CLF	1	IB
2009-11-17	CLF	1	OB
2009-11-17	CLG	1	OB
2009-11-17	CLF	60	IB
2009-11-17	CLG	60	IB
2009-11-17	CLG	60	OB
2009-11-17	CLF	60	OB



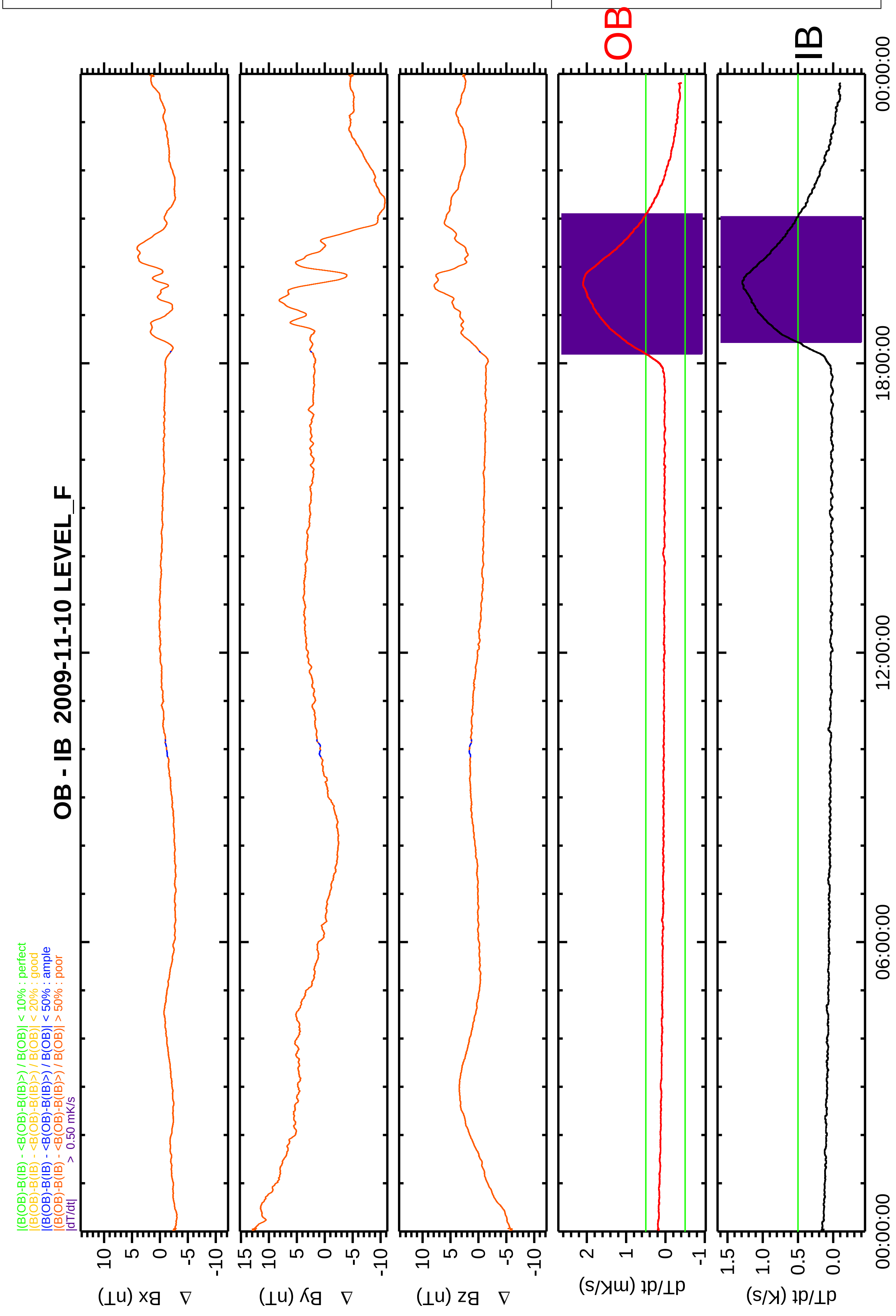
OB vs. IB 2009-11-09 LEVEL_F
|B(OB)-B(IB) - <B(OB)-B(IB)>| < 1 nT : perfect
|B(OB)-B(IB) - <B(OB)-B(IB)>| < 2 nT : good
|B(OB)-B(IB) - <B(OB)-B(IB)>| < 4 nT : ample
|B(OB)-B(IB) - <B(OB)-B(IB)>| > 4 nT : poor
|dΔT/dt| > 0.10 mK/s
OB
IB
Bx (nT)
By (nT)
Bz (nT)
T (deg C)
00:00:00
06:00:00
12:00:00
18:00:00
00:00:00



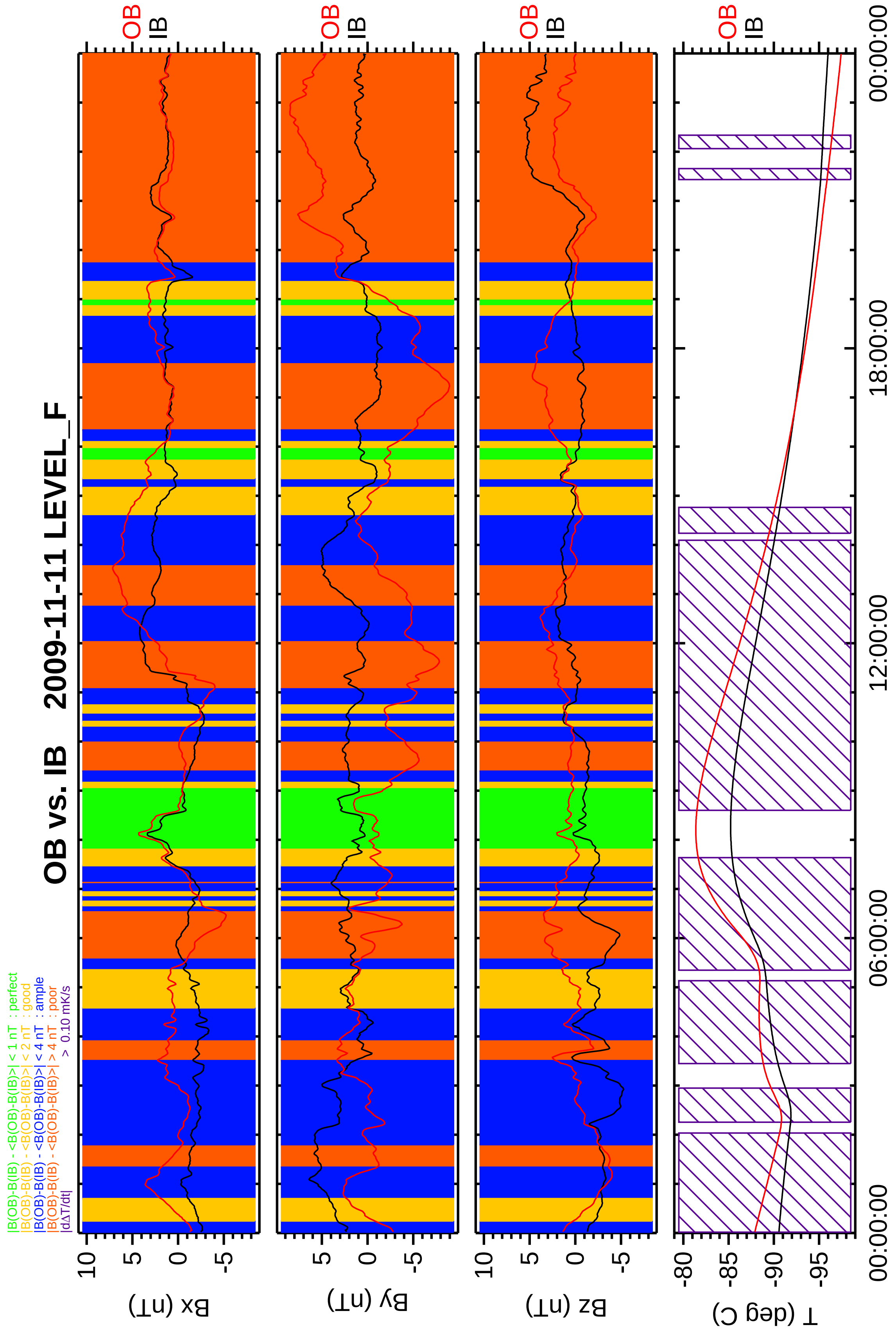
OB - IB 2009-11-09 LEVEL_F
OB
IB
|(B(OB)-B(IB) - <B(OB)-B(IB)>) / B(OB)| < 10% : perfect
|(B(OB)-B(IB) - <B(OB)-B(IB)>) / B(OB)| < 20% : good
|(B(OB)-B(IB) - <B(OB)-B(IB)>) / B(OB)| < 50% : ample
|(B(OB)-B(IB) - <B(OB)-B(IB)>) / B(OB)| > 50% : poor
|dT/dt| > 0.50 mK/s
Δ Bx (nT)
Δ By (nT)
Δ Bz (nT)
dT/dt (mK/s)
dT/dt (K/s)
00:00:00
06:00:00
12:00:00
18:00:00
00:00:00

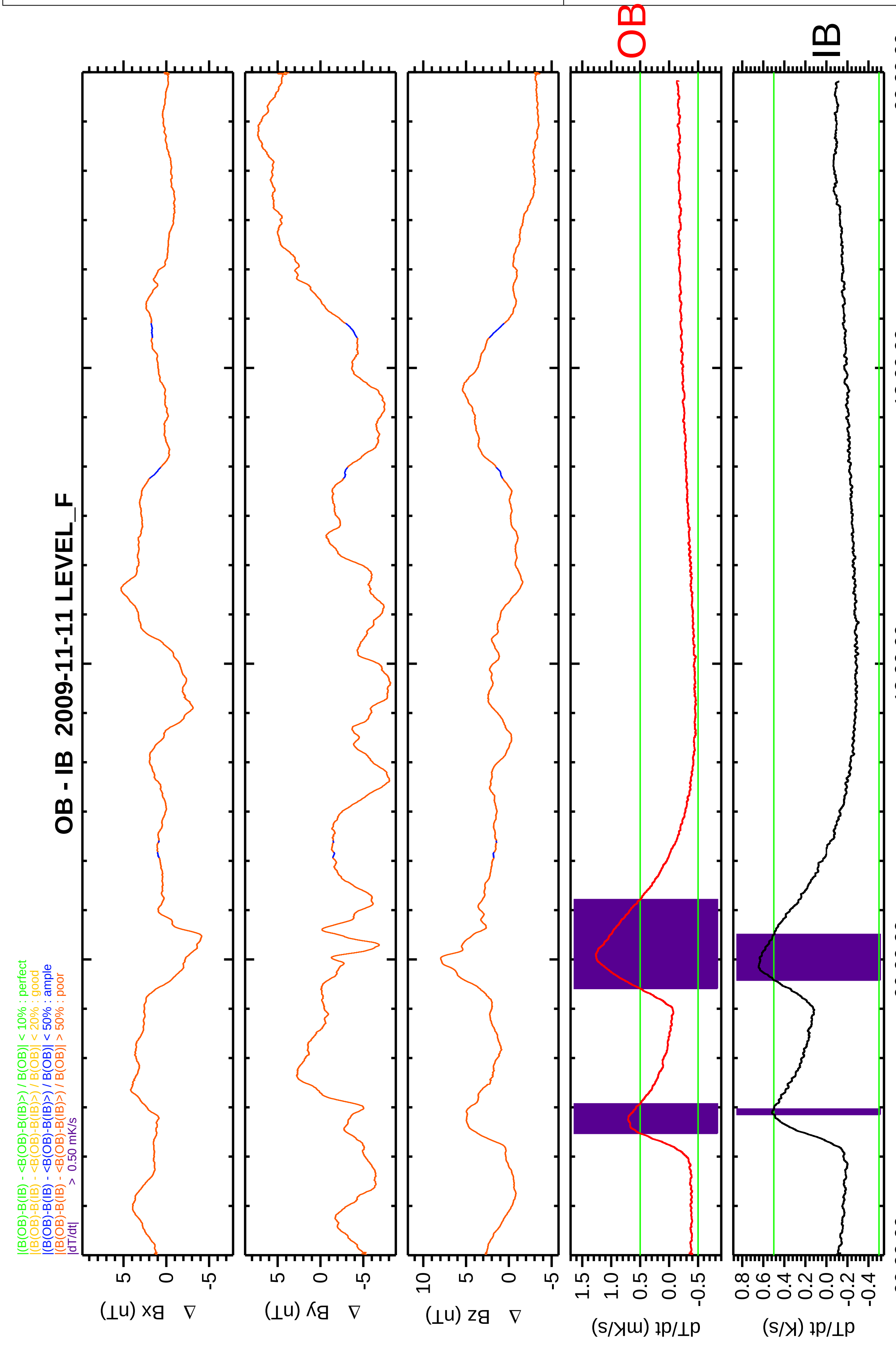


OB vs. IB 2009-11-10 LEVEL_F
|B(OB)-B(IB) - <B(OB)-B(IB)>| < 1 nT : perfect
|B(OB)-B(IB) - <B(OB)-B(IB)>| < 2 nT : good
|B(OB)-B(IB) - <B(OB)-B(IB)>| < 4 nT : ample
|B(OB)-B(IB) - <B(OB)-B(IB)>| > 4 nT : poor
|dΔT/dt| > 0.10 mK/s
OB
IB
Bx (nT)
By (nT)
Bz (nT)
T (deg C)
00:00:00
06:00:00
12:00:00
18:00:00
00:00:00

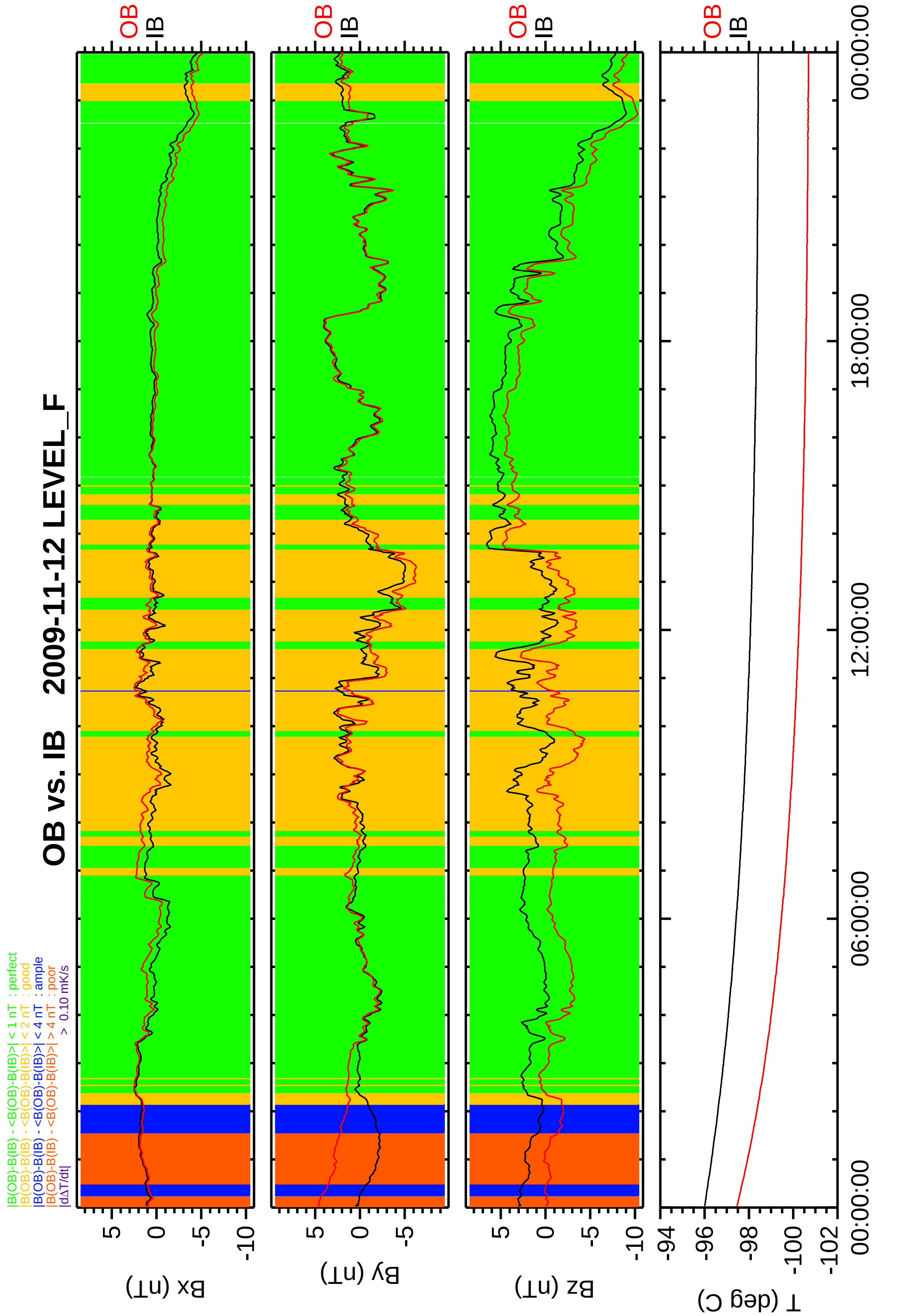


OB - IB 2009-11-10 LEVEL_F
|(B(OB)-B(IB) - <B(OB)-B(IB)>) / B(OB)| < 10% : perfect
|(B(OB)-B(IB) - <B(OB)-B(IB)>) / B(OB)| < 20% : good
|(B(OB)-B(IB) - <B(OB)-B(IB)>) / B(OB)| < 50% : ample
|(B(OB)-B(IB) - <B(OB)-B(IB)>) / B(OB)| > 50% : poor
|dT/dt| > 0.50 mK/s
Δ Bx (nT)
Δ By (nT)
Δ Bz (nT)
dT/dt (mK/s)
dT/dt (K/s)
OB
IB
00:00:00
06:00:00
12:00:00
18:00:00
00:00:00

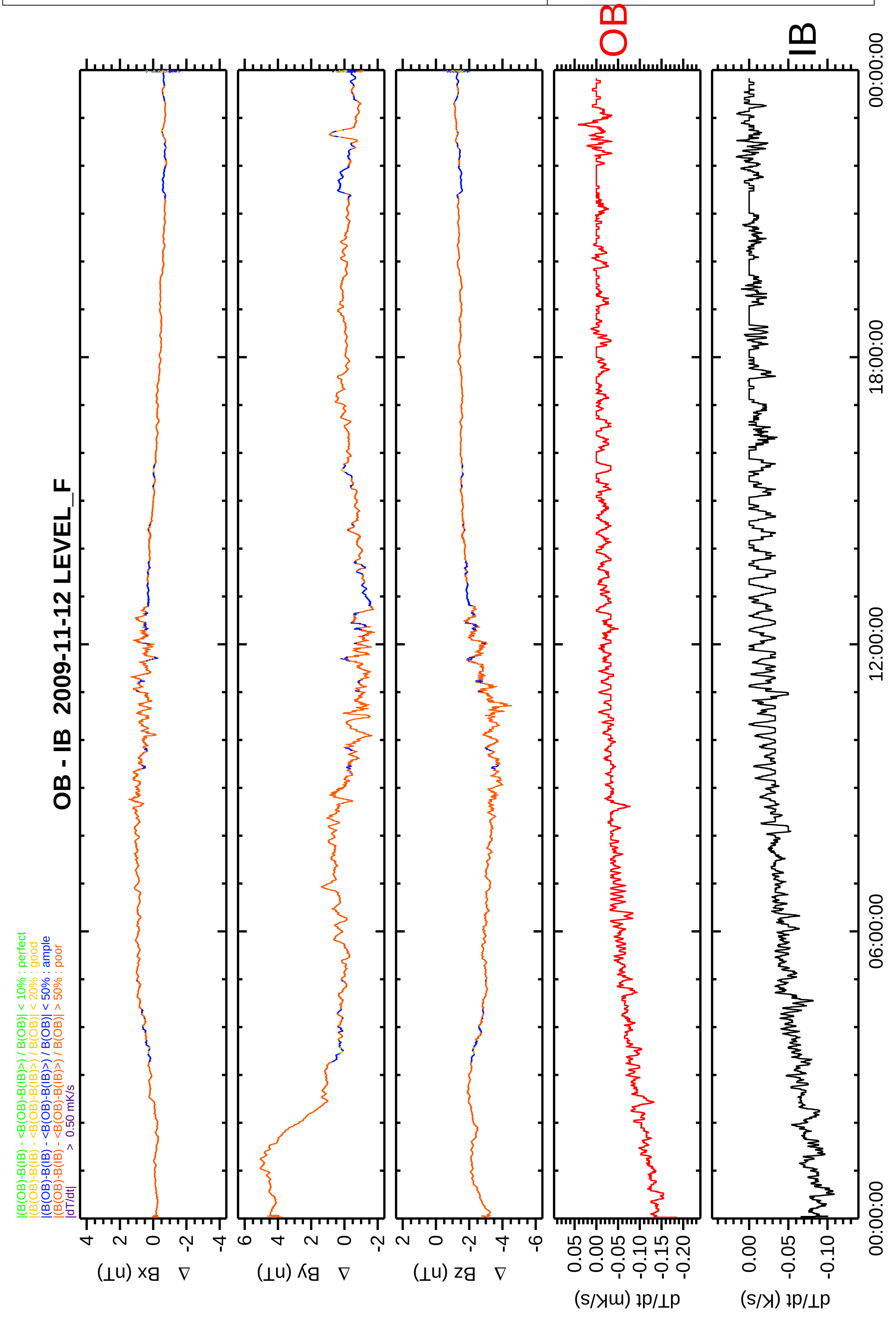

OB vs. IB 2009-11-11 LEVEL_F
|B(OB)-B(IB) - <B(OB)-B(IB)>| < 1 nT : perfect
|B(OB)-B(IB) - <B(OB)-B(IB)>| < 2 nT : good
|B(OB)-B(IB) - <B(OB)-B(IB)>| < 4 nT : ample
|B(OB)-B(IB) - <B(OB)-B(IB)>| > 4 nT : poor
|dΔT/dt| > 0.10 mK/s
OB
IB
Bx (nT)
By (nT)
Bz (nT)
T (deg C)
00:00:00
06:00:00
12:00:00
18:00:00
00:00:00



OB - IB 2009-11-11 LEVEL_F
|(B(OB)-B(IB) - <B(OB)-B(IB)>) / B(OB)| < 10% : perfect
|(B(OB)-B(IB) - <B(OB)-B(IB)>) / B(OB)| < 20% : good
|(B(OB)-B(IB) - <B(OB)-B(IB)>) / B(OB)| < 50% : ample
|(B(OB)-B(IB) - <B(OB)-B(IB)>) / B(OB)| > 50% : poor
|dT/dt| > 0.50 mK/s
Δ Bx (nT)
Δ By (nT)
Δ Bz (nT)
dT/dt (mK/s)
dT/dt (K/s)
OB
IB
00:00:00
06:00:00
12:00:00
18:00:00
00:00:00



OB vs. IB 2009-11-12 LEVEL_F
|B(OB)-B(IB) - <B(OB)-B(IB)>| < 1 nT : perfect
|B(OB)-B(IB) - <B(OB)-B(IB)>| < 2 nT : good
|B(OB)-B(IB) - <B(OB)-B(IB)>| < 4 nT : ample
|B(OB)-B(IB) - <B(OB)-B(IB)>| > 4 nT : poor
|dΔT/dt| > 0.10 mK/s
OB
IB
Bx (nT)
By (nT)
Bz (nT)
T (deg C)
5
0
-5
-10
-94
-96
-98
-100
-102
00:00:00
06:00:00
12:00:00
18:00:00
00:00:00



OB - IB 2009-11-12 LEVEL_F
OB
IB
Δ Bx (nT)
Δ By (nT)
Δ Bz (nT)
dT/dt (mK/s)
dT/dt (K/s)
00:00:00
06:00:00
12:00:00
18:00:00
00:00:00

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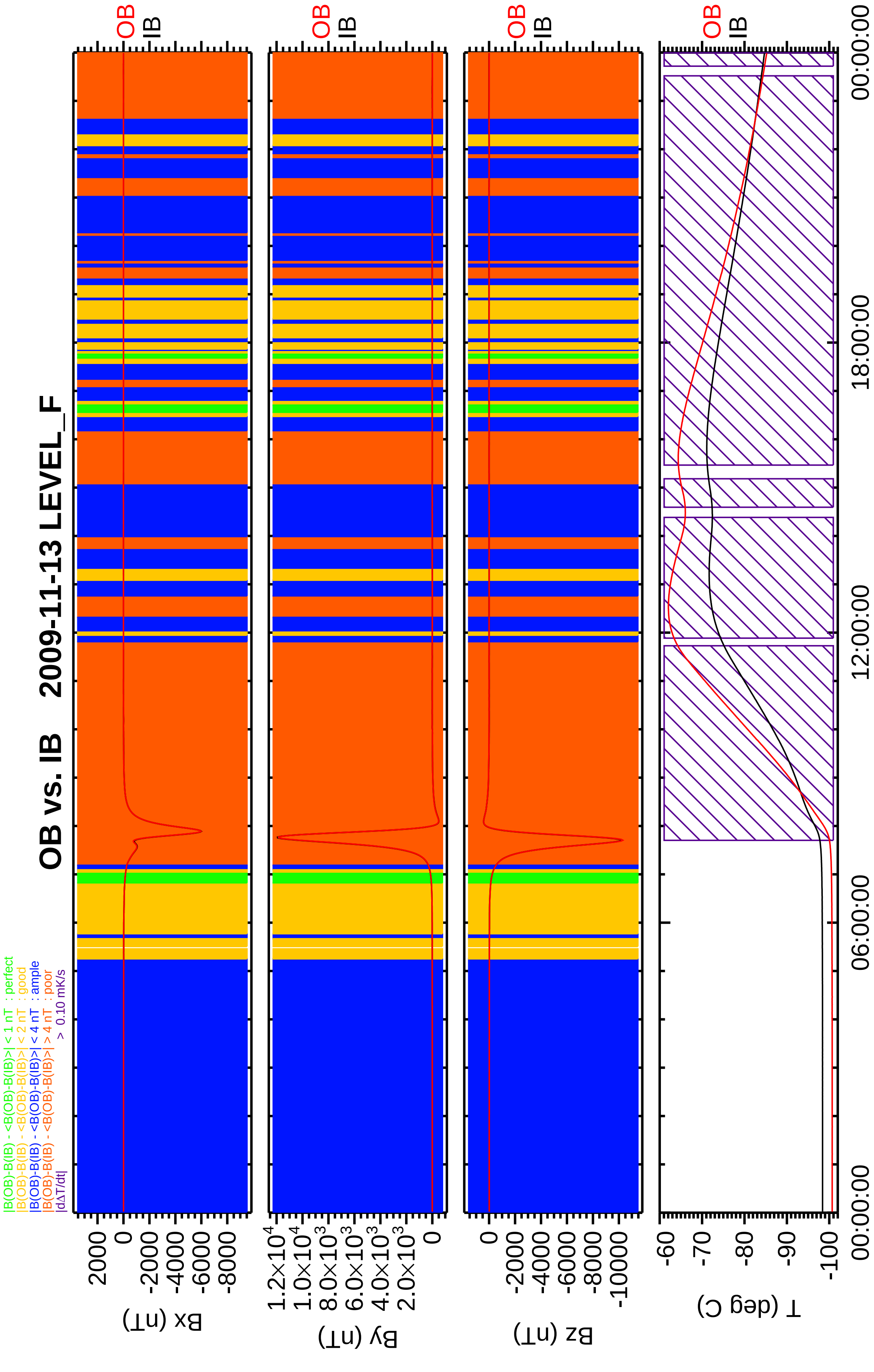
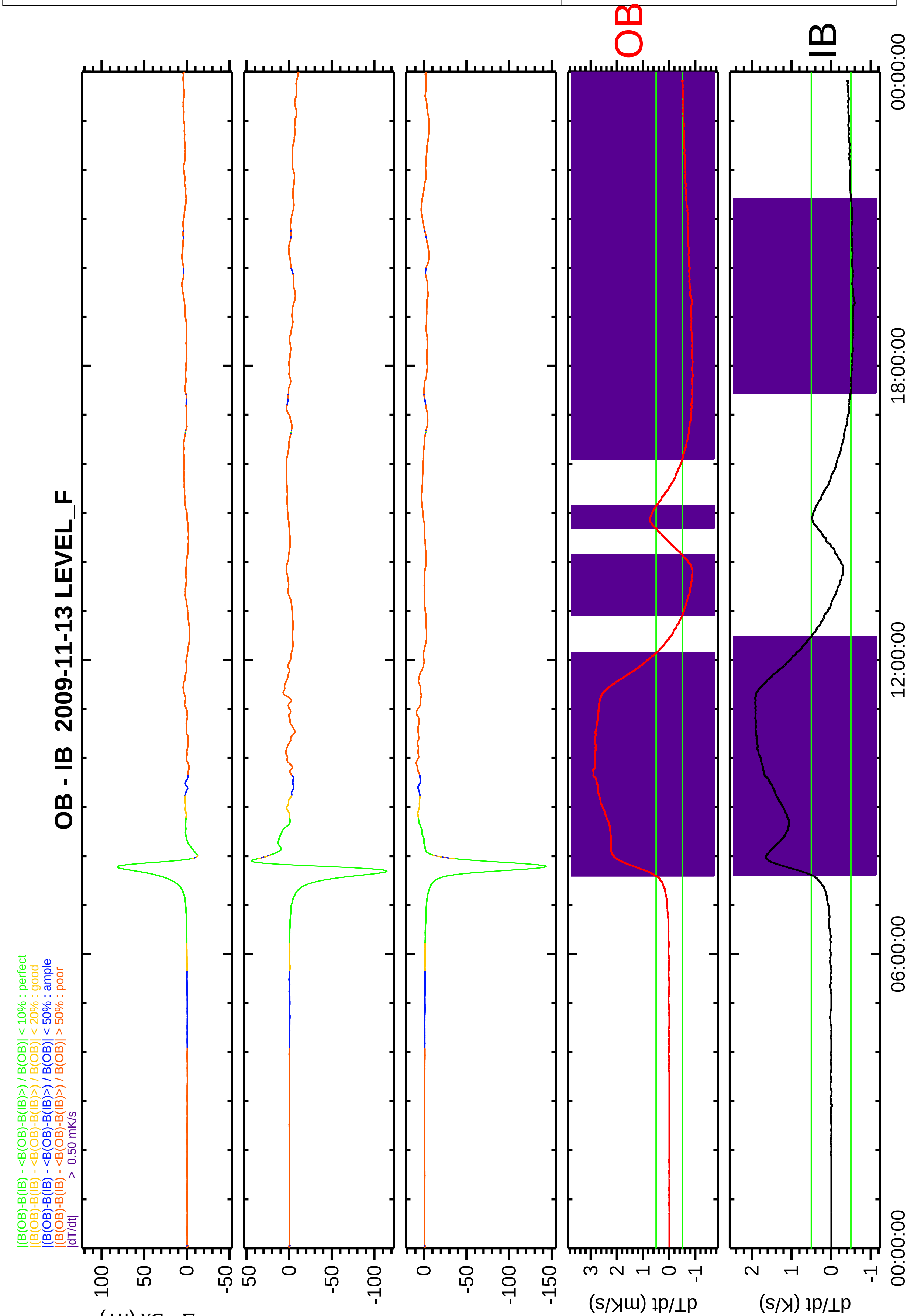
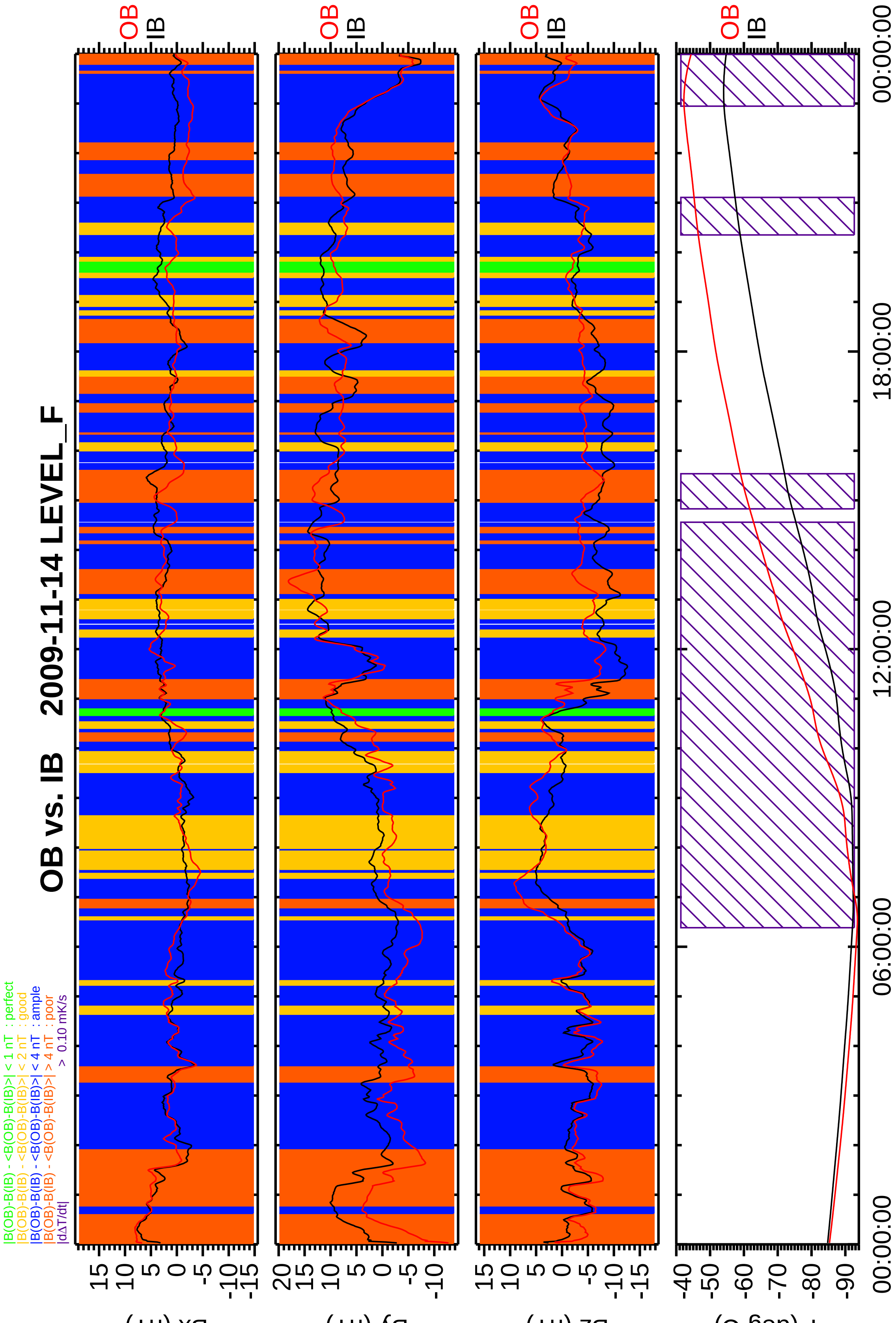
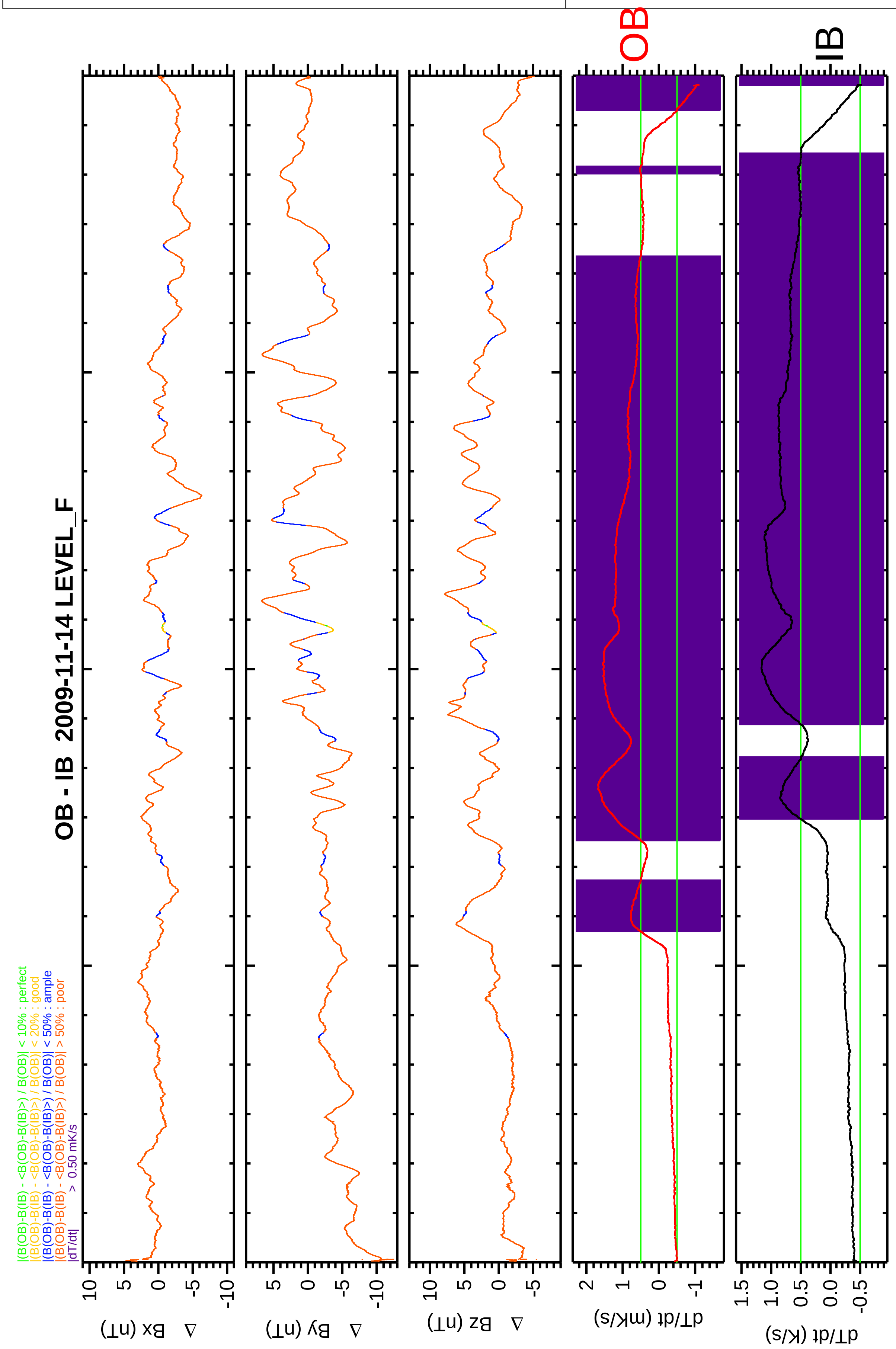




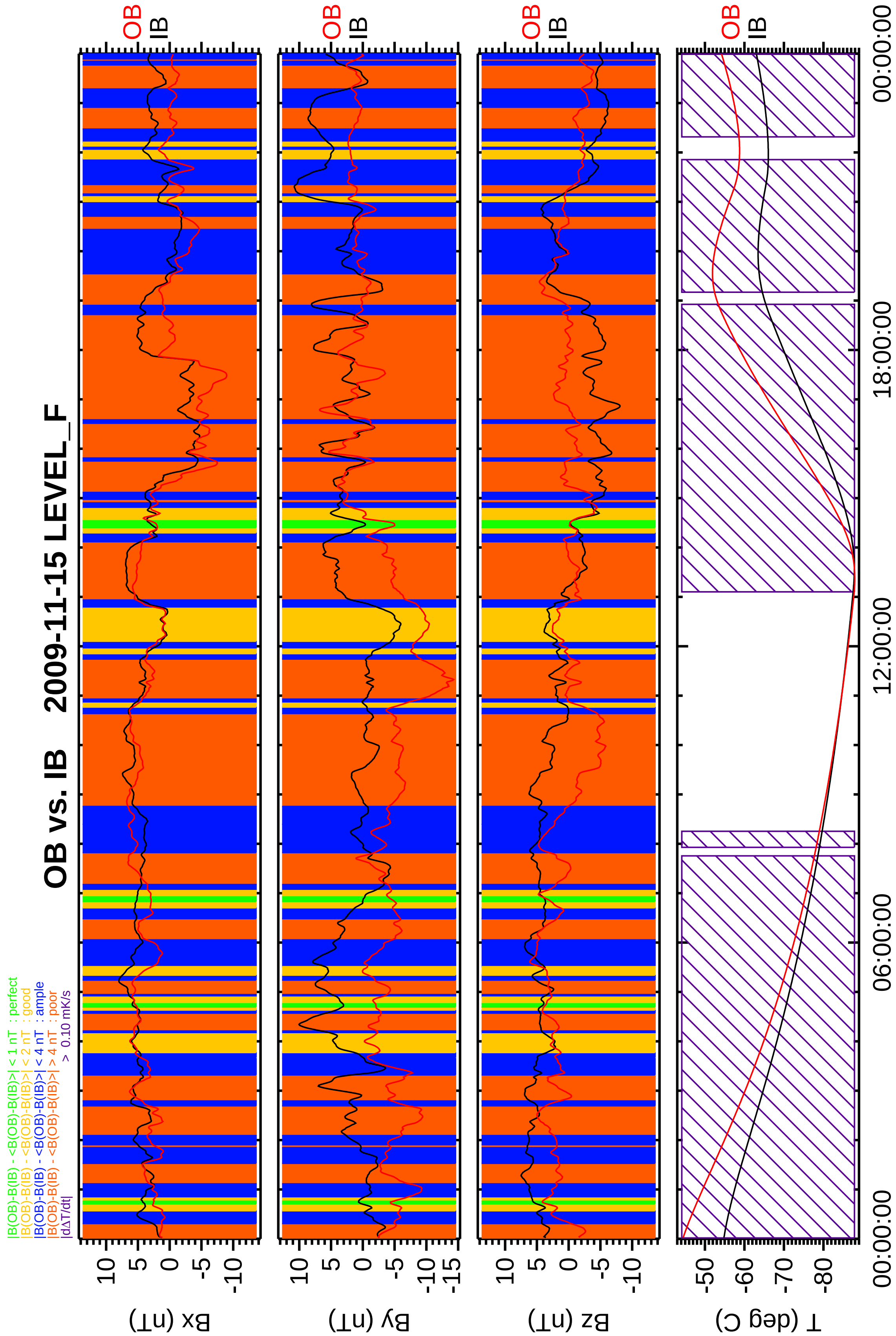
OB - IB 2009-11-13 LEVEL_F
|(B(OB)-B(IB) - <B(OB)-B(IB)>) / B(OB)| < 10% : perfect
|(B(OB)-B(IB) - <B(OB)-B(IB)>) / B(OB)| < 20% : good
|(B(OB)-B(IB) - <B(OB)-B(IB)>) / B(OB)| < 50% : ample
|(B(OB)-B(IB) - <B(OB)-B(IB)>) / B(OB)| > 50% : poor
|dT/dt| > 0.50 mK/s
Δ Bx (nT)
Δ By (nT)
Δ Bz (nT)
dT/dt (mK/s)
dT/dt (K/s)
OB
IB
00:00:00
06:00:00
12:00:00
18:00:00
00:00:00



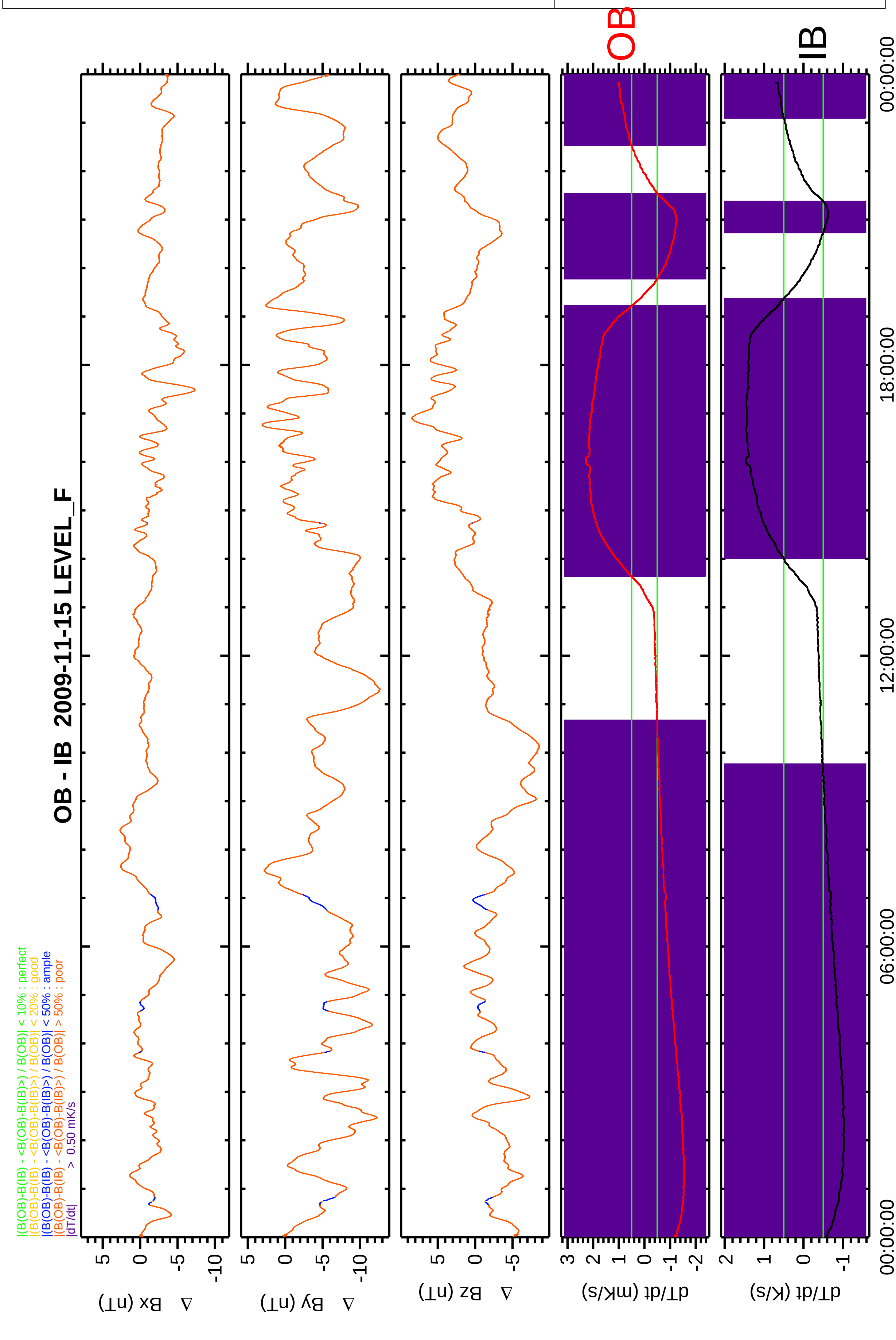
OB vs. IB 2009-11-14 LEVEL_F
|B(OB)-B(IB) - <B(OB)-B(IB)>| < 1 nT : perfect
|B(OB)-B(IB) - <B(OB)-B(IB)>| < 2 nT : good
|B(OB)-B(IB) - <B(OB)-B(IB)>| < 4 nT : ample
|B(OB)-B(IB) - <B(OB)-B(IB)>| > 4 nT : poor
|dΔT/dt| > 0.10 mK/s
OB
IB
Bx (nT)
By (nT)
Bz (nT)
T (deg C)
00:00:00
06:00:00
12:00:00
18:00:00
00:00:00

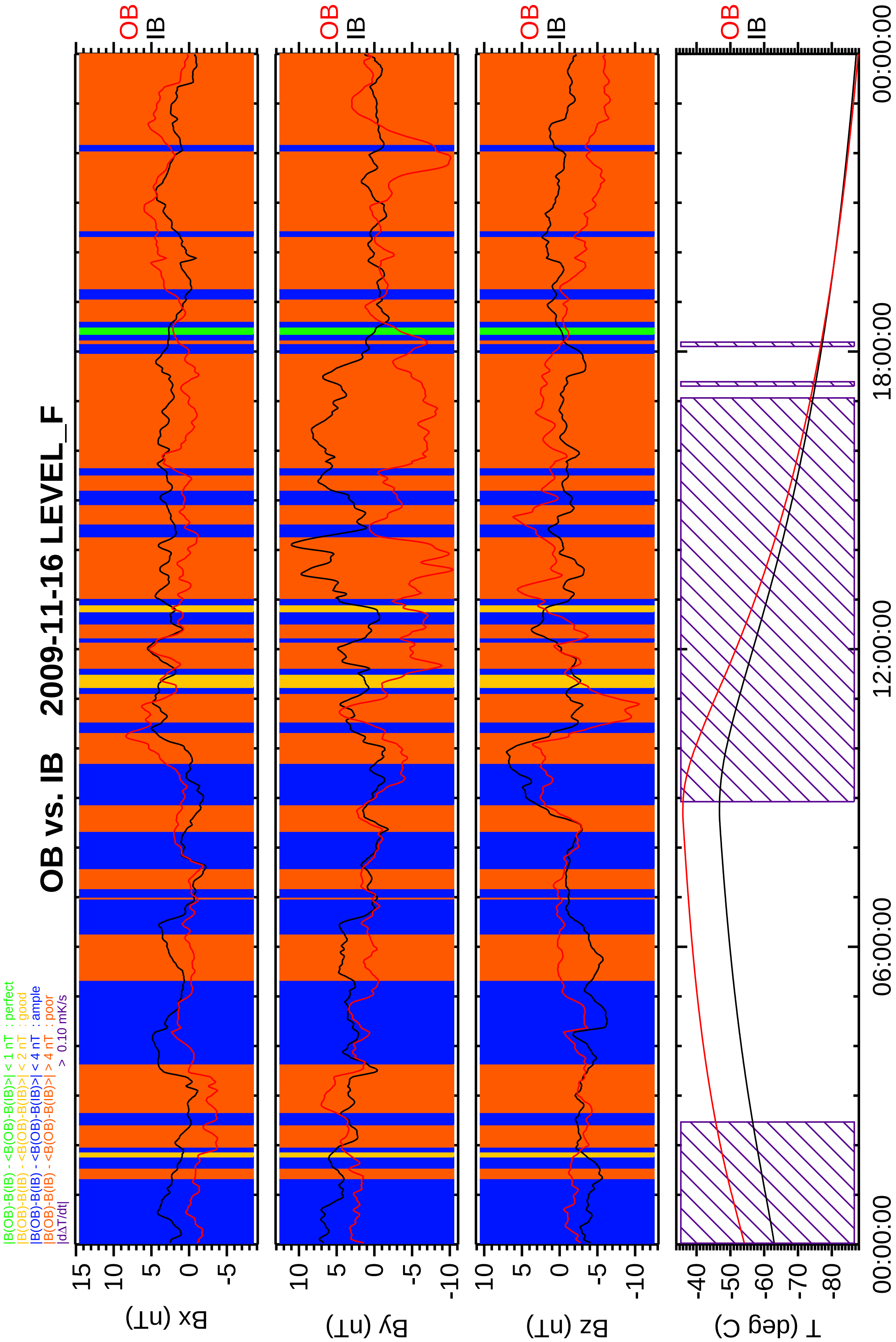


OB - IB 2009-11-14 LEVEL_F
|(B(OB)-B(IB) - <B(OB)-B(IB)>) / B(OB)| < 10% : perfect
|(B(OB)-B(IB) - <B(OB)-B(IB)>) / B(OB)| < 20% : good
|(B(OB)-B(IB) - <B(OB)-B(IB)>) / B(OB)| < 50% : ample
|(B(OB)-B(IB) - <B(OB)-B(IB)>) / B(OB)| > 50% : poor
|dT/dt| > 0.50 mK/s
Δ Bx (nT)
Δ By (nT)
Δ Bz (nT)
dT/dt (mK/s)
dT/dt (K/s)
OB
IB
00:00:00
06:00:00
12:00:00
18:00:00
00:00:00

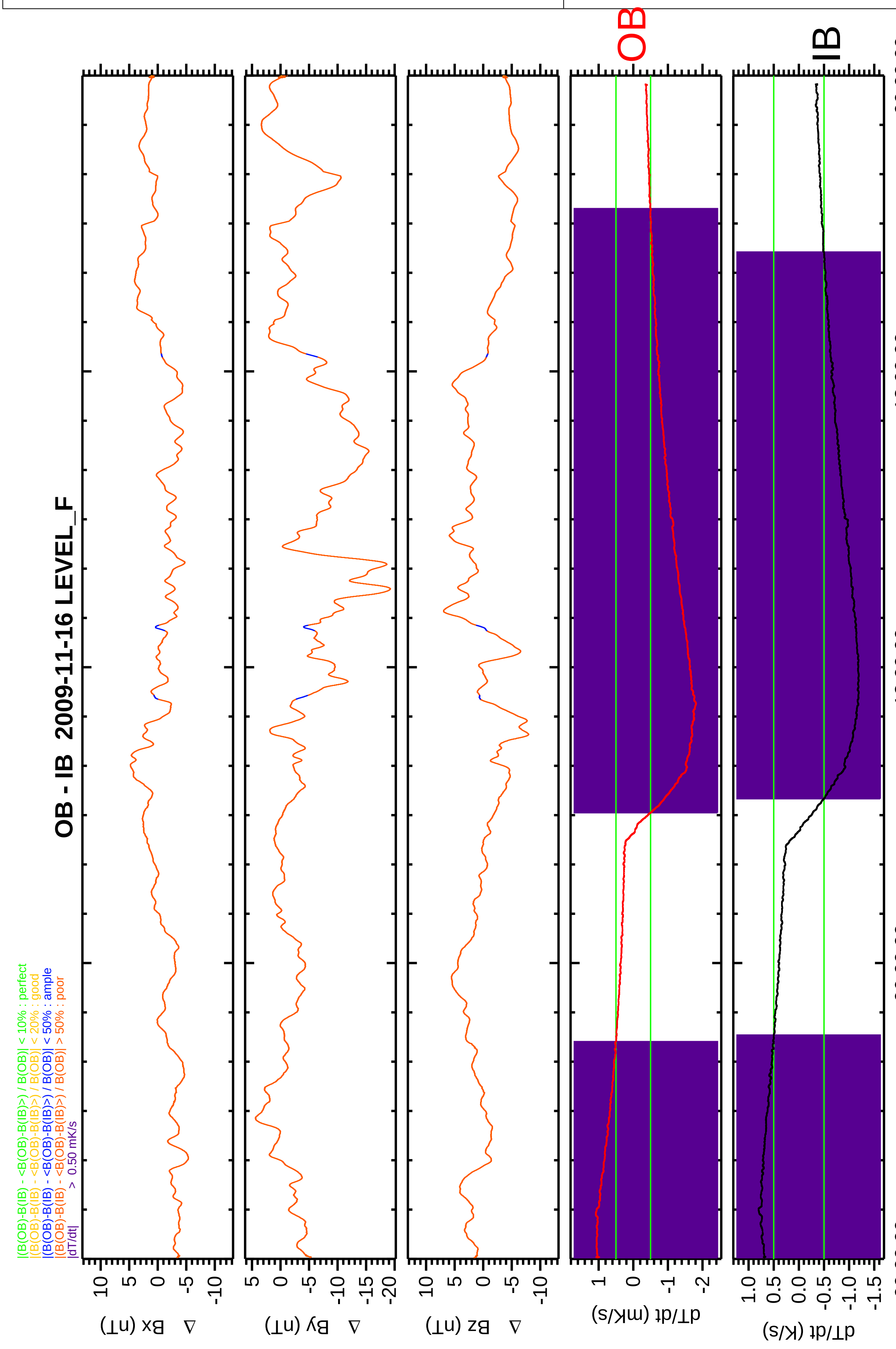


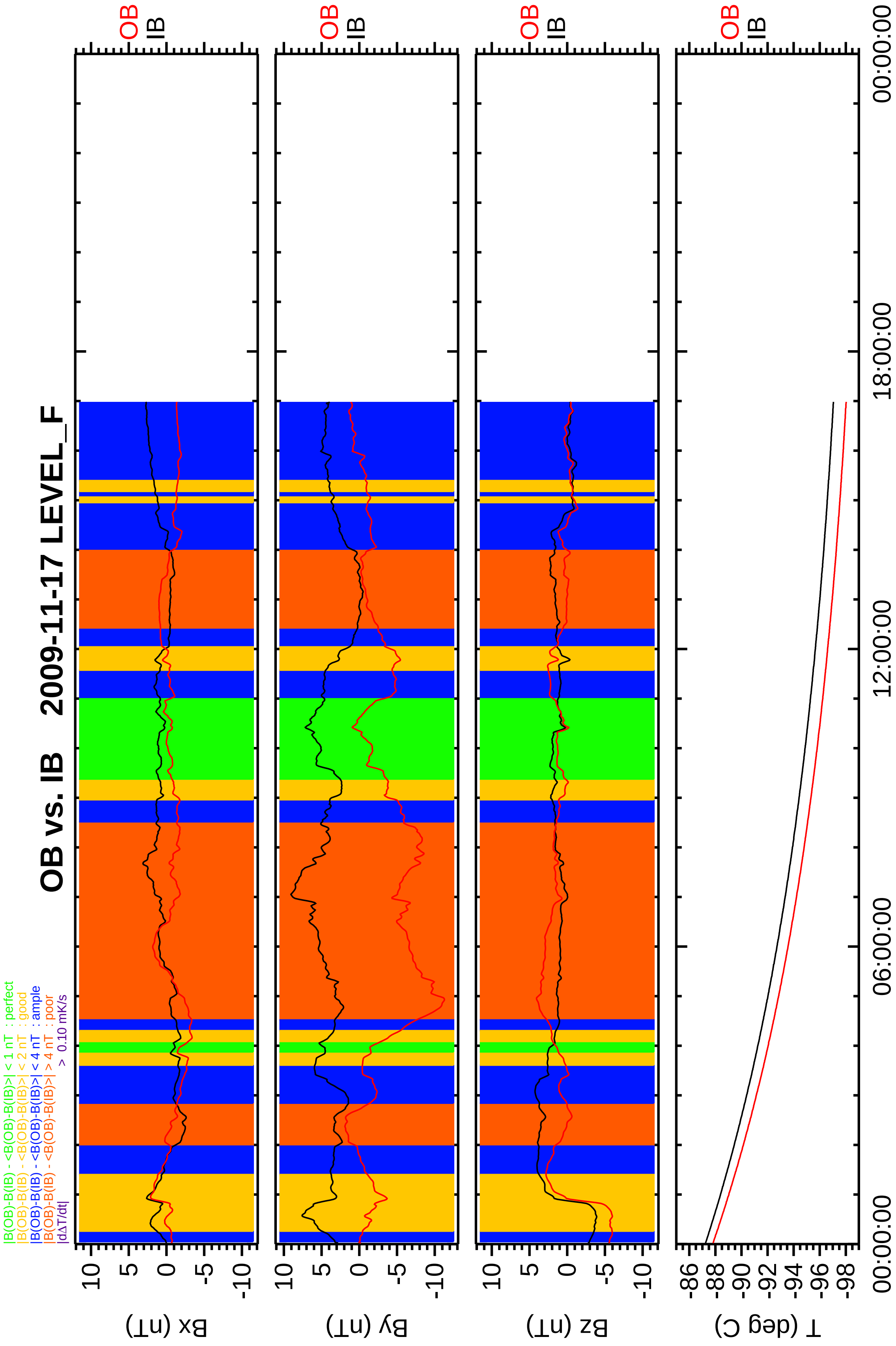
OB vs. IB 2009-11-15 LEVEL_F
|B(OB)-B(IB) - <B(OB)-B(IB)>| < 1 nT : perfect
|B(OB)-B(IB) - <B(OB)-B(IB)>| < 2 nT : good
|B(OB)-B(IB) - <B(OB)-B(IB)>| < 4 nT : ample
|B(OB)-B(IB) - <B(OB)-B(IB)>| > 4 nT : poor
|dΔT/dt| > 0.10 mK/s
OB
IB
Bx (nT)
By (nT)
Bz (nT)
T (deg C)
00:00:00
06:00:00
12:00:00
18:00:00
00:00:00


OB - IB 2009-11-15 LEVEL_F
|(B(OB)-B(IB) - <B(OB)-B(IB)>) / B(OB)| < 10% : perfect
|(B(OB)-B(IB) - <B(OB)-B(IB)>) / B(OB)| < 20% : good
|(B(OB)-B(IB) - <B(OB)-B(IB)>) / B(OB)| < 50% : ample
|(B(OB)-B(IB) - <B(OB)-B(IB)>) / B(OB)| > 50% : poor
|dT/dt| > 0.50 mK/s
Δ Bx (nT)
Δ By (nT)
Δ Bz (nT)
dT/dt (mK/s)
dT/dt (K/s)
OB
IB
00:00:00
06:00:00
12:00:00
18:00:00
00:00:00

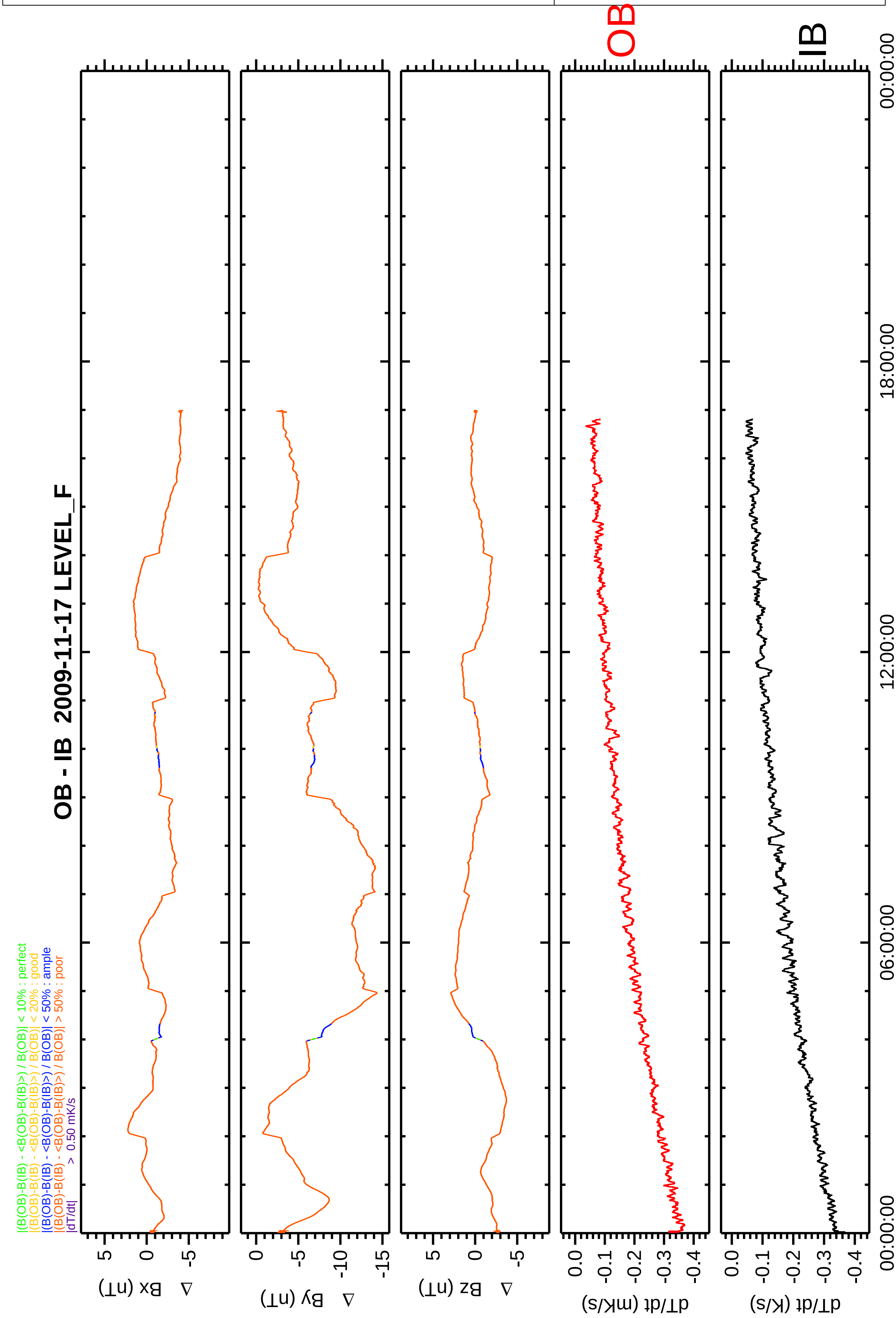


OB vs. IB 2009-11-16 LEVEL_F
|B(OB)-B(IB) - <B(OB)-B(IB)>| < 1 nT : perfect
|B(OB)-B(IB) - <B(OB)-B(IB)>| < 2 nT : good
|B(OB)-B(IB) - <B(OB)-B(IB)>| < 4 nT : ample
|B(OB)-B(IB) - <B(OB)-B(IB)>| > 4 nT : poor
|dΔT/dt| > 0.10 mK/s
OB
IB
Bx (nT)
By (nT)
Bz (nT)
T (deg C)
00:00:00
06:00:00
12:00:00
18:00:00
00:00:00


OB - IB 2009-11-16 LEVEL_F
|B(OB)-B(IB) - <B(OB)-B(IB)>| / B(OB)| < 10% : perfect
|B(OB)-B(IB) - <B(OB)-B(IB)>| / B(OB)| < 20% : good
|B(OB)-B(IB) - <B(OB)-B(IB)>| / B(OB)| < 50% : ample
|B(OB)-B(IB) - <B(OB)-B(IB)>| / B(OB)| > 50% : poor
|dT/dt| > 0.50 mK/s
Δ Bx (nT)
Δ By (nT)
Δ Bz (nT)
dT/dt (mK/s)
dT/dt (K/s)
OB
IB
00:00:00
06:00:00
12:00:00
18:00:00
00:00:00



OB vs. IB 2009-11-17 LEVEL_F
|B(OB)-B(IB) - <B(OB)-B(IB)>| < 1 nT : perfect
|B(OB)-B(IB) - <B(OB)-B(IB)>| < 2 nT : good
|B(OB)-B(IB) - <B(OB)-B(IB)>| < 4 nT : ample
|B(OB)-B(IB) - <B(OB)-B(IB)>| > 4 nT : poor
|dΔT/dt| > 0.10 mK/s
Bx (nT)
By (nT)
Bz (nT)
T (deg C)
OB
IB
00:00:00
06:00:00
12:00:00
18:00:00
00:00:00



OB - IB 2009-11-17 LEVEL_F
|(B(OB)-B(IB) - <B(OB)-B(IB)>) / B(OB)| < 10% : perfect
|(B(OB)-B(IB) - <B(OB)-B(IB)>) / B(OB)| < 20% : good
|(B(OB)-B(IB) - <B(OB)-B(IB)>) / B(OB)| < 50% : ample
|(B(OB)-B(IB) - <B(OB)-B(IB)>) / B(OB)| > 50% : poor
|dT/dt| > 0.50 mK/s
Δ Bx (nT)
Δ By (nT)
Δ Bz (nT)
dT/dt (mK/s)
dT/dt (K/s)
OB
IB
00:00:00
06:00:00
12:00:00
18:00:00
00:00:00