



LYRA

the Lyman-alpha Radiometer onboard PROBA-2

LYRA Calibration, Data Products, and FITS Files



PROBA2 SWT, CESRA
La Roche 14-15 June 2010



First...

... some hints where to find our raw data:

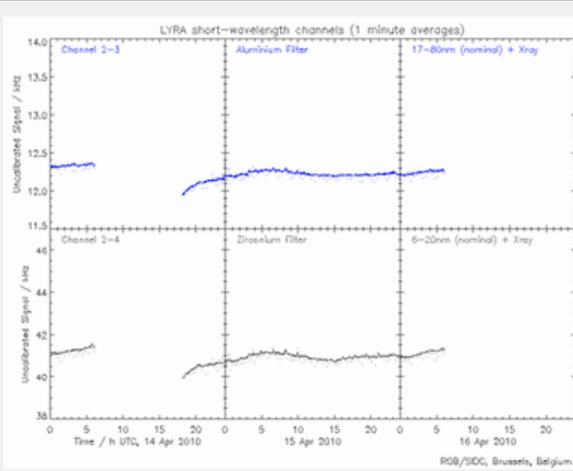


Welcome to the PROBA2 science center.



2010-04-17T17:16:51.538Z

[Watch the latest SWAP image](#)



LYRA short-wavelength channels (1 minute averages)

Channel 2-3 Aluminium Filter 17-20nm (nominal) + Xray

Channel 2-4 Zirconium Filter 6-20nm (nominal) + Xray

Time / h UTC, 14 Apr 2010

ROB/SIDC, Brussels, Belgium

[Go to the latest LYRA curve](#)

Latest news

- 21 January 2010 PROBA2 Press Event (26 January 2010)
- 18 December 2009 SWAP First Light!
- 12 November 2009 PROBA2 Passes First Health Checks

Best picture



Best movie



[PROBA2 SCIENCE CENTER] : Data - Mozilla Firefox

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http://proba2.sidc.be/index.html/Data-download/

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SIDC - Solar Influences Data ... [PROBA2 SCIENCE CENTER] ...



PROBA2 SCIENCE CENTER

Home About SWAP LYRA **Data** Community Meetings Outreach Gallery OK Last update: 31st of May 2010

Home page > Data

Data

SWAP & LYRA Data Distribution

Raw PROBA2 data will be received at [ESA's](#) ground station in Redu and transferred to the PROBA2 Science Center (P2SC) via ftp link. Once received by the P2SC, data will be automatically processed, calibrated, and prepared for public distribution. All data will be freely available to the public as soon as processing is complete and will be distributed on the web at this page.

PROBA2 has now begun its scientific mission and the data of [SWAP](#) and [LYRA](#) are freely available. Apart from the quicklook images, we are happy to announce the beta data release of the science data products.

For the time being we have online the following FITS files and quicklook PNG files in YYYY/MM/DD directories:

- SWAP raw images, i.e. [level0](#) data, e.g. <http://proba2.oma.be/swap/data/eng/2010/05/01/>
- SWAP calibrated images, i.e. [level1](#) data e.g. <http://proba2.oma.be/swap/data/bsd/2010/05/01/>
- SWAP quicklook data (png files), e.g <http://proba2.sidc.be/swap/data/qlviewer/2010/05/01/>
- LYRA raw 'standard' time curves, i.e. [level1](#) data, e.g. <http://proba2.oma.be/lyra/data/eng/2010/05/01/>
- LYRA last quicklook image, at <http://sidc.be>

User manuals are still under construction but the first information can be found [here](#) for SWAP and [here](#) for LYRA.

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[Inbox for dammasch... [PROBA2 SCIENCE CE... [T-Online eMail Center... [Keine neuen eMails - ... [dammasch@noublip... rdesktop - comappsrv

Index of /lyra/data - Mozilla Firefox

File Edit View History Bookmarks Tools Help

http://p2sc-s2/lyra/data/

Most Visited Getting Started Latest Headlines

Index of /lyra/data

Name	Last modified	Size	Description
 Parent Directory		-	
 bsd/	04-Dec-2009 14:48	-	
 eng/	04-Dec-2009 14:48	-	
 qlviewer/	27-Apr-2010 14:38	-	

Apache/2.2.8 (Ubuntu) PHP/5.2.4-2ubuntu5.10 with Suhosin-Patch Server at p2sc-s2 Port 80



Done

[Inbox for dammasch...] [Index of /lyra/data - M...] [T-Online eMail Center...] [Keine neuen eMails - ...] [dammasc@noublip...]

Index of /lyra/data/qlviewer/2010/06/08/30282

Name	Last modified	Size	Description
 Parent Directory		-	
 BINLYRA_1477_SVA1_2010.06.08T01.52.04/	08-Jun-2010 02:04	-	
 BINLYRA_1477_SVA1_2010.06.08T01.52.04_BACKUP_0V.txt	08-Jun-2010 02:04	0	
 BINLYRA_1477_SVA1_2010.06.08T01.52.04_BACKUP_2_5V.txt	08-Jun-2010 02:04	0	
 BINLYRA_1477_SVA1_2010.06.08T01.52.04_BACKUP_5V.txt	08-Jun-2010 02:04	0	
 BINLYRA_1477_SVA1_2010.06.08T01.52.04_BACKUP_HEAD1.txt	08-Jun-2010 02:04	0	
 BINLYRA_1477_SVA1_2010.06.08T01.52.04_BACKUP_HEAD2.txt	08-Jun-2010 02:04	0	
 BINLYRA_1477_SVA1_2010.06.08T01.52.04_BACKUP_HEAD3.txt	08-Jun-2010 02:04	0	
 BINLYRA_1477_SVA1_2010.06.08T01.52.04_NOMINAL_0V.txt	08-Jun-2010 02:04	0	
 BINLYRA_1477_SVA1_2010.06.08T01.52.04_NOMINAL_2_5V.txt	08-Jun-2010 02:04	14K	
 BINLYRA_1477_SVA1_2010.06.08T01.52.04_NOMINAL_5V.txt	08-Jun-2010 02:04	0	
 BINLYRA_1477_SVA1_2010.06.08T01.52.04_NOMINAL_HEAD1.txt	08-Jun-2010 02:04	0	
 BINLYRA_1477_SVA1_2010.06.08T01.52.04_NOMINAL_HEAD2.txt	08-Jun-2010 02:04	15M	
 BINLYRA_1477_SVA1_2010.06.08T01.52.04_NOMINAL_HEAD3.txt	08-Jun-2010 02:04	0	

Apache/2.2.8 (Ubuntu) PHP/5.2.4-2ubuntu5.10 with Suhosin-Patch Server at p2sc-s2 Port 80

2010-06-07T21:49:09.772Z 18809763.909 643155 3477 3350 509 1828 50 3
2010-06-07T21:49:09.822Z 18809763.959 643156 3475 3352 509 1828 50 3
2010-06-07T21:49:09.872Z 18809764.009 643157 3471 3352 509 1824 50 3
2010-06-07T21:49:09.922Z 18809764.059 643158 3475 3352 509 1831 50 3
2010-06-07T21:49:09.972Z 18809764.109 643159 3475 3351 510 1826 50 3
2010-06-07T21:49:10.022Z 18809764.159 643160 3476 3352 509 1828 50 3
2010-06-07T21:49:10.072Z 18809764.209 643161 3476 3351 509 1831 50 3
2010-06-07T21:49:10.122Z 18809764.259 643162 3474 3352 510 1828 50 3
2010-06-07T21:49:10.172Z 18809764.309 643163 3472 3352 509 1829 50 3
2010-06-07T21:49:10.222Z 18809764.359 643164 3473 3352 510 1828 50 3
2010-06-07T21:49:10.272Z 18809764.409 643165 3474 3352 509 1829 50 3
2010-06-07T21:49:10.322Z 18809764.459 643166 3473 3351 510 1828 50 3
2010-06-07T21:49:10.372Z 18809764.509 643167 3476 3351 510 1827 50 3
2010-06-07T21:49:10.422Z 18809764.559 643168 3476 3352 509 1830 50 3
2010-06-07T21:49:10.472Z 18809764.609 643169 3475 3352 510 1825 50 3
2010-06-07T21:49:10.522Z 18809764.659 643170 3473 3352 510 1824 50 3
2010-06-07T21:49:10.572Z 18809764.709 643171 3477 3352 509 1828 50 3
2010-06-07T21:49:10.622Z 18809764.759 643172 3477 3351 509 1829 50 3
2010-06-07T21:49:10.672Z 18809764.809 643173 3475 3351 510 1827 50 3
2010-06-07T21:49:10.722Z 18809764.859 643174 3477 3352 509 1826 50 3
2010-06-07T21:49:10.772Z 18809764.909 643175 3475 3352 510 1833 50 3
2010-06-07T21:49:10.822Z 18809764.959 643176 3474 3351 509 1833 50 3
2010-06-07T21:49:10.872Z 18809765.009 643177 3477 3353 509 1832 50 3
2010-06-07T21:49:10.922Z 18809765.059 643178 3476 3351 510 1827 50 3
2010-06-07T21:49:10.972Z 18809765.109 643179 3475 3351 509 1829 50 3
2010-06-07T21:49:11.022Z 18809765.159 643180 3473 3351 510 1832 50 3
2010-06-07T21:49:11.072Z 18809765.209 643181 3476 3352 509 1827 50 3
2010-06-07T21:49:11.122Z 18809765.259 643182 3475 3351 510 1830 50 3
2010-06-07T21:49:11.172Z 18809765.309 643183 3475 3352 509 1827 50 3
2010-06-07T21:49:11.222Z 18809765.359 643184 3477 3350 510 1831 50 3
2010-06-07T21:49:11.272Z 18809765.409 643185 3479 3352 509 1828 50 3
2010-06-07T21:49:11.322Z 18809765.459 643186 3474 3351 510 1831 50 3
2010-06-07T21:49:11.372Z 18809765.509 643187 3470 3351 509 1829 50 3
2010-06-07T21:49:11.422Z 18809765.559 643188 3475 3351 509 1830 50 3
2010-06-07T21:49:11.472Z 18809765.609 643189 3473 3352 509 1827 50 3
2010-06-07T21:49:11.522Z 18809765.659 643190 3477 3350 510 1832 50 3
2010-06-07T21:49:11.572Z 18809765.709 643191 3479 3351 509 1826 50 3
2010-06-07T21:49:11.622Z 18809765.759 643192 3482 3351 509 1831 50 3
2010-06-07T21:49:11.672Z 18809765.809 643193 3473 3352 509 1830 50 3
2010-06-07T21:49:11.722Z 18809765.859 643194 3475 3351 510 1828 50 3
2010-06-07T21:49:11.772Z 18809765.909 643195 3473 3351 509 1832 50 3
2010-06-07T21:49:11.822Z 18809765.959 643196 3472 3351 510 1832 50 3
2010-06-07T21:49:11.872Z 18809766.009 643197 3479 3351 509 1829 50 3
2010-06-07T21:49:11.922Z 18809766.059 643198 3472 3352 510 1826 50 3
2010-06-07T21:49:11.972Z 18809766.109 643199 3475 3351 510 1829 50 3
2010-06-07T21:49:12.022Z 18809766.159 643200 3472 3351 509 1830 50 3
2010-06-07T21:49:12.072Z 18809766.209 643201 3470 3351 509 1831 50 3
2010-06-07T21:49:12.122Z 18809766.259 643202 3473 3350 510 1831 50 3
2010-06-07T21:49:12.172Z 18809766.309 643203 3474 3351 510 1830 50 3
2010-06-07T21:49:12.222Z 18809766.359 643204 3472 3352 509 1826 50 3
2010-06-07T21:49:12.272Z 18809766.409 643205 3474 3350 510 1830 50 3
2010-06-07T21:49:12.322Z 18809766.459 643206 3474 3351 509 1829 50 3
2010-06-07T21:49:12.372Z 18809766.509 643207 3477 3351 510 1828 50 3
2010-06-07T21:49:12.422Z 18809766.559 643208 3473 3350 509 1827 50 3
2010-06-07T21:49:12.472Z 18809766.609 643209 3476 3352 510 1828 50 3

Done

Index of /lyra/data/eng/2010/06/08

Name	Last modified	Size	Description
Parent Directory	-		
lyra_20100608-000000_lev1_cal.fits	08-Jun-2010 09:58	5.6K	
lyra_20100608-000000_lev1_met.fits	08-Jun-2010 09:58	39K	
lyra_20100608-000000_lev1_rej.fits	08-Jun-2010 09:58	8.4K	
lyra_20100608-000000_lev1_std.fits	08-Jun-2010 09:58	17M	

Apache/2.2.8 (Ubuntu) PHP/5.2.4-2ubuntu5.10 with Suhosin-Patch Server at p2sc-s2 Port 80

FITS file name ? **lyra_20100311-000000_levl_met.fits**

```

SIMPLE = T / Written by PyFits
BITPIX = 8 / array data type
NAXIS = 0 / number of array dimensions
EXTEND = T / File contains extensions
ORIGIN = 'ROB-SIDC'
TELESCOP= 'PROBA2 '
INSTRUME= 'LYRA '
OBJECT = 'EUV solar irradi'
OBS_MODE= 'metadata' / std., ecl., cal. (std. or bak.), or met.
DATE = '2010-03-25' / FITS file creation date (yyyy-mm-dd)
DATE_OBS= '2010-03-11T00:00:00.000Z' / UTC start of observation
DATE_END= '2010-03-11T23:59:59.995Z' / UTC end of observation
DATASRC = 'Redu ' / Receiving ground station
ALGOR_V = 'EDG=0.2 ' / softs versions
LEVEL = '1 ' / Calibration level
CAL_FILE= 'lyra_cal_20100311_20090810' / File version number
FILENAME= 'lyra_20100311-000000_levl_met.fits' / Name of this FITS file
END

```

```

XTENSION= 'BINTABLE' / binary table extension
BITPIX = 8 / array data type
NAXIS = 2 / number of array dimensions
NAXIS1 = 28 / length of dimension 1
NAXIS2 = 2774 / length of dimension 2
PCOUNT = 0 / number of group parameters
GCOUNT = 1 / number of groups
TFIELDS = 4 / number of table fields
TTYPE1 = 'TIME ' / TIME in UTC (second of day)
TFORM1 = 'D ' / TIME data type: Real*8 (double precision)
TUNIT1 = 's ' / TIME physical unit: seconds of day
TTYPE2 = 'TEMPERATURE' / TEMPERATURE of LYRA detector
TFORM2 = 'E ' / TEMPERAT. d. type: Real*4 (floating point)
TUNIT2 = 'deg C ' / TEMPERATURE physical unit: degree Celcius

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TFORM2 = 'E' / TEMPERAT. d. type: Real*4 (floating point)
TUNIT2 = 'deg C' / TEMPERATURE physical unit: degree Celcius
TTYPE3 = 'POINTING' / POINTING calculated with SPICE
TFORM3 = '2E' / POINTING data type: Real*4 (floating point)
TUNIT3 = 'arcsec' / POINTING physical unit: second of arc
TTYPE4 = 'DISTANCE' / DISTANCE calculated with SPICE
TFORM4 = 'D' / DISTANCE data type: Real*8 (double precision)
TUNIT4 = 'km' / DISTANCE physical unit: km between s/c and Sun
EXTNAME = 'HK LEVEL 1' / Name of first metadata tableHK
END

```

FITS Binary Table: HK LEVEL 1
Table contains 4 columns, by 2774 rows

Col	Name	Type	Size	Units	Null
1	TIME	Dbl	1	s	
2	TEMPERATURE	Flt	1	deg C	
3	POINTING	Flt	2	arcsec	
4	DISTANCE	Dbl	1	km	

first and last 20 of 2774 rows

1	19.000000	41009.0	NaN	NaN	1.4859513e+08
2	49.000000	41009.0	NaN	NaN	1.4859519e+08
3	79.000000	41009.0	NaN	NaN	1.4859525e+08
4	109.00000	41009.0	NaN	NaN	1.4859531e+08
5	139.00000	41012.0	NaN	NaN	1.4859537e+08
6	169.00000	41012.0	NaN	NaN	1.4859543e+08
7	199.00000	41012.0	NaN	NaN	1.4859548e+08
8	229.00000	41012.0	NaN	NaN	1.4859554e+08
9	259.00000	41012.0	NaN	NaN	1.4859560e+08
10	289.00000	41012.0	NaN	NaN	1.4859566e+08
11	319.00000	41012.0	NaN	NaN	1.4859571e+08
12	349.00000	41012.0	NaN	NaN	1.4859577e+08
13	379.00000	41017.0	NaN	NaN	1.4859582e+08
14	409.00000	41017.0	NaN	NaN	1.4859587e+08
15	439.00000	41017.0	NaN	NaN	1.4859592e+08
16	469.00000	41017.0	NaN	NaN	1.4859598e+08
17	499.00000	41017.0	NaN	NaN	1.4859603e+08
18	529.00000	41017.0	NaN	NaN	1.4859608e+08

19	559.00000	41017.0	NaN	NaN	1.4859612e+08
20	589.00000	41017.0	NaN	NaN	1.4859617e+08
:::					
2755	85820.000	40994.0	NaN	NaN	1.4863543e+08
2756	85850.000	40994.0	NaN	NaN	1.4863540e+08
2757	85880.000	40994.0	NaN	NaN	1.4863537e+08
2758	85910.000	40994.0	NaN	NaN	1.4863534e+08
2759	85940.000	40994.0	NaN	NaN	1.4863530e+08
2760	85970.000	40994.0	NaN	NaN	1.4863527e+08
2761	86000.000	40994.0	NaN	NaN	1.4863524e+08
2762	86030.000	40994.0	NaN	NaN	1.4863521e+08
2763	86060.000	40987.0	NaN	NaN	1.4863518e+08
2764	86090.000	40987.0	NaN	NaN	1.4863514e+08
2765	86120.000	40987.0	NaN	NaN	1.4863511e+08
2766	86150.000	40987.0	NaN	NaN	1.4863508e+08
2767	86180.000	40987.0	NaN	NaN	1.4863505e+08
2768	86210.000	40987.0	NaN	NaN	1.4863502e+08
2769	86240.000	40987.0	NaN	NaN	1.4863498e+08
2770	86270.000	40987.0	NaN	NaN	1.4863495e+08
2771	86300.000	40979.0	NaN	NaN	1.4863492e+08
2772	86330.000	40979.0	NaN	NaN	1.4863489e+08
2773	86360.000	40979.0	NaN	NaN	1.4863486e+08
2774	86390.000	40979.0	NaN	NaN	1.4863482e+08

```

-----
XTENSION= 'BINTABLE'      / binary table extension
BITPIX   =                8 / array data type
NAXIS    =                2 / number of array dimensions
NAXIS1   =               45 / length of dimension 1
NAXIS2   =                1 / length of dimension 2
PCOUNT   =                0 / number of group parameters
GCOUNT   =                1 / number of groups
TFIELDS  =               10 / number of table fields
TTYPE1   = 'TIME'        ' / TIME in UTC (yyyy-mm-dd)
TFORM1   = 'D'           ' / TIME data type: Real*8 (double precision)
TUNIT1   = 's'           ' / TIME physical unit: seconds of day
TTYPE2   = 'HEAD'       ' / HEAD used for detection (1, 2, 3, off=0)
TFORM2   = 'B'           ' / HEAD data type: Integer*1 (byte)
TUNIT2   = '            ' / HEAD physical unit: none
TTYPE3   = 'MODE'       ' / MODE: nominal=1 or backup=0
TFORM3   = 'B'           ' / MODE data type: Integer*1 (byte)

```

```

TUNIT1 = 's' / TIME physical unit: seconds of day
TTYPE2 = 'HEAD' / HEAD used for detection (1, 2, 3, off=0)
TFORM2 = 'B' / HEAD data type: Integer*1 (byte)
TUNIT2 = ' ' / HEAD physical unit: none
TTYPE3 = 'MODE' / MODE: nominal=1 or backup=0
TFORM3 = 'B' / MODE data type: Integer*1 (byte)
TUNIT3 = ' ' / MODE physical unit: none
TTYPE4 = 'COVER' / COVER: closed=1 or open=0
TFORM4 = 'B' / COVER data type: Integer*1 (byte)
TUNIT4 = ' ' / COVER physical unit: none
TTYPE5 = 'VISLED' / VISLED: visible led used=1 or not used=0
TFORM5 = 'B' / VISLED data type: Integer*1 (byte)
TUNIT5 = ' ' / VISLED physical unit: none
TTYPE6 = 'UVLED' / UVLED: ultraviolet led used=1 or not used=0
TFORM6 = 'B' / UVLED data type: Integer*1 (byte)
TUNIT6 = ' ' / UVLED physical unit: none
TTYPE7 = 'DARKCURR1' / Dark current of channel1 detector
TFORM7 = 'D' / DARKCURR1 data type: Real*8 (double precision)
TUNIT7 = 'kHz' / DARKCURR1 physical unit: kilohertz
TTYPE8 = 'DARKCURR2' / Dark current of channel2 detector
TFORM8 = 'D' / DARKCURR2 data type: Real*8 (double precision)
TUNIT8 = 'kHz' / DARKCURR2 physical unit: kilohertz
TTYPE9 = 'DARKCURR3' / Dark current of channel3 detector
TFORM9 = 'D' / DARKCURR3 data type: Real*8 (double precision)
TUNIT9 = 'kHz' / DARKCURR3 physical unit: kilohertz
TTYPE10 = 'DARKCURR4' / Dark current of channel4 detector
TFORM10 = 'D' / DARKCURR4 data type: Real*8 (double precision)
TUNIT10 = 'kHz' / DARKCURR4 physical unit: kilohertz
EXTNAME = 'STATUS LEVEL 1' / name of binary table extension
END

```

FITS Binary Table: STATUS LEVEL 1
Table contains 10 columns, by 1 rows

Col	Name	Type	Size	Units	Null
1	TIME	Dbl	1	s	
2	HEAD	Byt	1		
3	MODE	Byt	1		
4	COVER	Byt	1		

```

5 VISLED          Byt  1
6 UVLED          Byt  1
7 DARKCURR1     Dbl  1      kHz
8 DARKCURR2     Dbl  1      kHz
9 DARKCURR3     Dbl  1      kHz
10 DARKCURR4    Dbl  1      kHz

```

```

-----
      1      0.0000000  2  1  0  0  0      0.0000000      0.0000000      0.0000000      0.0000000
-----

```

```

XTENSION= 'BINTABLE'      / binary table extension
BITPIX   =                8 / array data type
NAXIS    =                2 / number of array dimensions
NAXIS1   =               41 / length of dimension 1
NAXIS2   =                4 / length of dimension 2
PCOUNT   =                0 / number of group parameters
GCOUNT   =                1 / number of groups
TFIELDS  =                6 / number of table fields
TTYPE1   = 'TIME'        / TIME in UTC (yyyy-mm-dd)
TFORM1   = 'D'           / TIME data type: Real*8 (double precision)
TUNIT1   = 's'           / TIME physical unit: seconds of day
TTYPE2   = 'MODE'        / MODE: nominal=1 or backup=0
TFORM2   = 'B'           / MODE data type: Integer*1 (byte)
TUNIT2   = ' '           / MODE physical unit: none
TTYPE3   = 'VFC1'        / VFC1
TFORM3   = '2E'          / VFC1 data type: Real*4 (floating point)
TUNIT3   = ' '           / VFC1 physical unit: none
TTYPE4   = 'VFC2'        / VFC2
TFORM4   = '2E'          / VFC2 data type: Real*4 (floating point)
TUNIT4   = ' '           / VFC2 physical unit: none
TTYPE5   = 'VFC3'        / VFC3
TFORM5   = '2E'          / VFC3 data type: Real*4 (floating point)
TUNIT5   = ' '           / VFC3 physical unit: none
TTYPE6   = 'VFC4'        / VFC4
TFORM6   = '2E'          / VFC4 data type: Real*4 (floating point)
TUNIT6   = ' '           / VFC4 physical unit: none
EXTNAME  = 'VEC_LEVEL_1' / name of binary table extension

```

```

TTYPE5 = 'VFC3' / VFC3
TFORM5 = '2E' / VFC3 data type: Real*4 (floating point)
TUNIT5 = ' ' / VFC3 physical unit: none
TTYPE6 = 'VFC4' / VFC4
TFORM6 = '2E' / VFC4 data type: Real*4 (floating point)
TUNIT6 = ' ' / VFC4 physical unit: none
EXTNAME = 'VFC LEVEL 1' / name of binary table extension
END

```

FITS Binary Table: VFC LEVEL 1
Table contains 6 columns, by 4 rows

Col	Name	Type	Size	Units	Null
1	TIME	Dbl	1	s	
2	MODE	Byt	1		
3	VFC1	Flt	2		
4	VFC2	Flt	2		
5	VFC3	Flt	2		
6	VFC4	Flt	2		

```

-----
1 11823.888 1 -0.0276253 0.00415074 -0.0269938 0.00414643 -0.0271163 0.00414961 -0.0276315 0.00415011
2 33426.588 1 -0.0276146 0.00415071 -0.0269937 0.00414643 -0.0271000 0.00414958 -0.0276213 0.00415010
3 55026.883 1 -0.0277880 0.00415073 -0.0271554 0.00414644 -0.0272475 0.00414959 -0.0277674 0.00415011
4 76627.185 1 -0.0276359 0.00415075 -0.0269969 0.00414645 -0.0271058 0.00414961 -0.0276261 0.00415011
-----

```



LYRA

- + LYRA
- + Publications
- LYRA Analysis Manual

LYRA analysis manual
Level 1 : raw data and meta-data
Level 2: calibrated data
Level 3: averaged data

Home page > LYRA > LYRA Analysis Manual

LYRA analysis manual

LYRA proposes three levels of products:

- level 1 is a set of metadata and uncalibrated data daily fits files
- level 2 corresponds to the calibrated data, provided as daily fits files
- level 3 provides, as level 2, calibrated data, but averaged over 1 min

For the time being, only level 1 is distributed.

Level 1 : raw data and meta-data - [PROBA2 SCIENCE CENTER] - Mozilla Firefox

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http://proba2.sidc.be/index.html/science/lyra-analysis-manual/article/level-1-raw-data-and-meta-data?menu=

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LYRA Analysis Manual

LYRA analysis manual

Level 1 : raw data and meta-data

Level 2: calibrated data

Level 3: averaged data

Level 1 of Lyra data consist in a set of four (seven, when acquisition is performed with two units at the same time) fits files:

- a standard file named lyra_yyyyymmdd-hhmmss_lev1_std.fits (or lyra_yyyyymmdd-hhmmss_lev1_bst.fits, when a back-up unit is used)
- a calibration file named lyra_yyyyymmdd-hhmmss_lev1_cal.fits (or lyra_yyyyymmdd-hhmmss_lev1_bca.fits, when a back-up unit is used)
- a file with rejected samples named lyra_yyyyymmdd-hhmmss_lev1_rej.fits (or lyra_yyyyymmdd-hhmmss_lev1_bre.fits, when a back-up unit is used)
- a metadata file named lyra_yyyyymmdd-hhmmss_lev1_met.fits

These files contain a common primary header and a secondary header, which depends on the file type (std, met, cal, rej). The primary header has the following configuration:

fits keywords for lev1 Lyra product: primary header

KEYWORD	EXAMPLE OF VALUE	COMMENT
SIMPLE	T	Written by PyFits
BITPIX	8	array data type
NAXIS	0	number of array dimensions
EXTEND	T	File contains extensions
ORIGIN	'ROB-SIDC'	
TELESCOP	'PROBA2'	
INSTRUME	'LYRA '	
OBJECT	'EUV solar irradi'	
OBS_MODE	'standard'	std., ecl., cal. (std. or bak.), met., or rej.
DATE	'2009-07-31'	FITS file creation date (yyyy-mm-dd)
DATE_OBS	'2009-07-30T00:00:00.000'	UTC start of observation
DATE_END	'2009-07-30T23:59:59.990'	UTC end of observation
DATASRC	'Redu '	Receiving ground station
ALGOR_V	'EDG=0.2 '	softs versions
LEVEL	'1 '	Calibration level
CAL_NAME	lyra_cal_20090730-000000'	File version number
FILENAME	'lyra_20090730-000000_lev1_std_v01.fits'	Name of this FITS file
END		

The standard file

The standard file contains all the acquired samples corresponding to uncalibrated solar signal measurements.

"Uncalibrated" does not only mean that raw LYRA count rates [1] are shown instead of physical units; the curves also still include a long-term trend due to instrumental degradation, dark currents (which are not subtracted at this level), daily and orbital variations due to on-board temperature changes, regular disturbances per orbit due to spacecraft rotations, and possible disturbances due to commanding. Gaps may be caused by missing downlinks or calibration campaigns.

```
FITS file name ? lyra_20100311-000000_levl_std.fits
SIMPLE = T / Written by PyFits
BITPIX = 8 / array data type
NAXIS = 0 / number of array dimensions
EXTEND = T / File contains extensions
ORIGIN = 'ROB-SIDC'
TELESCOP= 'PROBA2 '
INSTRUME= 'LYRA '
OBJECT = 'EUV solar irradi'
OBS_MODE= 'nominal standard' / std., ecl., cal. (std. or bak.), or met.
DATE = '2010-03-25' / FITS file creation date (yyyy-mm-dd)
DATE_OBS= '2010-03-11T00:00:00.000Z' / UTC start of observation
DATE_END= '2010-03-11T23:59:59.995Z' / UTC end of observation
DATASRC = 'Redu ' / Receiving ground station
ALGOR_V = 'EDG=0.2 ' / softs versions
LEVEL = '1 ' / Calibration level
CAL_FILE= 'lyra_cal_20100311_20090810' / File version number
FILENAME= 'lyra_20100311-000000_levl_std.fits' / Name of this FITS file
END

XTENSION= 'BINTABLE' / binary table extension
BITPIX = 8 / array data type
NAXIS = 2 / number of array dimensions
NAXIS1 = 41 / length of dimension 1
NAXIS2 = 8601244 / length of dimension 2
PCOUNT = 0 / number of group parameters
GCOUNT = 1 / number of groups
TFIELDS = 6 / number of table fields
TTYPE1 = 'TIME ' / TIME in UTC (yyyy-mm-dd)
TFORM1 = 'D ' / TIME data type: Real*8 (double precision)
TUNIT1 = 's ' / TIME physical unit: seconds of day
TTYPE2 = 'CHANNEL1' / CHANNEL1: Lyman alpha
TFORM2 = 'D ' / CHANNEL1 data type: Real*8 (double precision)
TUNIT2 = 'kHz ' / CHANNEL1 physical unit: kiloHertz
TTYPE3 = 'CHANNEL2' / CHANNEL2: Herzberg
TFORM3 = 'D ' / CHANNEL2 data type: Real*8 (double precision)
TUNIT3 = 'kHz ' / CHANNEL2 physical unit: kiloHertz
```

```

TFORM3 = 'D' / CHANNEL2 data type: Real*8 (double precision)
TUNIT3 = 'kHz' / CHANNEL2 physical unit: kiloHertz
TTYPE4 = 'CHANNEL3' / CHANNEL3: Aluminium filter
TFORM4 = 'D' / CHANNEL3 data type: Real*8 (double precision)
TUNIT4 = 'kHz' / CHANNEL3 physical unit: kiloHertz
TTYPE5 = 'CHANNEL4' / CHANNEL4: Zirconium filter
TFORM5 = 'D' / CHANNEL4 data type: Real*8 (double precision)
TUNIT5 = 'kHz' / CHANNEL4 physical unit: kiloHertz
TTYPE6 = 'QFACTOR' / QFACTOR: calculated TIME quality factor
TFORM6 = 'B' / QFACTOR data type: Interger*1 (byte)
TUNIT6 = ' ' / QFACTOR physical unit: none
EXTNAME = 'FREQ LEVEL 1' / Name of binary table extension
END

```

FITS Binary Table: FREQ LEVEL 1
Table contains 6 columns, by 8601244 rows

Col	Name	Type	Size	Units	Null
1	TIME	Dbl	1	s	
2	CHANNEL1	Dbl	1	kHz	
3	CHANNEL2	Dbl	1	kHz	
4	CHANNEL3	Dbl	1	kHz	
5	CHANNEL4	Dbl	1	kHz	
6	QFACTOR	Byt	1		

first and last 20 of 8601244 rows

1	0.010000000	167.47720	291.70860	15.316200	46.649400	3
2	0.020000000	167.17690	291.60850	15.416300	46.749500	3
3	0.030000000	166.97670	291.60850	15.416300	46.549300	3
4	0.040000000	167.27700	291.70860	15.416300	46.749500	3
5	0.050000000	167.17690	291.60850	15.416300	46.649400	3
6	0.060000000	167.37710	291.70860	15.416300	46.649400	3
7	0.070000000	167.07680	291.70860	15.416300	46.649400	3
8	0.080000000	167.07680	291.70860	15.416300	46.849600	3
9	0.090000000	167.17690	291.60850	15.416300	46.949700	3
10	0.100000000	167.07680	291.70860	15.416300	46.649400	3
11	0.110000000	167.07680	291.70860	15.316200	46.749500	3

12	0.12000000	167.27700	291.60850	15.416300	46.649400	3
13	0.13000000	167.17690	291.70860	15.416300	46.649400	3
14	0.14000000	167.27700	291.70860	15.416300	46.549300	3
15	0.15000000	167.27700	291.60850	15.416300	46.949700	3
16	0.16000000	167.17690	291.70860	15.416300	46.849600	3
17	0.17000000	167.17690	291.70860	15.416300	46.949700	3
18	0.18000000	167.27700	291.70860	15.416300	46.749500	3
19	0.19000000	167.27700	291.60850	15.416300	46.549300	3
20	0.20000000	167.27700	291.80880	15.416300	46.849600	3
:::						
8601225	86399.805	165.47510	283.80030	15.616500	47.850600	3
8601226	86399.815	165.37500	283.80030	15.616500	47.750500	3
8601227	86399.825	165.57520	283.80030	15.616500	47.750500	3
8601228	86399.835	165.47510	283.80030	15.616500	47.950700	3
8601229	86399.845	165.47510	283.70020	15.616500	47.850600	3
8601230	86399.855	165.57520	283.80030	15.716600	47.750500	3
8601231	86399.865	165.47510	283.70020	15.616500	47.750500	3
8601232	86399.875	165.47510	283.80030	15.716600	47.850600	3
8601233	86399.885	165.47510	283.70020	15.616500	47.850600	3
8601234	86399.895	165.57520	283.80030	15.716600	47.850600	3
8601235	86399.905	165.57520	283.70020	15.616500	47.850600	3
8601236	86399.915	165.37500	283.70020	15.716600	47.750500	3
8601237	86399.925	165.47510	283.80030	15.616500	47.550300	3
8601238	86399.935	165.37500	283.70020	15.616500	47.950700	3
8601239	86399.945	165.47510	283.70020	15.716600	47.750500	3
8601240	86399.955	165.57520	283.70020	15.616500	47.850600	3
8601241	86399.965	165.37500	283.80030	15.616500	47.850600	3
8601242	86399.975	165.57520	283.80030	15.716600	47.750500	3
8601243	86399.985	165.37500	283.70020	15.616500	47.850600	3
8601244	86399.995	165.37500	283.70020	15.716600	47.550300	3

The keywords contained in the secondary header are:

fits keywords for lev1 standard Lyra product: secondary header

KEYWORD	EXAMPLE OF VALUE	COMMENT
XTENSION	'BINTABLE'	binary table extension
BITPIX	8	array data type
NAXIS	2	number of array dimensions
NAXIS1	41	length of dimension 1
NAXIS2	7488	length of dimension 2
PCOUNT	0	number of group parameters
GCOUNT	1	number of groups
TFIELDS	6	number of table fields
TTYPE1	'TIME '	TIME in UTC (yyyy-mm-dd)
TFORM1	'1D '	TIME data type: Real*8 (double precision)
TUNIT1	's '	TIME physical unit: seconds of day
TTYPE2	'CHANNEL1'	CHANNEL1: Lyman alpha
TFORM2	'1D '	CHANNEL1 data type: Real*8 (double precision)
TUNIT2	'kHz '	CHANNEL1 physical unit: kiloHertz
TTYPE3	'CHANNEL2'	CHANNEL2: Herzberg
TFORM3	'1D '	CHANNEL2 data type: Real*8 (double precision)
TUNIT3	'kHz '	CHANNEL2 physical unit: kiloHertz
TTYPE4	'CHANNEL1'	CHANNEL3: Aluminium filter
TFORM4	'1D '	CHANNEL3 data type: Real*8 (double precision)
TUNIT4	'kHz '	CHANNEL3 physical unit: kiloHertz
TTYPE5	'CHANNEL1'	CHANNEL4: Zirconium filter
TFORM5	'1D '	CHANNEL4 data type: Real*8 (double precision)
TUNIT5	'kHz '	CHANNEL4 physical unit: kiloHertz
TTYPE6	'QFACTOR '	QFACTOR: calculated TIME quality factor
TFORM6	'1B '	QFACTOR data type: Interger*1 (byte)
TUNIT6	' '	QFACTOR physical unit: none
EXTNAME	'FREQ LEVEL 1'	Name of binary table extension
END		

The calibration file

This file contains all the data dedicated to the calibration of the instrument:

- dark current measurement
- LEDs signal

The secondary header is similar than in the case of a standard file.

FITS file name ? **lyra_20100311-000000_lev2.fits**

```
SIMPLE =                               T /Written by IDL:  Sat Mar 27 18:11:47 2010
BITPIX =                               8 /
NAXIS  =                               0 /
EXTEND  =                               T /File contains extensions
ORIGIN  = 'ROB-SIDC'                    /
TELESCOP= 'PROBA2 '                    /
INSTRUME= 'LYRA '                      /
OBJECT  = 'EUV solar irradi'           /
OBS_MODE= 'standard'                   /std, ecl, bak, eng, or met
DATE    = '2010-03-27'                 /
DATE_OBS= '2010-03-11T00:00:00.000Z'   /UTC start of observation
DATE_END= '2010-03-11T23:59:59.995Z'   /UTC end of observation
DATASRC = 'Redu '                      /receiving ground station
LEVEL   = '2 '                         /calibration level
ALGOR_V = '0101 '                      /LYRA calibration S/W version lev1.lev2
FILENAME= 'lyra_20100311-000000_lev2.fits' /name of this FITS file
END
```

```
XTENSION= 'BINTABLE'                   /Written by IDL:  Sat Mar 27 18:11:48 2010
BITPIX  =                               8 /
NAXIS   =                               2 /Binary table
NAXIS1  =                               45 /Number of bytes per row
NAXIS2  =                               8601244 /Number of rows
PCOUNT  =                               0 /Random parameter count
GCOUNT  =                               1 /Group count
TFIELDS =                               6 /Number of columns
EXTNAME = 'IRRAD LEVEL 2'              /name of binary table extension
TFORM1  = '1D '                        /Real*8 (double precision)
TTYPE1  = 'TIME '                      /Label for column 1
TUNIT1  = 's '                         /Units of column 1
TFORM2  = '1D '                        /Real*8 (double precision)
TTYPE2  = 'CHANNEL1'                  /Label for column 2
TUNIT2  = 'W/m**2 '                   /Units of column 2
TFORM3  = '1D '                        /Real*8 (double precision)
```

```

TUNIT2 = 'W/m**2 ' /Units of column 2
TFORM3 = '1D ' /Real*8 (double precision)
TTYPE3 = 'CHANNEL2' /Label for column 3
TUNIT3 = 'W/m**2 ' /Units of column 3
TFORM4 = '1D ' /Real*8 (double precision)
TTYPE4 = 'CHANNEL3' /Label for column 4
TUNIT4 = 'W/m**2 ' /Units of column 4
TFORM5 = '1D ' /Real*8 (double precision)
TTYPE5 = 'CHANNEL4' /Label for column 5
TUNIT5 = 'W/m**2 ' /Units of column 5
TFORM6 = '5A ' /Character string
TTYPE6 = 'WARNING ' /Label for column 6
TUNIT6 = ' ' /Units of column 6
END

```

FITS Binary Table: IRRAD LEVEL 2
Table contains 6 columns, by 8601244 rows

Col	Name	Type	Size	Units	Null
1	TIME	Dbl	1	s	
2	CHANNEL1	Dbl	1	W/m**2	
3	CHANNEL2	Dbl	1	W/m**2	
4	CHANNEL3	Dbl	1	W/m**2	
5	CHANNEL4	Dbl	1	W/m**2	
6	WARNING	Asc	1		

first and last 20 of 8601244 rows

1	0.010000000	0.0000000	0.0059791424	0.00075934281	0.00020747255	33222
2	0.020000000	0.0000000	0.0059791424	0.00075934281	0.00020747255	33222
3	0.030000000	0.0000000	0.0059791424	0.00075934281	0.00020747255	33222
4	0.040000000	0.0000000	0.0059791424	0.00075934281	0.00020747255	33222
5	0.050000000	0.0000000	0.0059791424	0.00075934281	0.00020747255	33222
6	0.060000000	0.0000000	0.0059791424	0.00075934281	0.00020747255	33222
7	0.070000000	0.0000000	0.0059791424	0.00075934281	0.00020747255	33222
8	0.080000000	0.0000000	0.0059791424	0.00075934281	0.00020747255	33222
9	0.090000000	0.0000000	0.0059791424	0.00075934281	0.00020747255	33222
10	0.100000000	0.0000000	0.0059791424	0.00075934281	0.00020747255	33222
11	0.110000000	0.0000000	0.0059791424	0.00075934281	0.00020747255	33222



Summary: FITS File Structure

- lyra_20100609_000000_lev1_***.fits
- where: *** = met, std, cal, rej, (bst, bca, bre)
- generally: header + binary extension table(s)
- extension = header + data (variable length)
- Lev1 met = HK, STATUS, VFC
- Lev1 std = uncalibr. irradiance (counts/ms)
- Lev2 std = calibr. irradiance (W/m²)
- Lev3 std = calibr. aver. irradiance (W/m²)
- per line: time, ch1, ch2, ch3, ch4, qual.



Product Definition

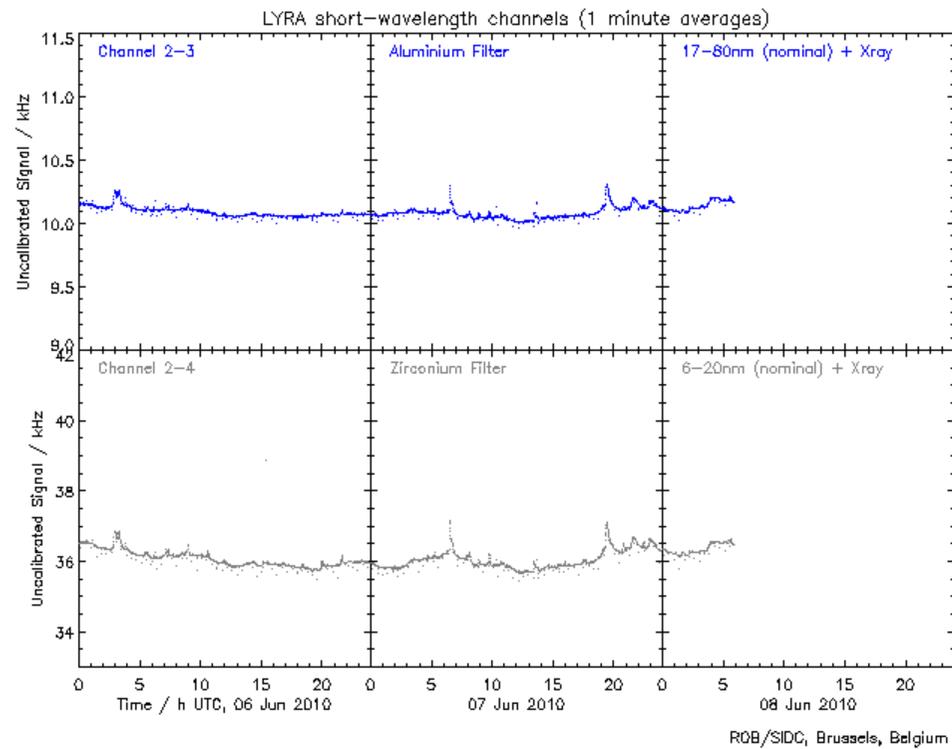
- Level 1 = full raw data (LY-EDG output)
- Level 2 = calibrated physical data (LY-BSDG output) Caution: preliminary status. Require versioning.
- Level 3 = processed products (e.g. averages)
- Level 4 = plots of products
- Level 5 = event lists (optionally with plots)



Further Data Products...

...“Level 4”, “Level 5” (still preliminary):

Preliminary Daily Image

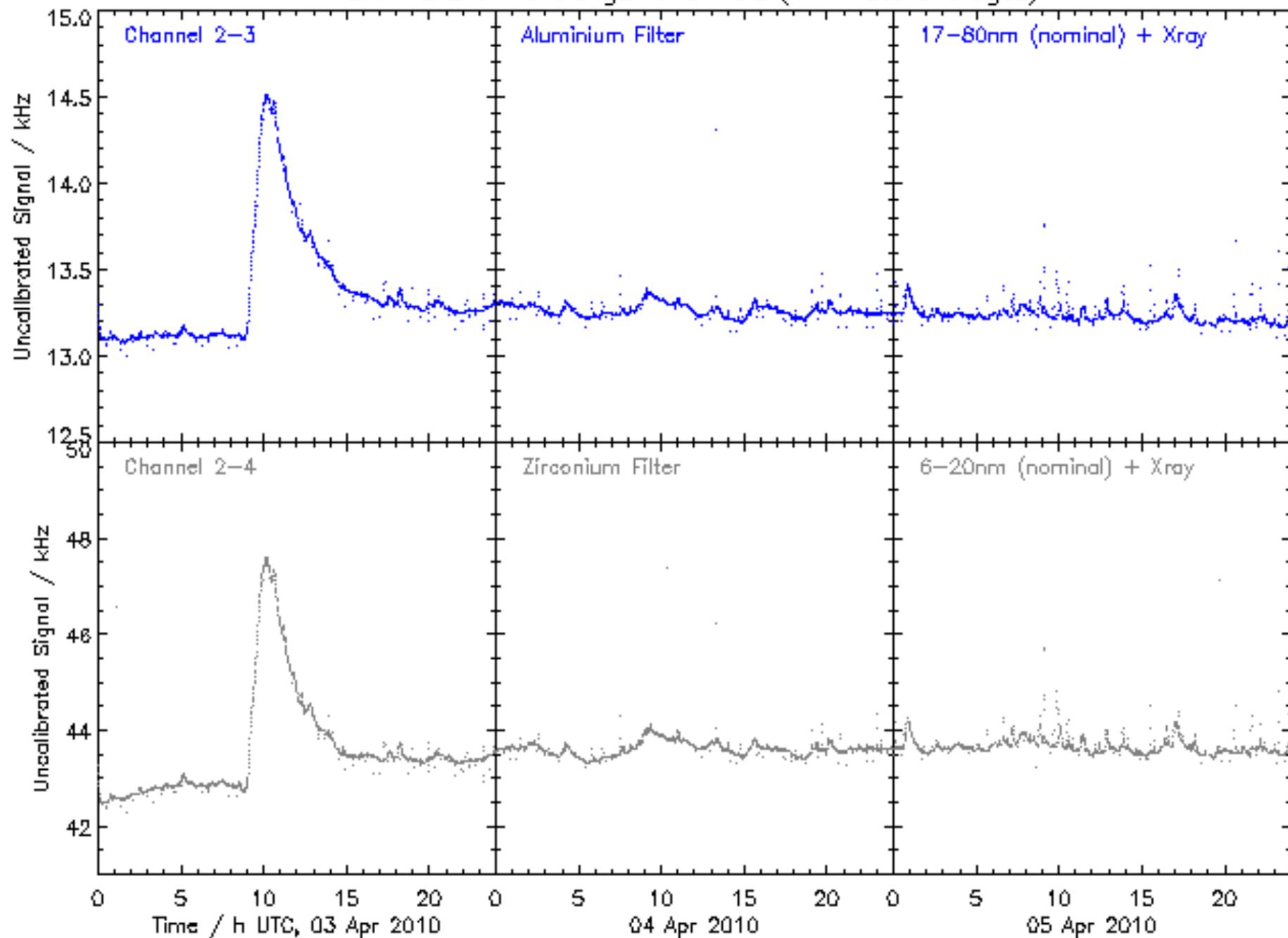


"17-80nm (nominal) + Xray", "6-20nm (nominal) + Xray" - [what does it mean?](#)

Jun 2010

[Tue 01](#) [Wed 02](#) [Thu 03](#) [Fri 04](#) [Sat 05](#) [Sun 06](#)
[Mon 07](#) [Tue 08](#) Wed 09 Thu 10 Fri 11 Sat 12 Sun 13
Mon 14 Tue 15 Wed 16 Thu 17 Fri 18 Sat 19 Sun 20
Mon 21 Tue 22 Wed 23 Thu 24 Fri 25 Sat 26 Sun 27
Mon 28 Tue 29 Wed 30

LYRA short-wavelength channels (1 minute averages)



Preliminary Flare List

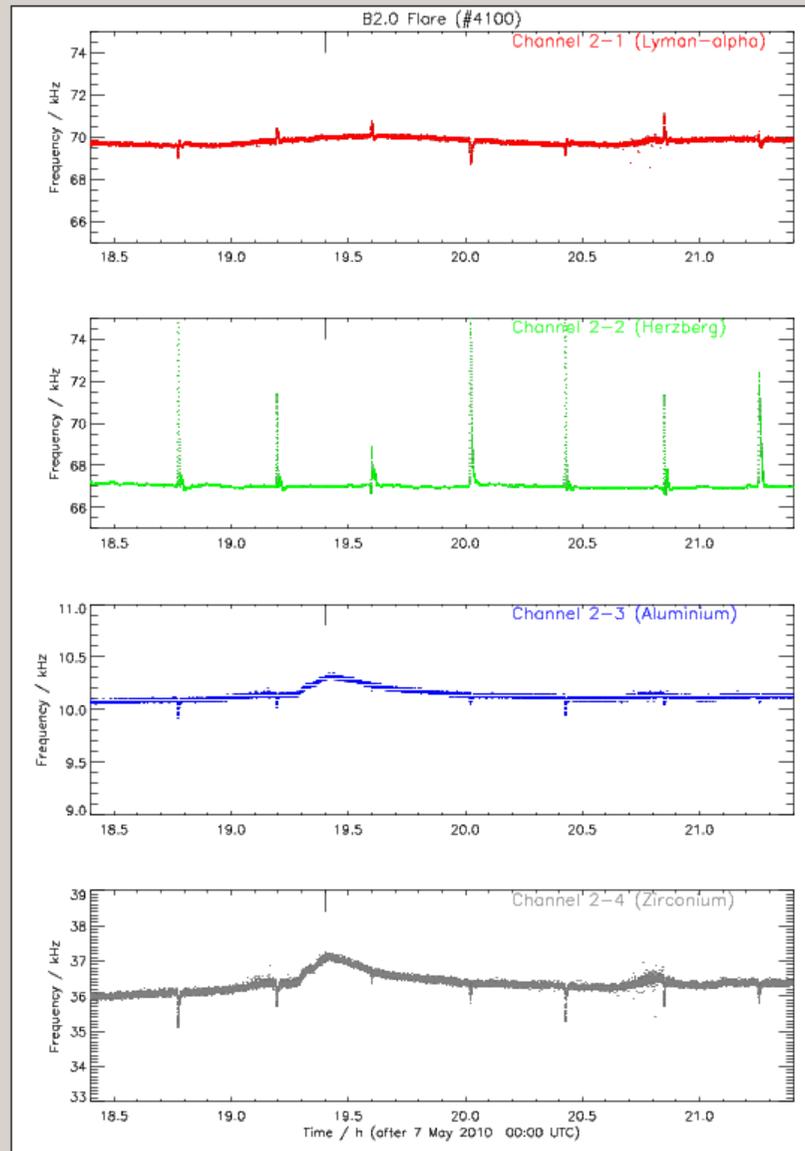
June 2010

Day	Event	Begin	Max	End	Obs	Q	Type	Loc/Frq	Particulars
02	3960	1841	1845	1850	G14	5	XRA	1-8A	B1.0 4.0E-05
02	3970	2249	2253	2300	G14	5	XRA	1-8A	B1.2 6.4E-05
03	4000 +	1128	1131	1145	G14	5	XRA	1-8A	B1.0 9.7E-05
03	4010 +	1230	1233	1236	G14	5	XRA	1-8A	B1.1 4.1E-05
03	4030	1332	1338	1343	G14	5	XRA	1-8A	B1.1 5.8E-05
03	4040	1349	1355	1402	G14	5	XRA	1-8A	B1.3 8.3E-05
06	4060 +	0250	0255	0301	G14	5	XRA	1-8A	B1.4 6.9E-05
07	4090	0627	0630	0634	G14	5	XRA	1-8A	B2.0 4.7E-05
07	4100	1915	1924	1931	G14	5	XRA	1-8A	B2.0 1.3E-04

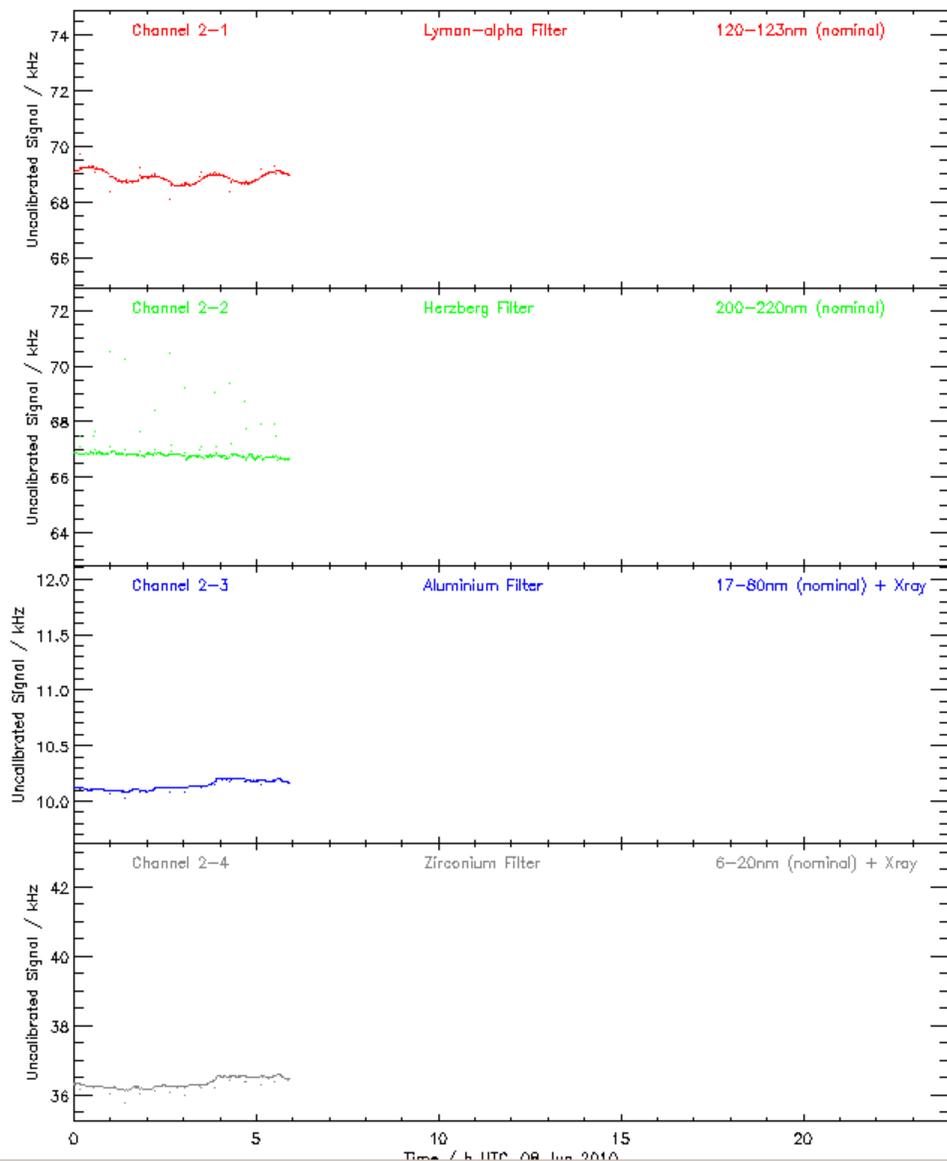
May 2010

Day	Event	Begin	Max	End	Obs	Q	Type	Loc/Frq	Particulars
01	3100	0134	0139	0143	G14	5	XRA	1-8A	C5.7 1.7E-03
01	3110	0523	0527	0531	G14	5	XRA	1-8A	B1.6 5.3E-05
01	3130	0948	0952	0959	G14	5	XRA	1-8A	B1.0 4.9E-05
04	3420 +	1615	1629	1634	G14	5	XRA	1-8A	C3.6 1.9E-03
05	3510	1713	1719	1722	G14	5	XRA	1-8A	M1.2 3.2E-03
06	3540	1509	1513	1517	G14	5	XRA	1-8A	B1.4 4.3E-05
07	3550	0030	0034	0036	G14	5	XRA	1-8A	B1.1 2.5E-05
07	3560	0555	0558	0600	G14	5	XRA	1-8A	B1.2 1.9E-05
07	3570	0729	0742	0802	G14	5	XRA	1-8A	C2.0 2.6E-03
07	3580 +	2249	2257	2303	G14	5	XRA	1-8A	B4.6 2.6E-04
08	3590	0058	0104	0110	G14	5	XRA	1-8A	B2.6 1.4E-04
08	3600	0131	0139	0146	G14	5	XRA	1-8A	B5.8 3.4E-04
08	3610	0318	0323	0327	G14	5	XRA	1-8A	B4.3 1.5E-04
08	3620	0451	0459	0504	G14	5	XRA	1-8A	C9.3 3.6E-03
08	3630	0837	0852	0857	G14	5	XRA	1-8A	B2.1 1.7E-04
08	3640	0915	0920	0923	G14	5	XRA	1-8A	B2.1 6.5E-05
08	3650	1011	1019	1023	G14	5	XRA	1-8A	B3.8 1.7E-04
08	3660 +	1140	1150	1155	G14	5	XRA	1-8A	C1.8 9.1E-04
08	3680 +	1841	1855	1914	G14	5	XRA	1-8A	B7.2 9.4E-04
08	3690 +	2004	2011	2018	G14	5	XRA	1-8A	C2.4 1.1E-03

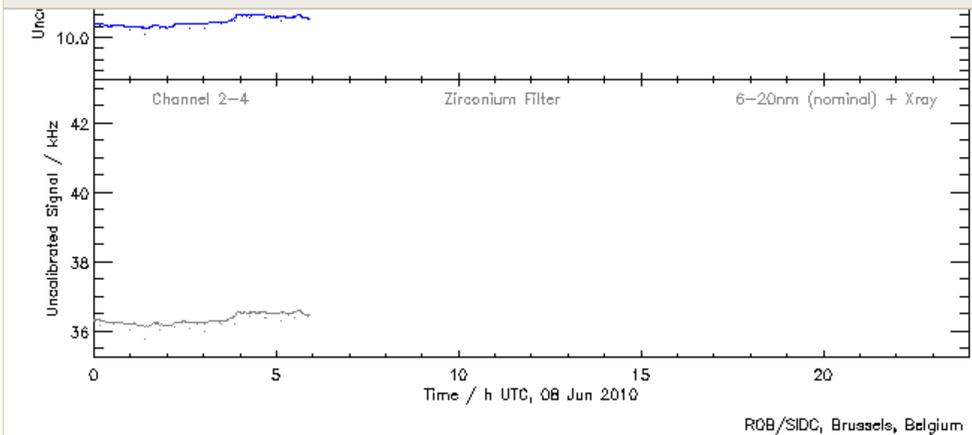
Done



Preliminary Level 4 (Uncalibrated)



Done



Please note: "Uncalibrated" does not only mean that raw LYRA count rates are shown instead of physical units; the curves also still include dark currents, a long-term trend due to instrumental degradation, daily and orbital variations due to on-board temperature changes, regular disturbances per orbit due to spacecraft rotations, and possible disturbances due to commanding. Gaps may be caused by missing downlinks or calibration campaigns.

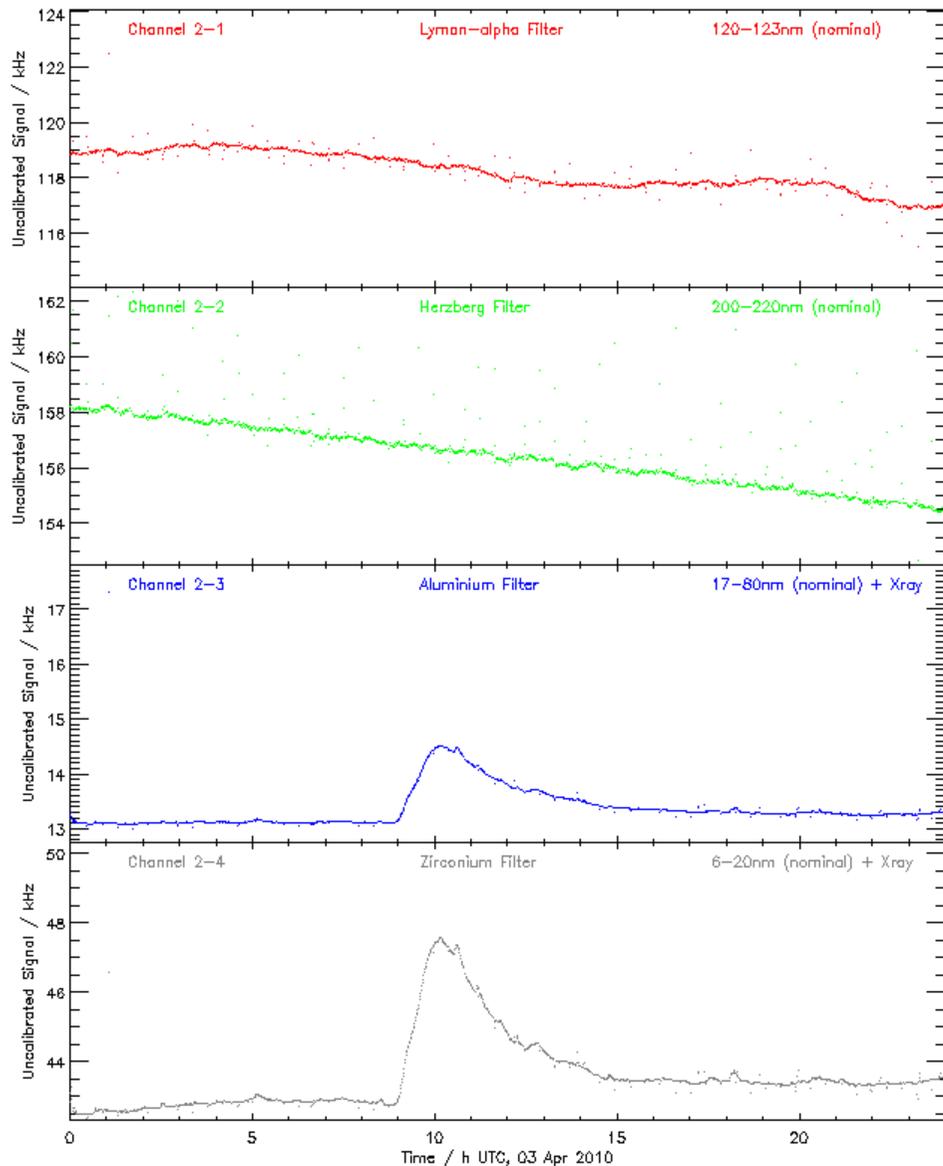
Jun 2010

[Tue 01](#) [Wed 02](#) [Thu 03](#) [Fri 04](#) [Sat 05](#) [Sun 06](#)
[Mon 07](#) [Tue 08](#) [Wed 09](#) [Thu 10](#) [Fri 11](#) [Sat 12](#) [Sun 13](#)
[Mon 14](#) [Tue 15](#) [Wed 16](#) [Thu 17](#) [Fri 18](#) [Sat 19](#) [Sun 20](#)
[Mon 21](#) [Tue 22](#) [Wed 23](#) [Thu 24](#) [Fri 25](#) [Sat 26](#) [Sun 27](#)
[Mon 28](#) [Tue 29](#) [Wed 30](#)

May 2010

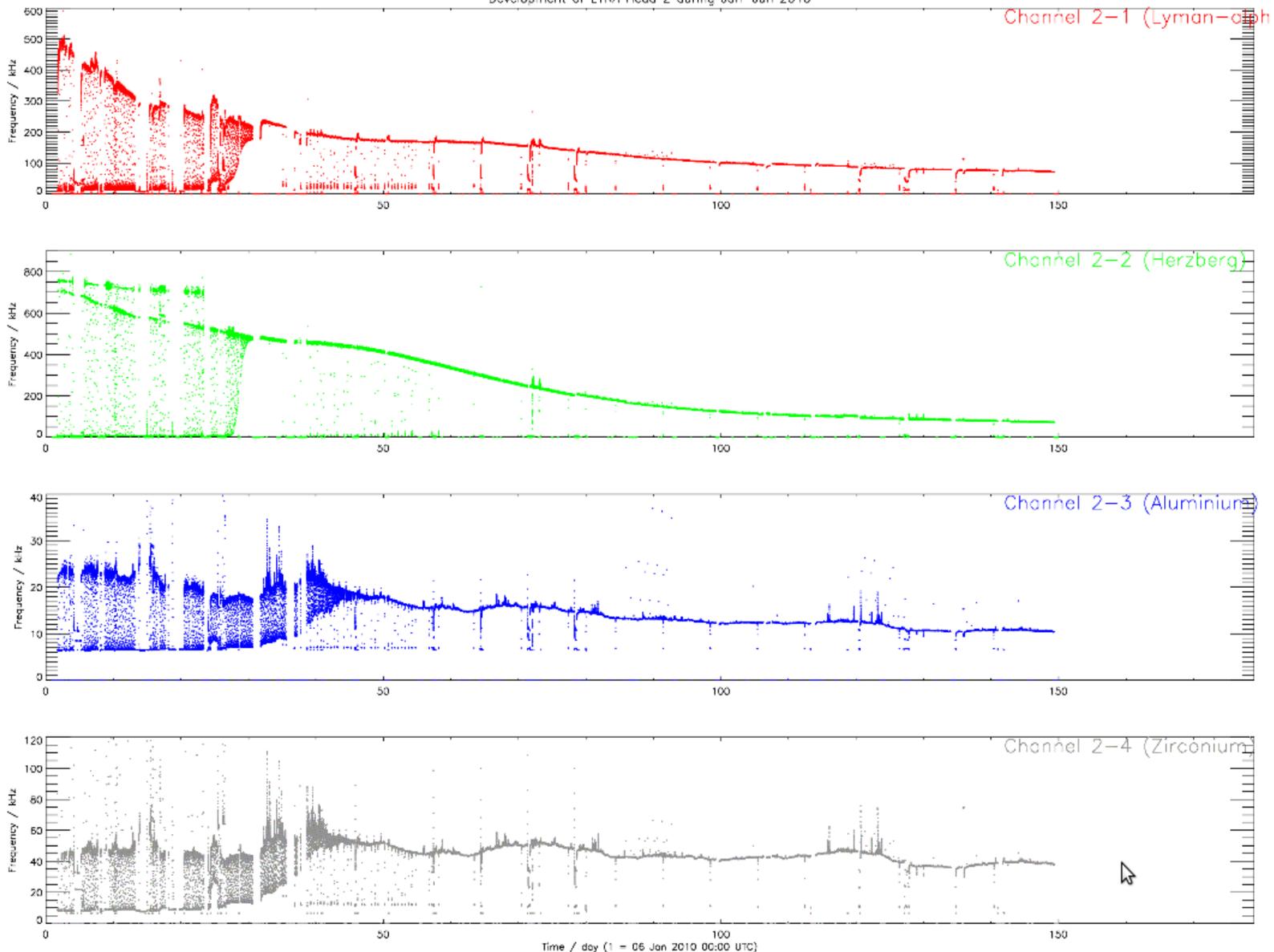
[Sat 01](#) [Sun 02](#)
[Mon 03](#) [Tue 04](#) [Wed 05](#) [Thu 06](#) [Fri 07](#) [Sat 08](#) [Sun 09](#)
[Mon 10](#) [Tue 11](#) [Wed 12](#) [Thu 13](#) [Fri 14](#) [Sat 15](#) [Sun 16](#)
[Mon 17](#) [Tue 18](#) [Wed 19](#) [Thu 20](#) [Fri 21](#) [Sat 22](#) [Sun 23](#)
[Mon 24](#) [Tue 25](#) [Wed 26](#) [Thu 27](#) [Fri 28](#) [Sat 29](#) [Sun 30](#)

Mon 31
Done

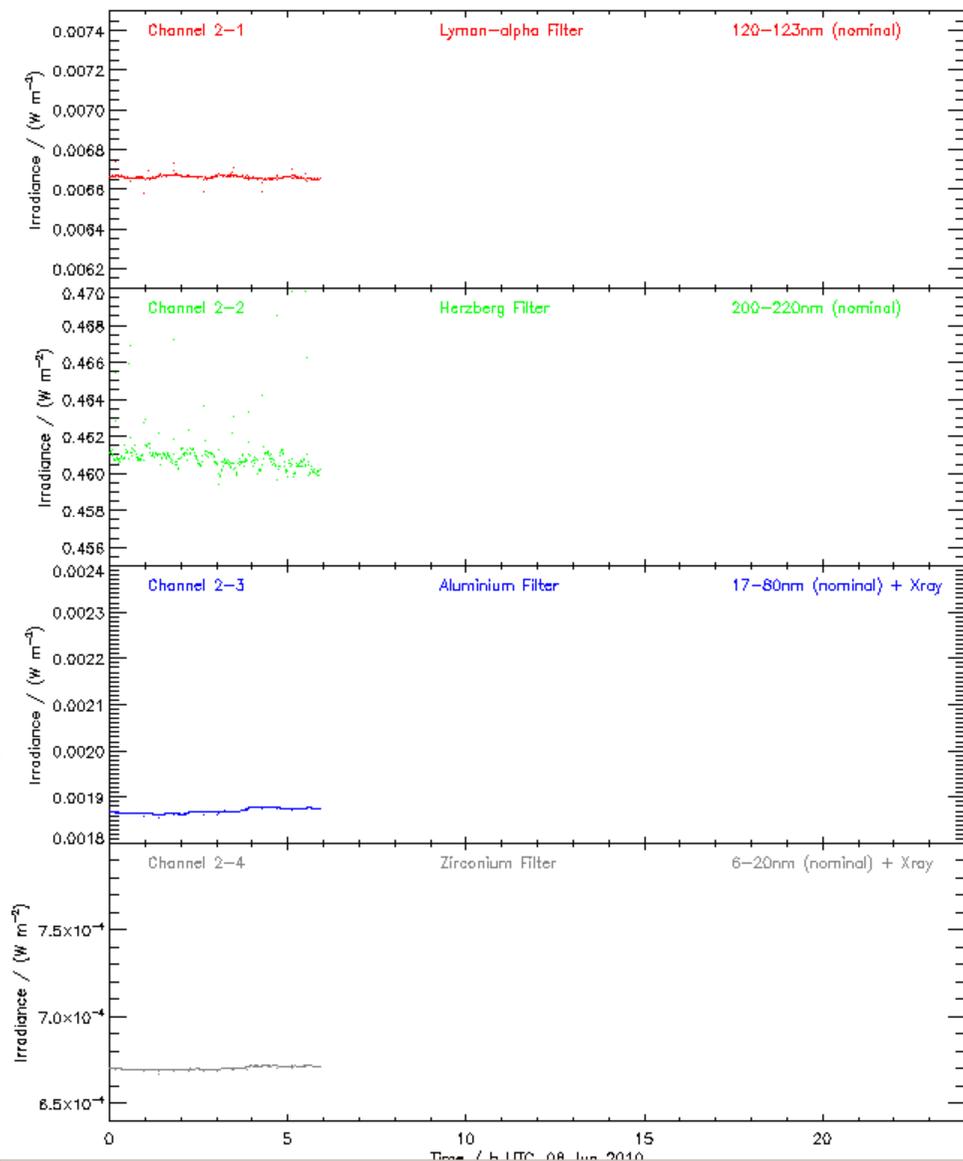


ROB/SIDC, Brussels, Belgium

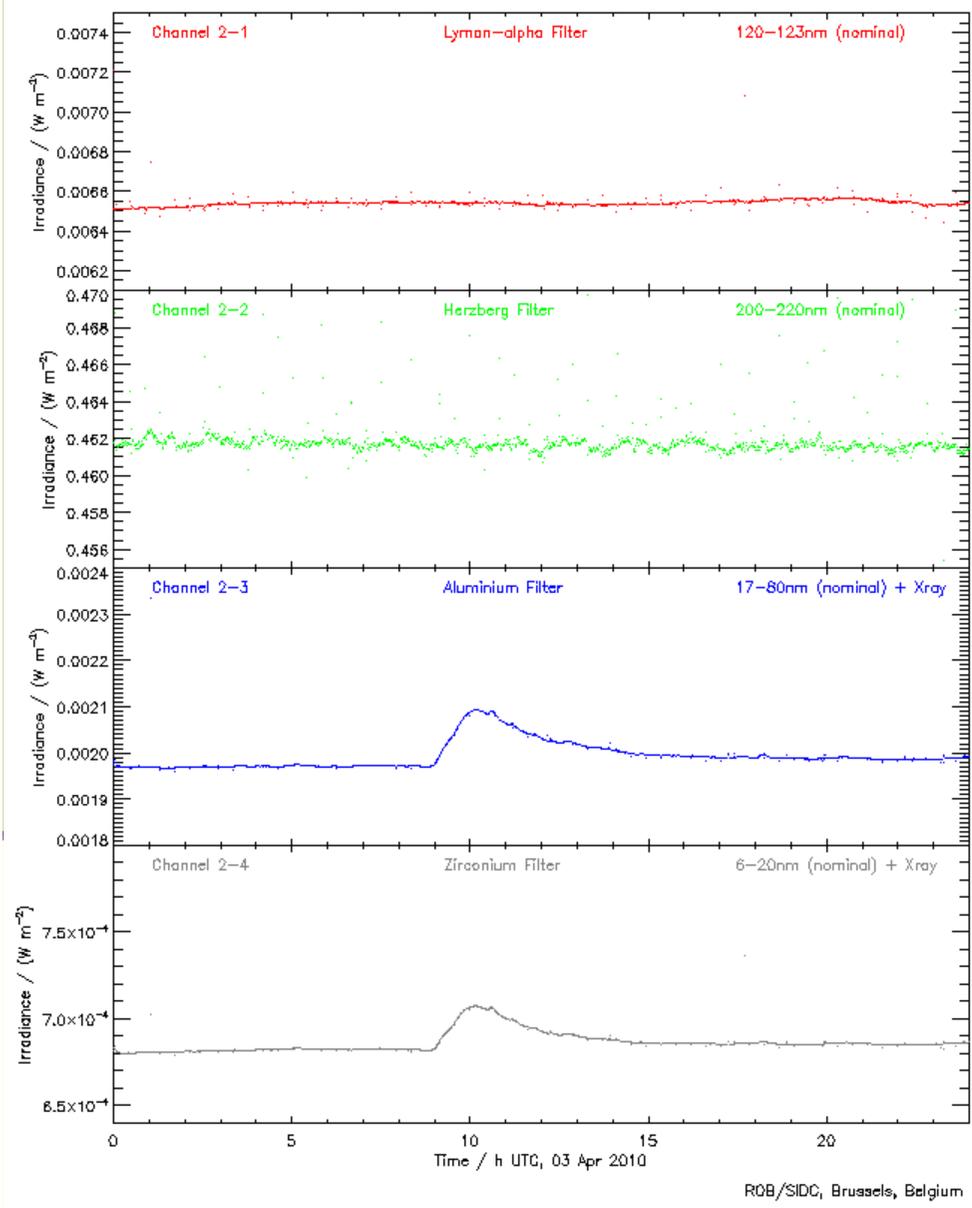
Development of LYRA Head 2 during Jan-Jun 2010



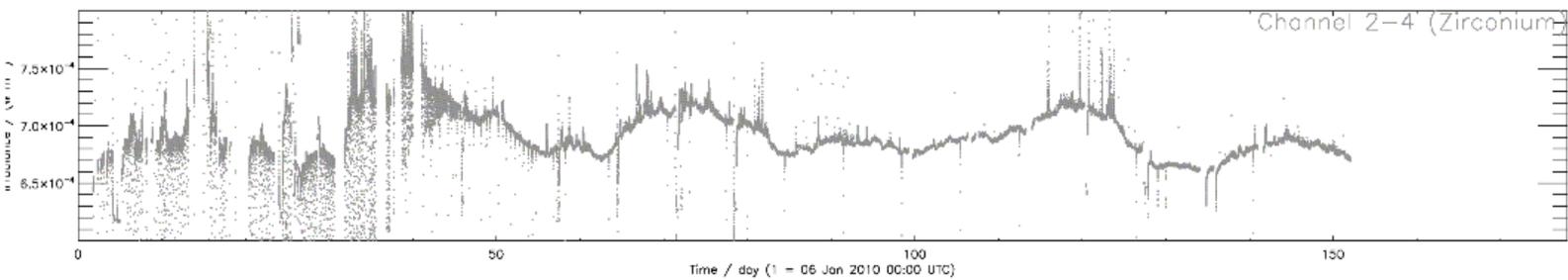
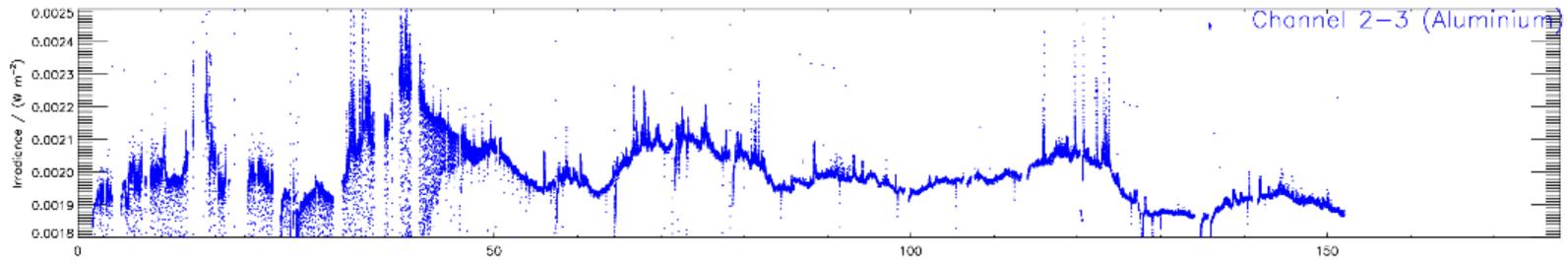
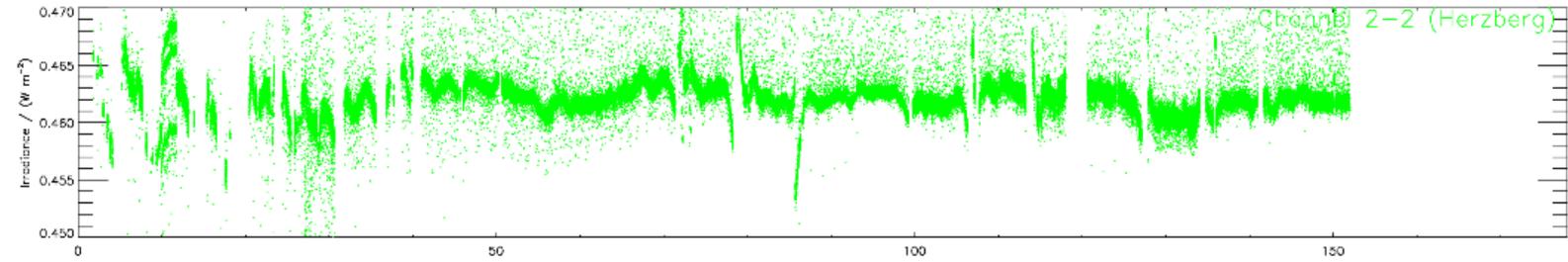
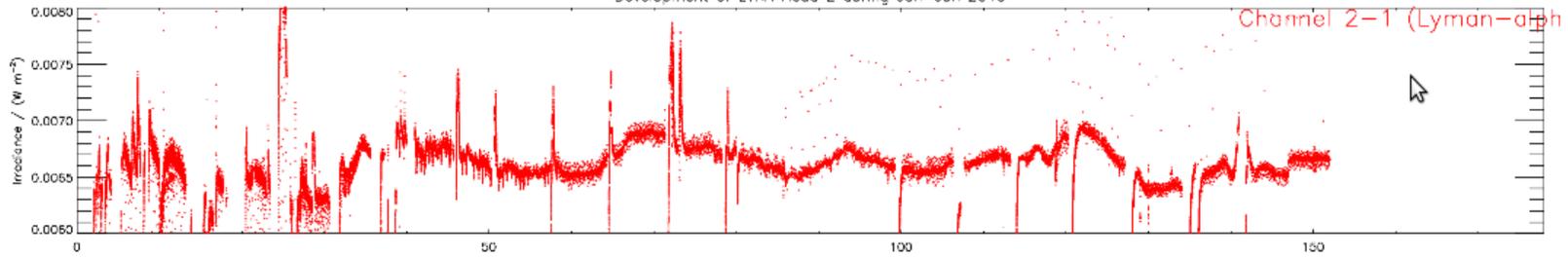
Preliminary Level 4 (Calibrated)



Done



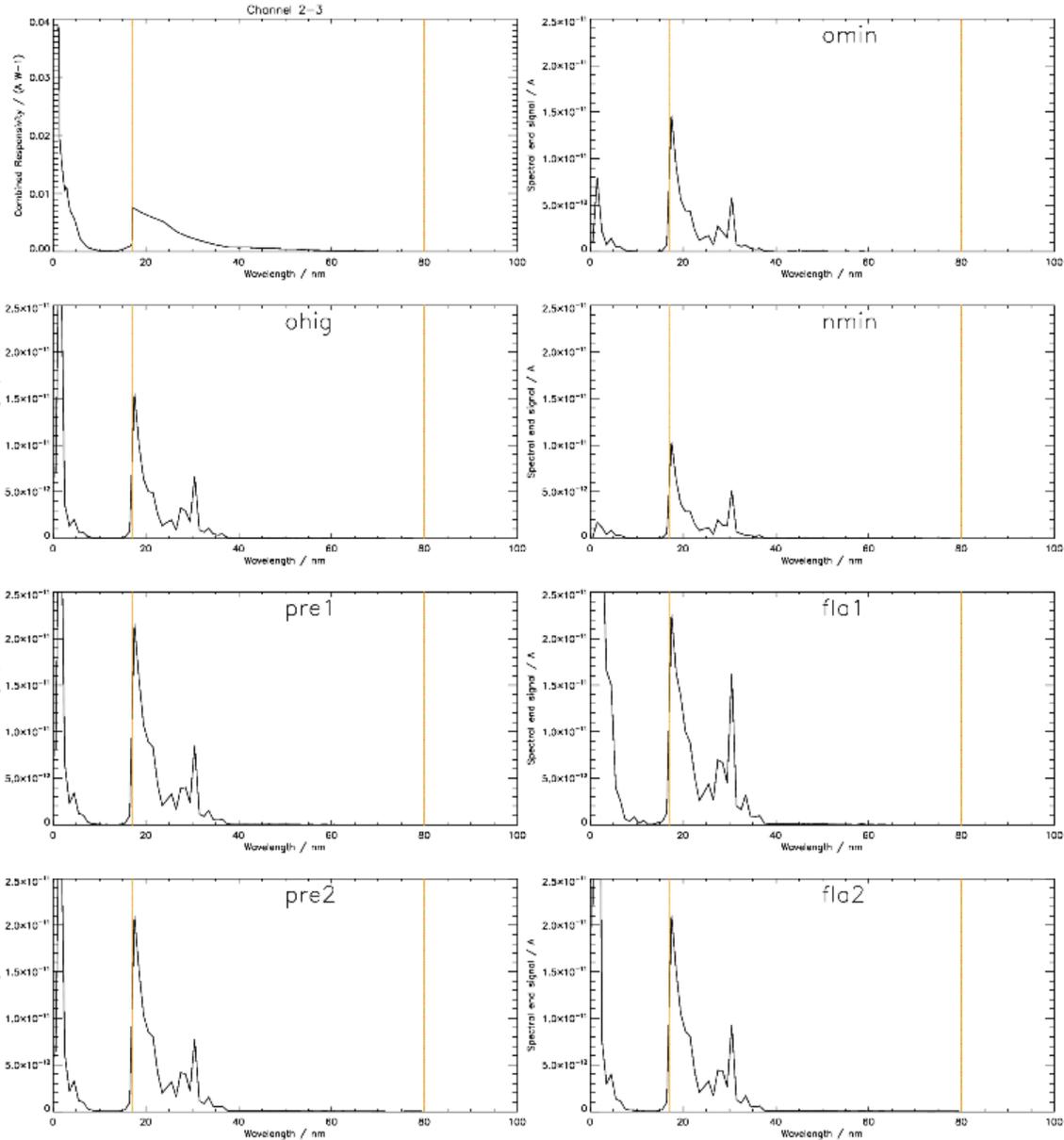
Development of LYRA Head 2 during Jan-Jun 2010





Calibration...

...incl. problems



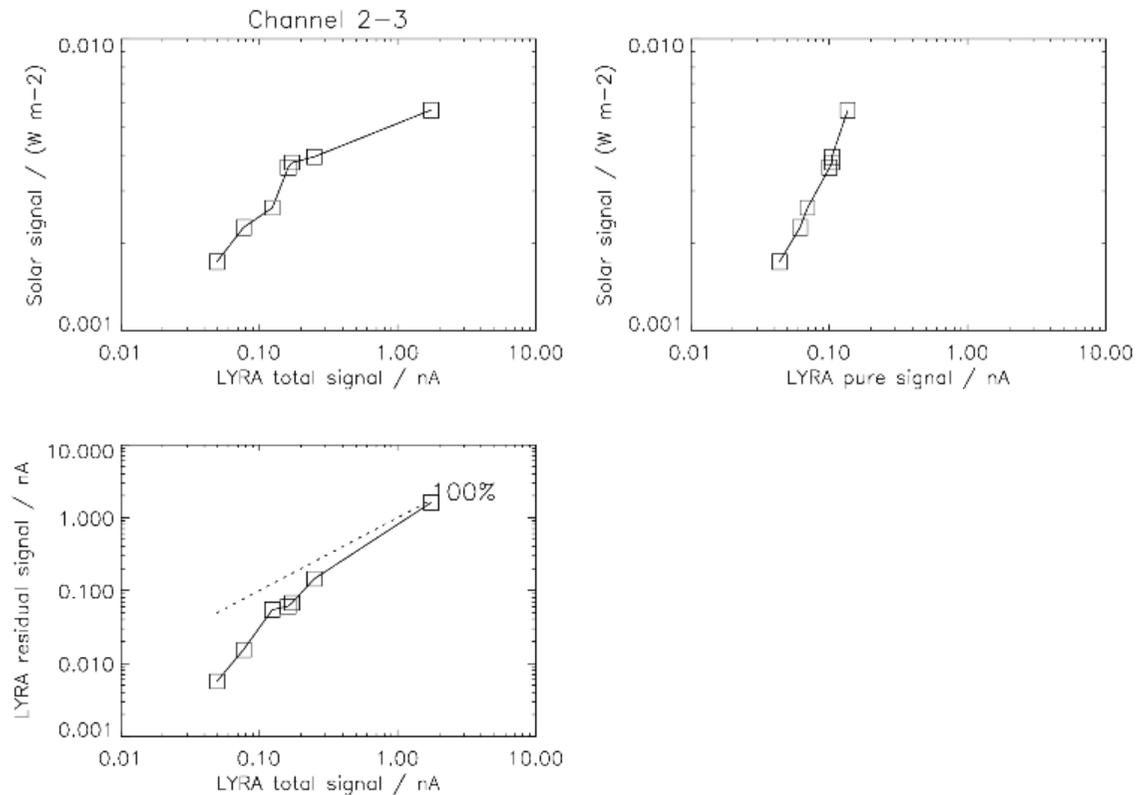


Figure 2-3a. Simulated relations between input and output for LYRA channel 2-3.

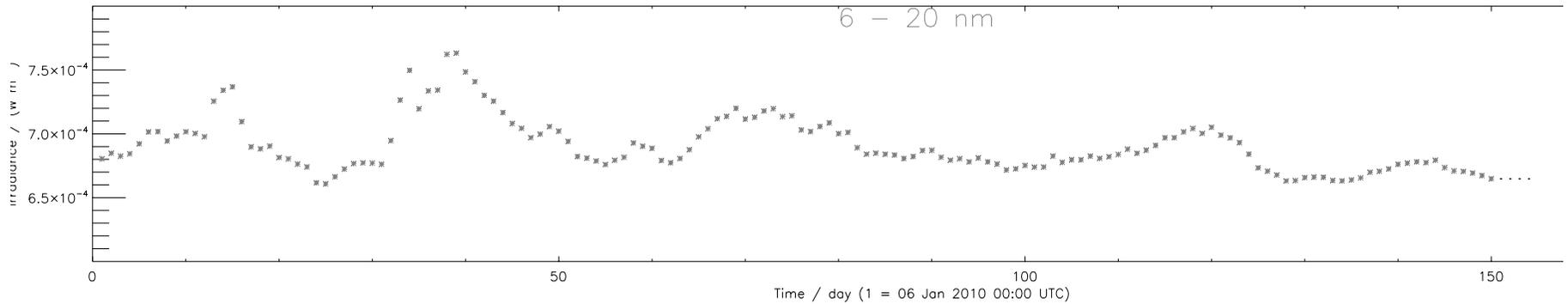
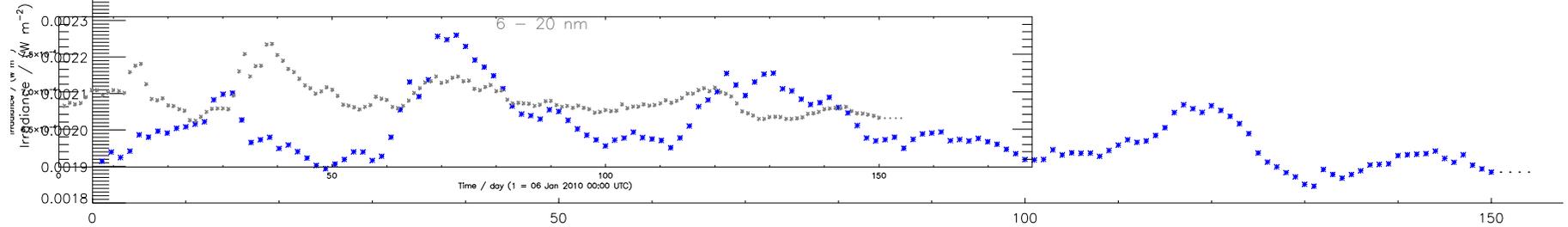
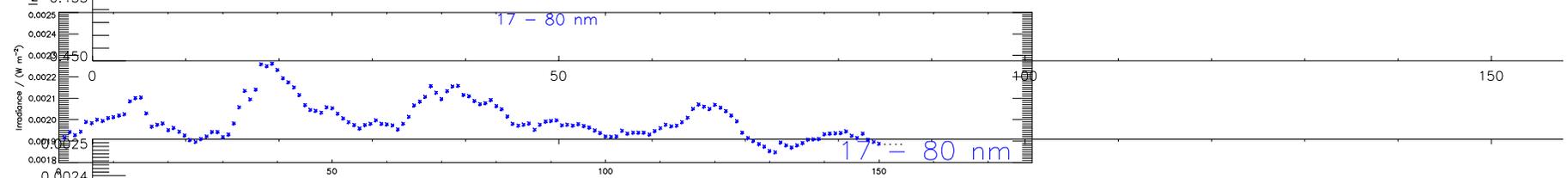
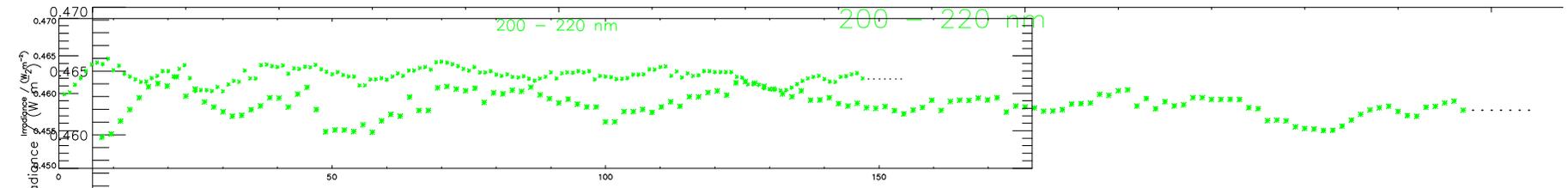
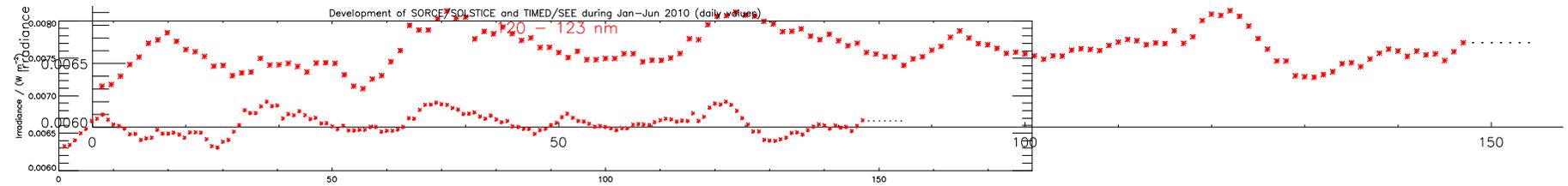
Remarks: The functional relation between the solar signal and the LYRA total signal is still not quite straightforward (but much less irregular than before the “new-spectra” update, compare upper left image before and after). The reason for nonlinearity is a contamination due to the influence of the interval below ~10 nm, which is not part of the 17-80 nm nominal interval of the Al channels. - Although the channel interval nominally reaches up to 80 nm, effectively it appears to end at 35 nm (see Figure 2-3). - For the small subset of flare events, the uncalibrated data of this channel (i.e. before subtraction of the substantial short-wavelength contamination) will probably not be very meaningful.

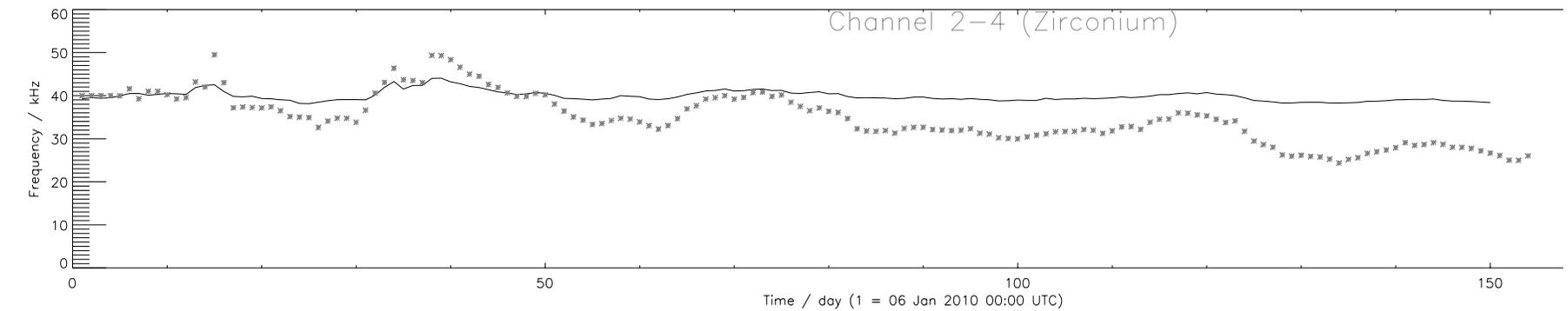
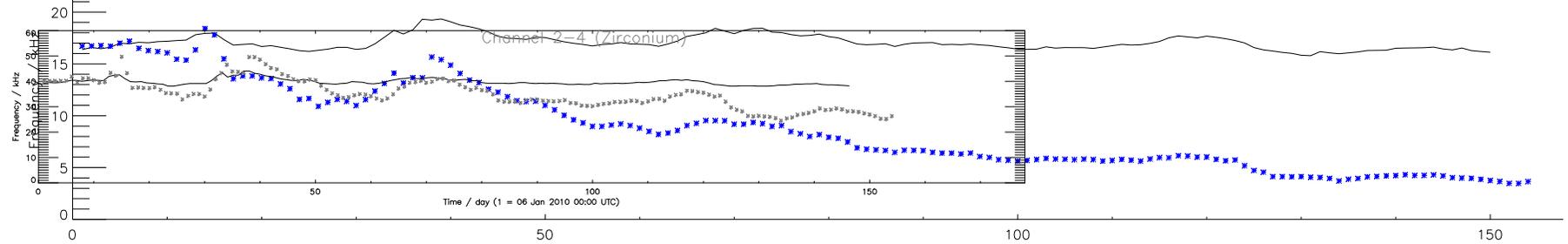
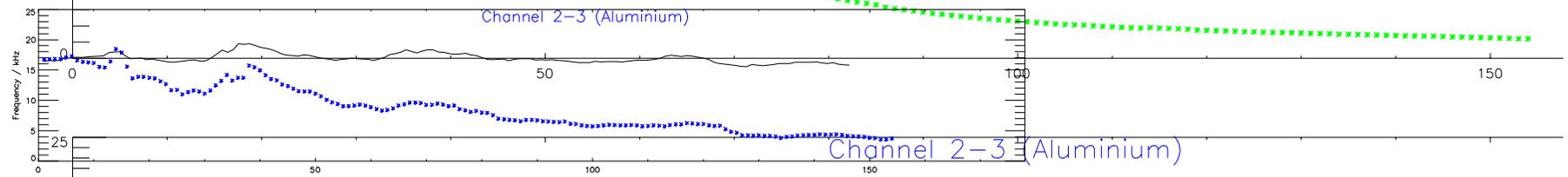
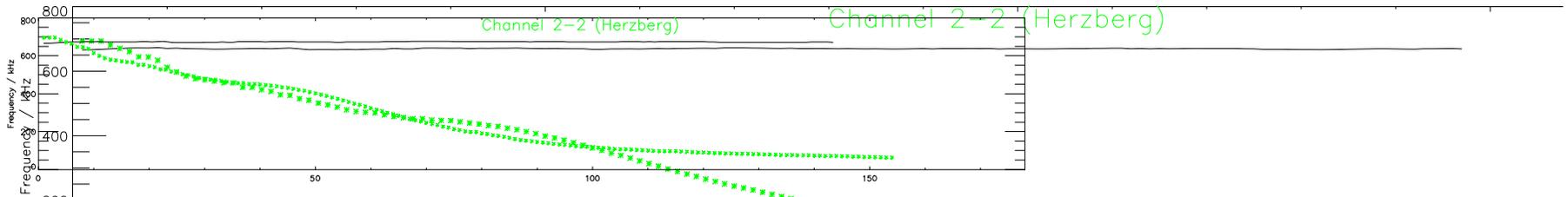
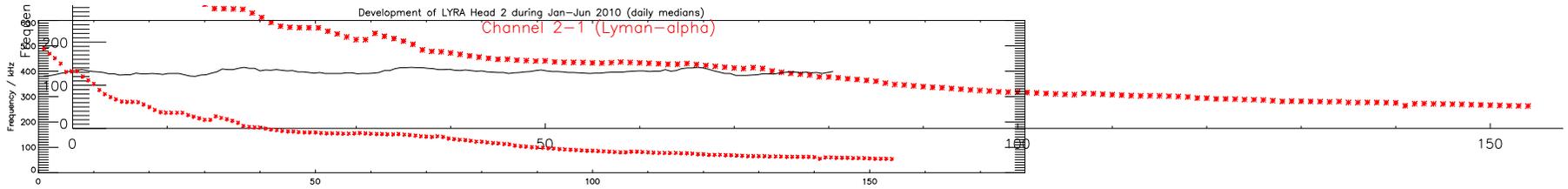


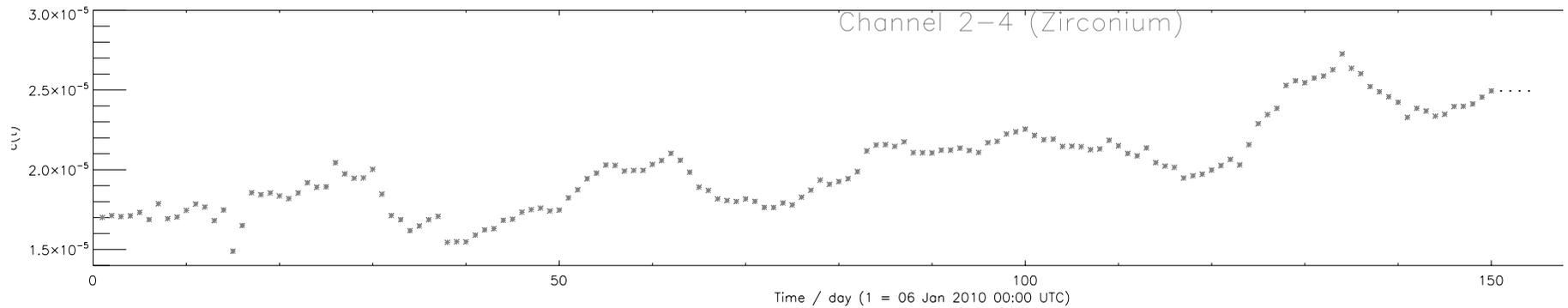
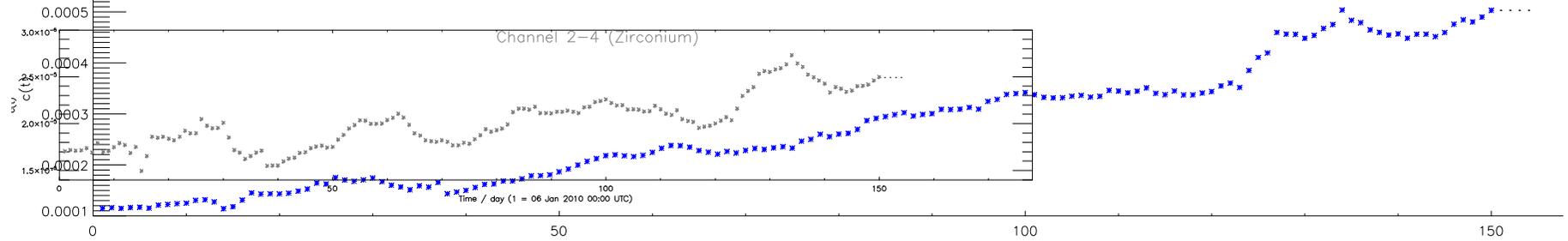
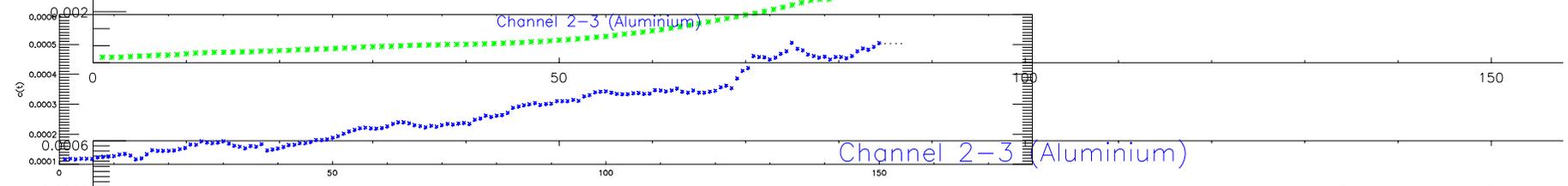
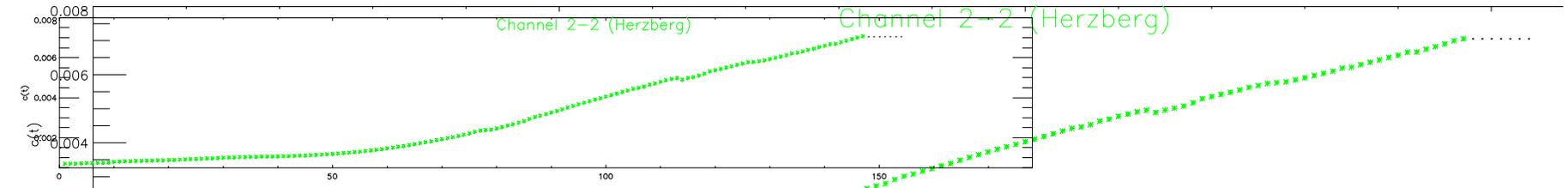
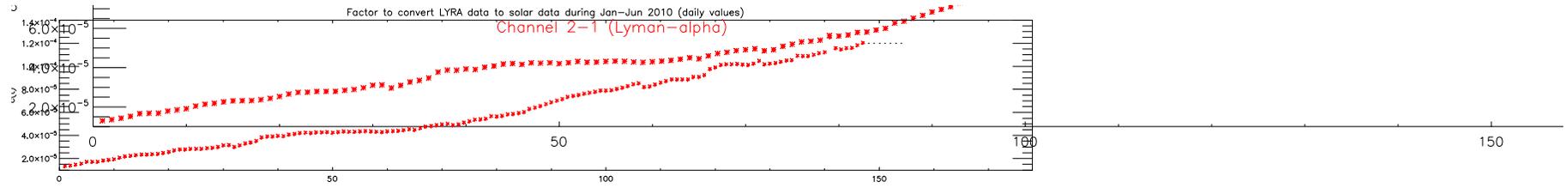
before & after (& still later)

LYRA output, in kHz, incl. dark currents

<u>Ch1-1</u>	<u>Ch1-2</u>	<u>Ch1-3</u>	<u>Ch1-4</u>	
700	500	20	30	expected
950+	620	16+	37	begin Jan 2010
650+	520	16+	37	end Apr 2010
<u>Ch2-1</u>	<u>Ch2-2</u>	<u>Ch2-3</u>	<u>Ch2-4</u>	<u>(nominal unit)</u>
260	580	19	42	expected
470	700	23	45	begin Jan 2010
100	100	12	40	end Apr 2010
<u>Ch3-1</u>	<u>Ch3-2</u>	<u>Ch3-3</u>	<u>Ch3-4</u>	
685	470	232	29	expected
900	550	280	35	begin Jan 2010
800	500	250	35	end Apr 2010









Model

$t = \text{time } \{1, \dots, T\}$ $T = \text{number of days}$

$s(t) = \text{solar data}$

$l(t) = \text{LYRA data}$

$c(t) = s(t)/l(t)$ conversion factor \Rightarrow

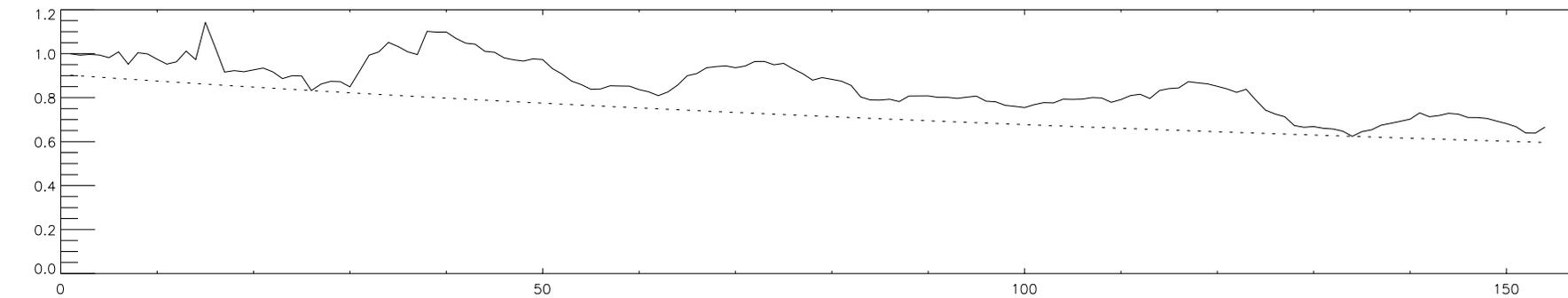
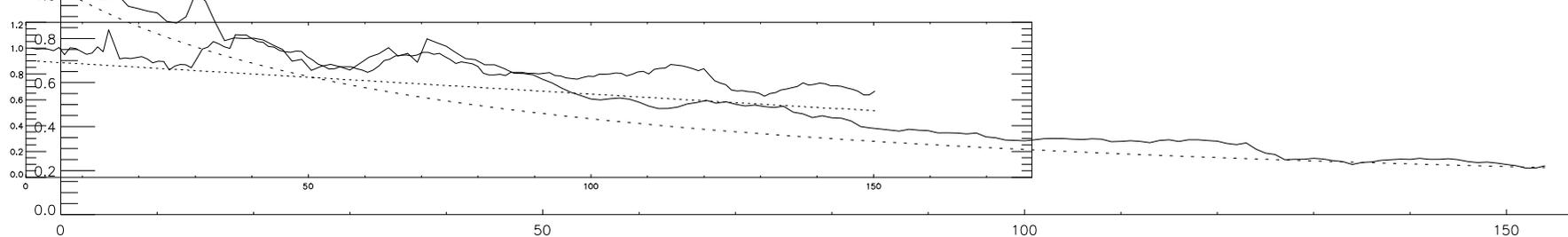
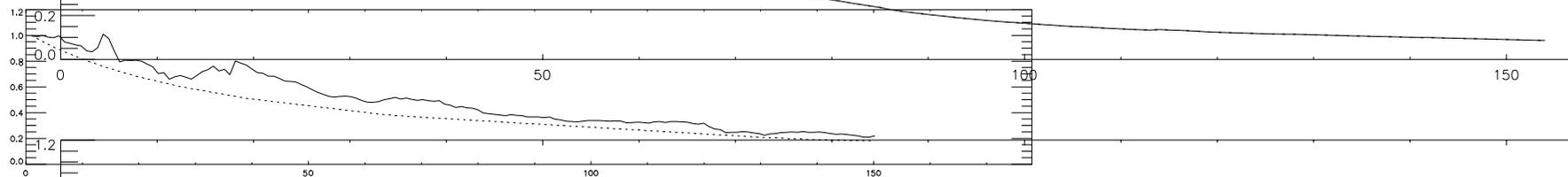
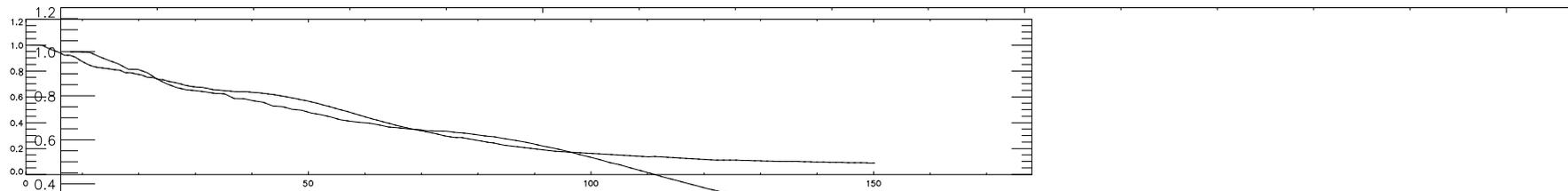
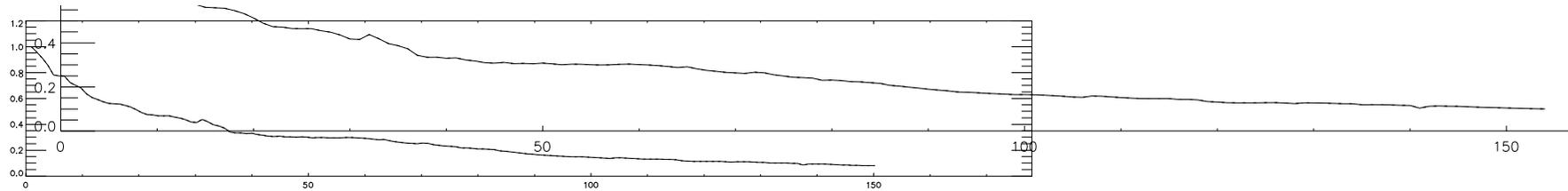
$s(i) = c(t)*l(i)$ $\{1, \dots, 8\,000\,000\}$ simple expansion??

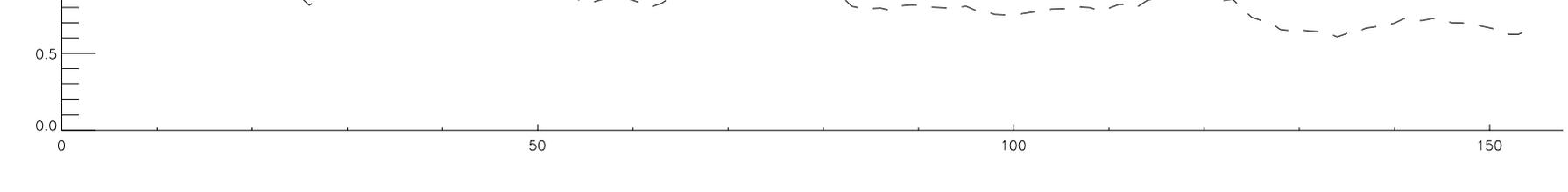
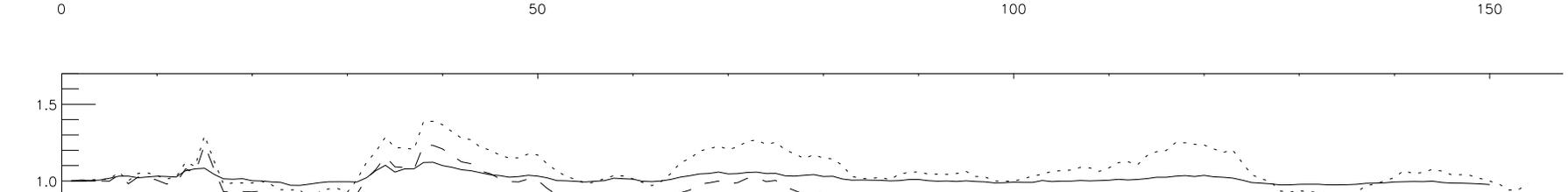
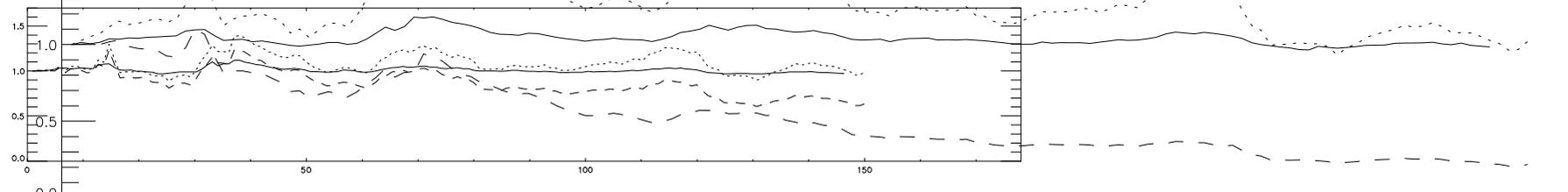
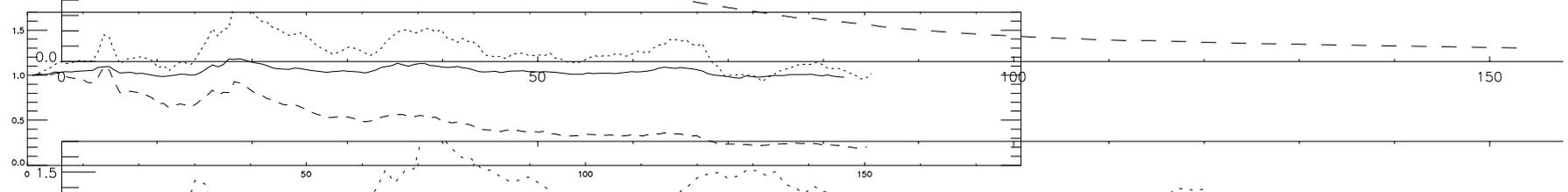
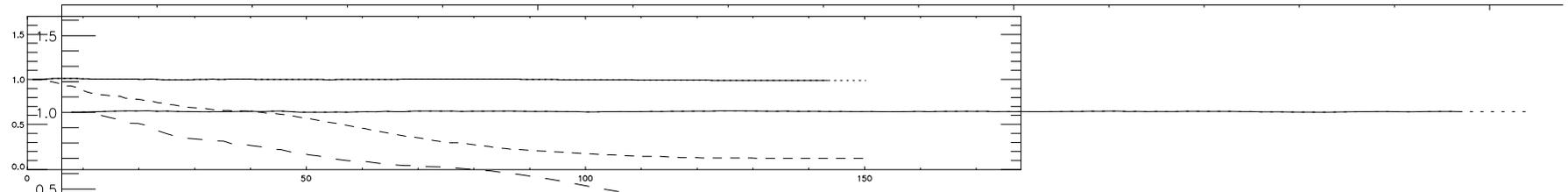
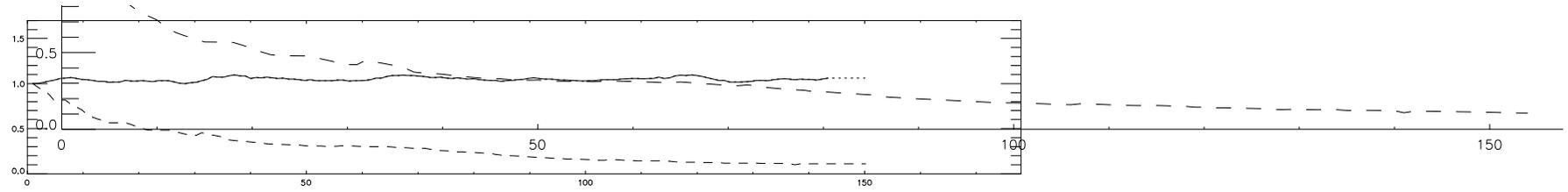
$c(t) = b*d(t)$ degradation correction and conversion??

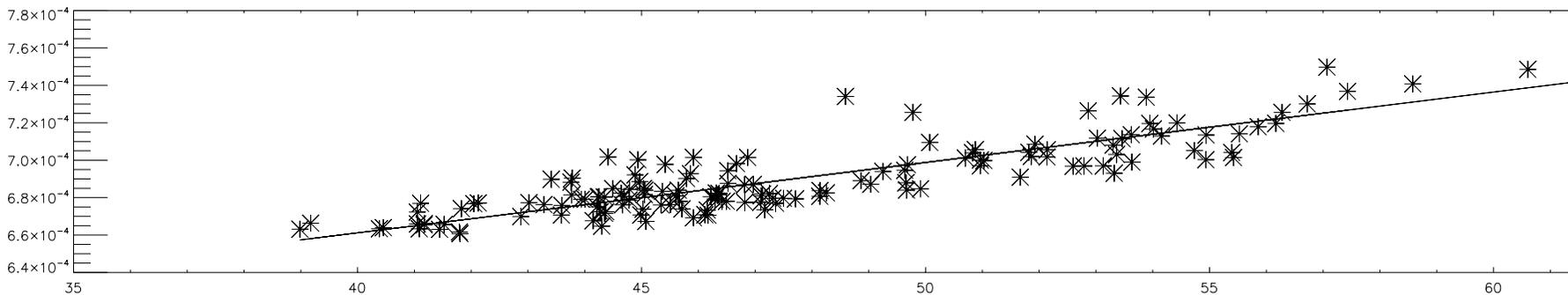
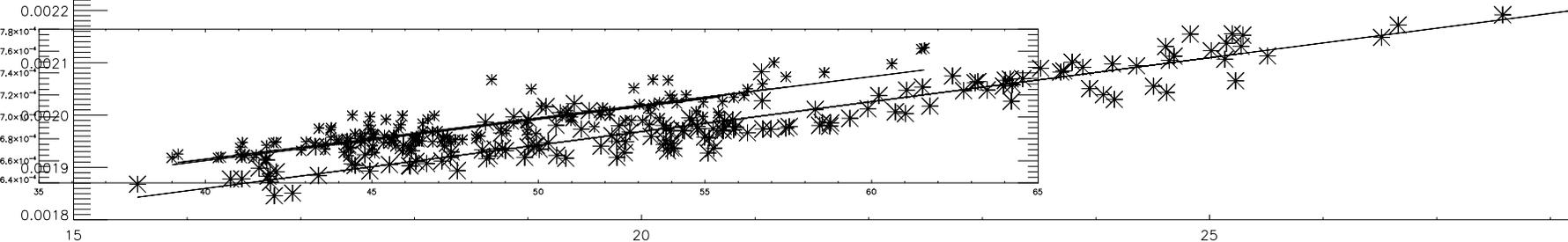
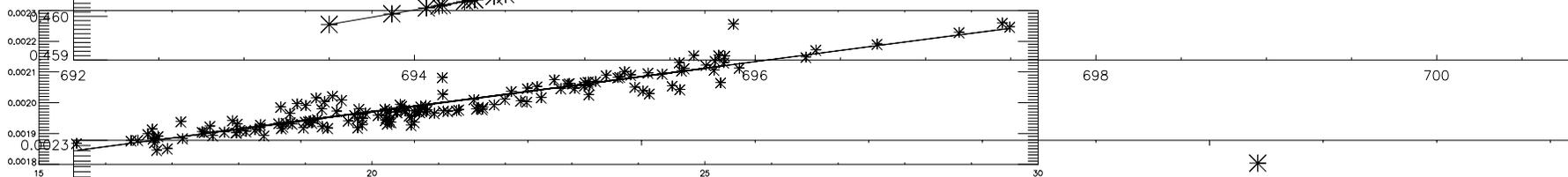
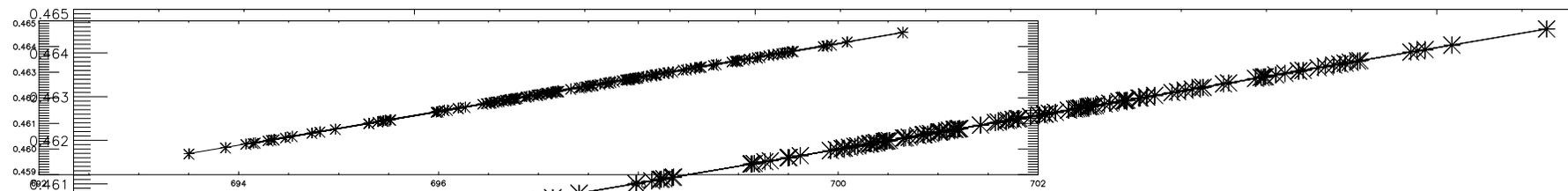
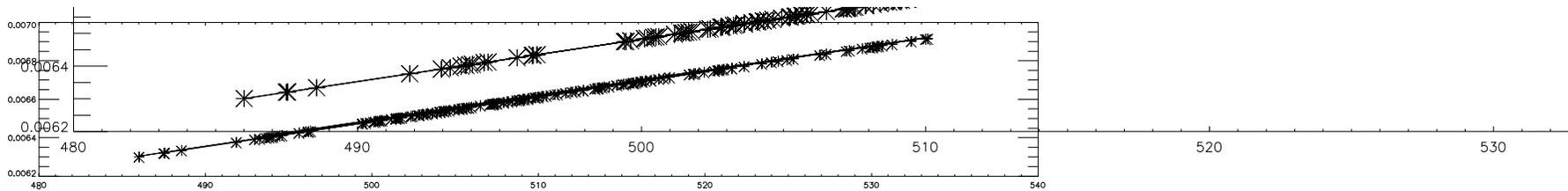
solar = $a + b*lyra$ more realistic, see LRM, thus

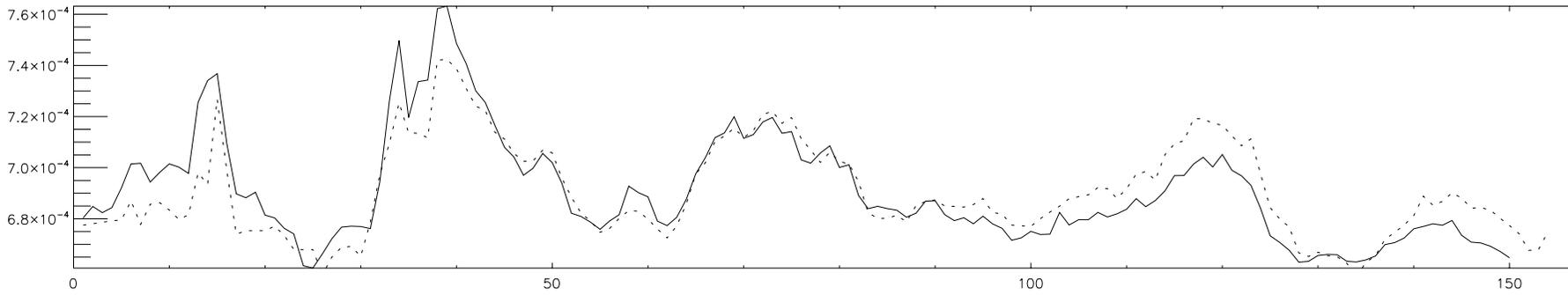
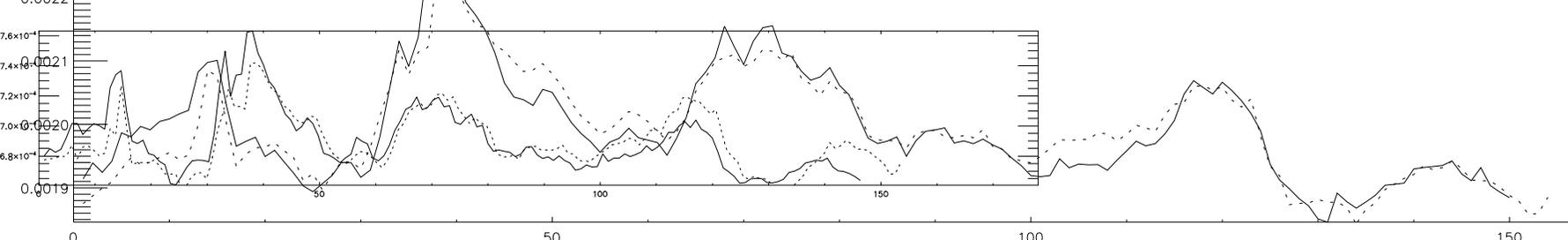
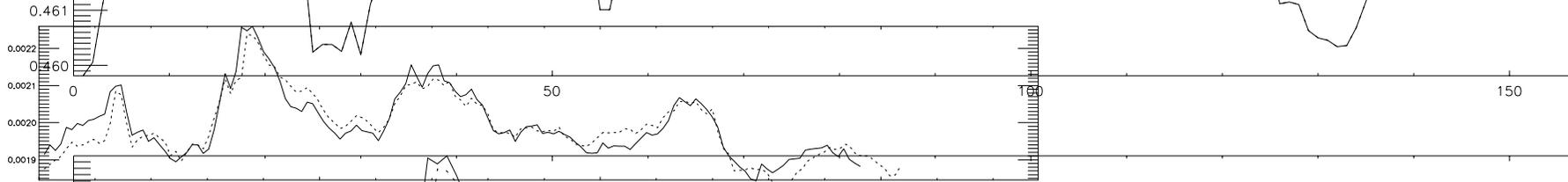
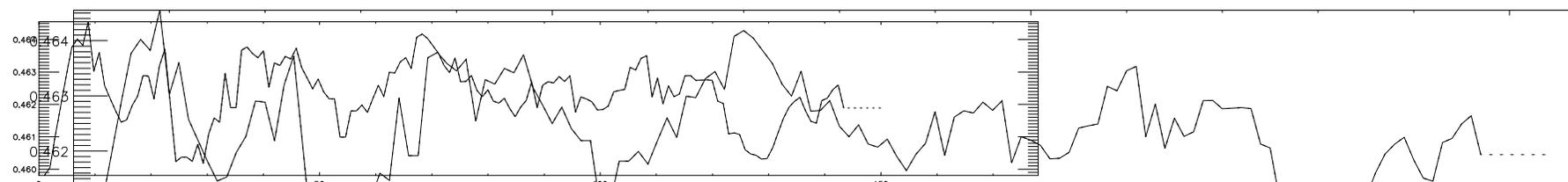
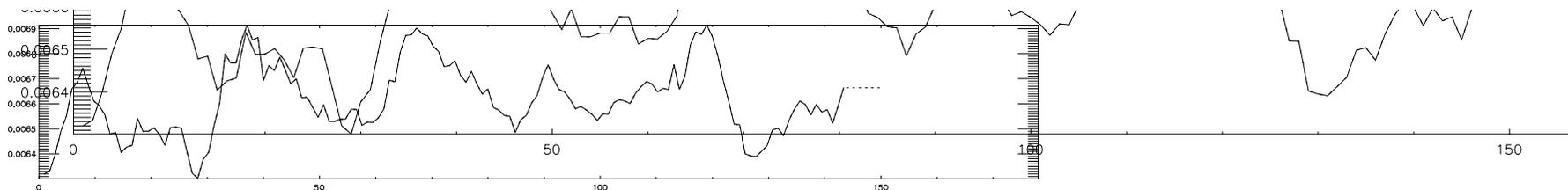
$s(i) = a + b*d(t)*l(i)$

$s(t) - a = b*d(t)*l(t)$ $\Rightarrow T$ equations for $T+2$ variables











Procedure (instead of LRM)

- Get daily SORCE and TIMED data from the web
- Calculate degradation correction $d(t)$ and expand with splines
- Calculate conversion parameters a and b
- Estimate dark current from past measurements, or from temperatures
- Estimate missing days with linear extrapolation of $d(t)$
 - currently only possible for channels 3 and 4



* sigh *

Any suggestion for better solutions or other feedback is very welcome.



Thank you for your patience.