```
Identifier inspect_spd

Purpose       To display two plots:
              upper: LWS SPD data before deglitching
              lower  LWS SPD data after deglitching

Synopsis     inspect_spd,tdt=tdt,dir=dir,psym=psym,/itk,mc=mc

Arguments    Name      I/O  Type        Description
             ----------------------------------------------------


             dir (string)   - the directory from which the input files
                              are to be read.
                              It can be a relative or absolute path.
                              e.g. dir='data/'.
                              If not specified then the data are read from
                              the user's curent working directory.

             tdt (string)   - the tdt number associated with the observation.
                              For example if the tdt number is 44700574 then
                              the routine will look
                  for the LSPD file lspd44700574.fits.
                  If not specified the routine assumes that file to be
                  read is called lspd.fit (viz the SOC processed file
                  from the CD_ROM).

             psym (integer) - optional
                  symbol to be used for plotting the data (e.g. psym=4). If
                  not specified the points are simply connected together.

             itk            - optional
                  if set, the x-axis is plotted in LWS Instrument Time Key
                  (ITK) units. Otherwise the x-axis plots the time in seconds
                  from the start of the observation

             mc             - optional
                  If set, the routine reads the MC-FITS format data files from
                  the ARC_DAT directory. Only expected to be used by
```

the instrument team.

Returns

Description This routine allows the user to examine the contents of the LWS Standard Processed Data (SPD). In a two panel plot for each detector it shows the extracted photocurrents before and after the glitched points have been removed.

It should be particularly useful for demonstrating the success or otherwise of the glitch detection algorithm, and for comparing the effects of glitches between different detectors. The plots can be zoomed for closer inspection of data.

Glitch statistics are displayed to the user for each detector.

The display widget allows hardcopies of plots to be made by saving output as a PostScript file.

Data files used - lspd

Dependencies:

Comment

Example inspect_spd,tdt='22001101',psym=-4,dir='/mydisk/data/'

Category LIA

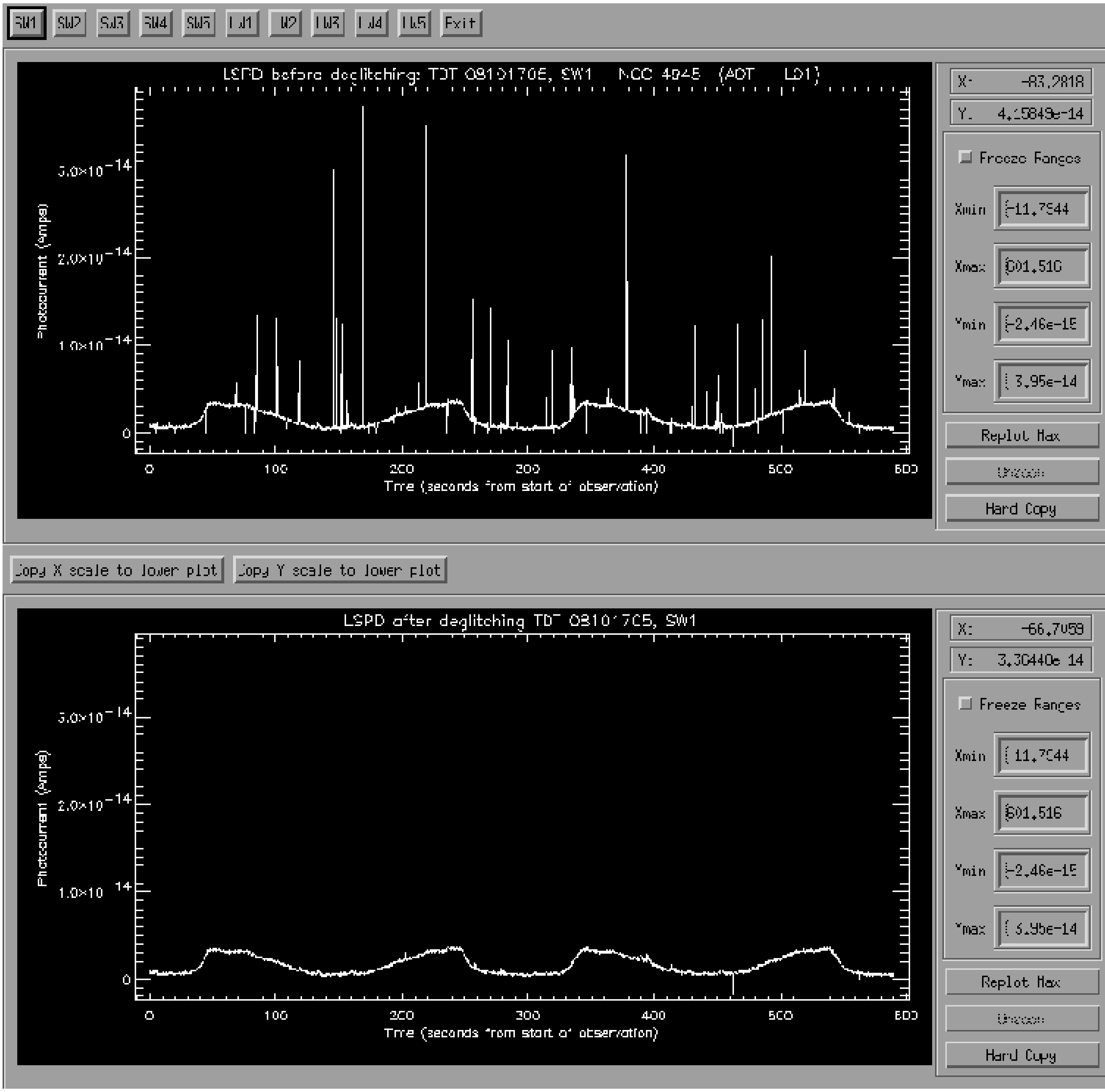
Filename inspect_spd.pro

Author Sunil Sidher, Andrew Harwood
Uses Sarah's version of INSPECT_RSRF as template.

Version 1.0

History

U.S. Government Sponsorship under NASA Contract NAS7-918 is acknowledged.
LWS Data Products Inspection Routines
(1)



SW1
SW2
SW3
SW4
SW5
LW1
LW2
LW3
LW4
LW5
Exit
LSPD before deglitching: TDT 08101705, SW1 NGC 4945 (AOT LO1)
Photocurrent (Amps)
Time (seconds from start of observation)
Freeze Ranges
Xmin
Xmax
Ymin
Ymax
Replot Max
Unzoom
Hard Copy
Copy X scale to lower plot
Copy Y scale to lower plot
LSPD after deglitching TDT 08101705, SW1
Photocurrent (Amps)
Time (seconds from start of observation)
Freeze Ranges
Xmin
Xmax
Ymin
Ymax
Replot Max
Unzoom
Hard Copy

Identifier inspect_ipd

Purpose: Display the illuminator flashes used to compute the absolute responsivity correction. Also looks at the dark current.

Synopsis: inspect_ipd,tdt=tdt,dir=dir,mc=mc

Returns

Description This routine allows the user to examine the data from the illuminator flash sequence for each of the 10 detectors from an LWS observation. In the top panel all the closed illuminator flashes are plotted and the points affected by glitches or saturation are marked. On the x-axis the tick marks indicate when each one of the 5 illuminators is switched on in the flash sequence.

The lower panel shows the dark current data as measured at the start of each closed flash sequence plotted in time sequence - i.e. Dark 0 refers to the dark measurement from the first closed flash and dark 1 refers to the dark measurement from the second closed flash, etc. Points with error bars are individual ramps.

The 3-sigma median clipped average is calculated for each dark measurement and printed on the screen: dark0, dark1, etc. These values and their uncertainties are indicated by horizontal lines on the lower panel, with a dashed line for the actual average dark.

The dark current appropriate for the data between successive closed flashes is simply the average of the corresponding darks. e.g. For two closed flashes, the estimated dark current is simply (dark0+dark1)/2

This dark current is also printed as a dark flux in units of Watts cm^-2 um^-1.

This routine should be useful for comparing the different closed flashes, since they are used to compute the absolute responsivity correction factors, as well as for checking the validity of the measured dark currents. On the basis of the results from this routine, the user will then be in a position to decide whether it would be beneficial to run short_aal on his/her data. For instance, if the darks being subtracted from the data are too high for even a single detector, then it would be worthwhile running short_aal to produce a revised lsan file.

Dependencies:

Comment

Example

Category LIA

Filename inspect_ipd.pro

Author S.D.Sidher
Version 1.0

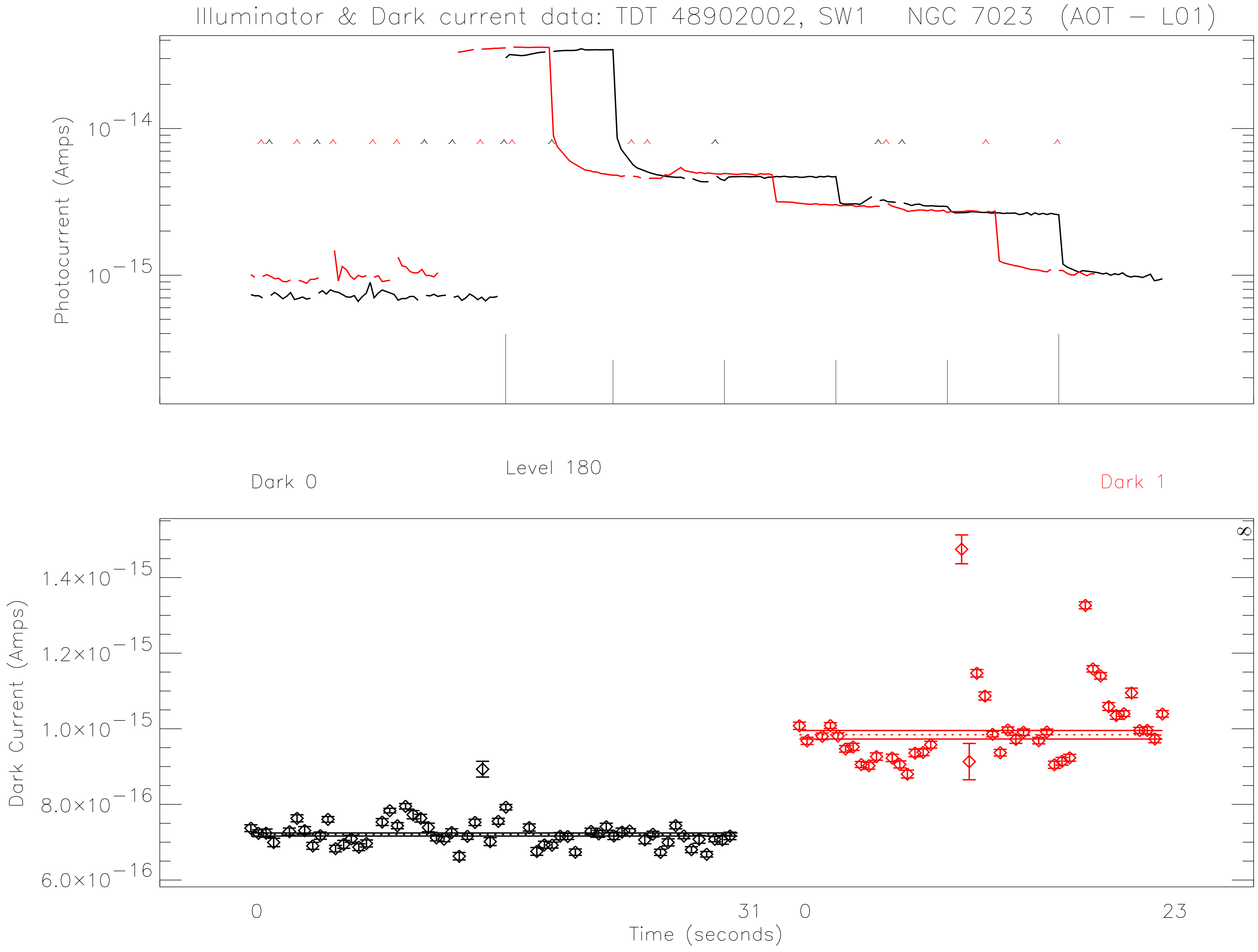
History

LWS Data Products Inspection Routines
(2)

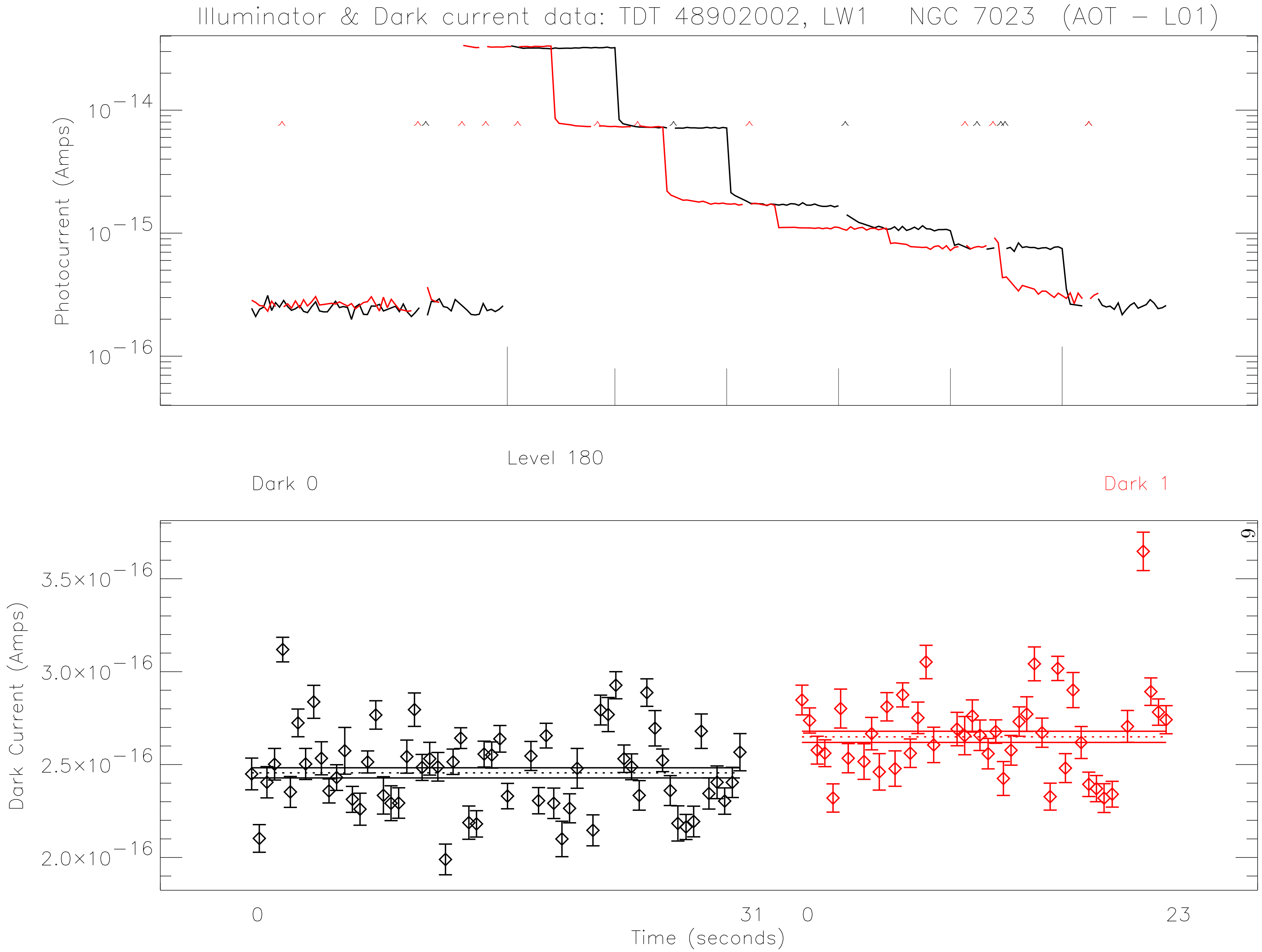
INSPECT_IPD

Data files used - lipd, liac
Calibration files used - lcgb, lcgr

```
 Arguments:     Name      I/O  Type        Description
               --------------------------------------------------------

Inputs keywords:  dir (string)   - the directory from which the input files
                                   are to be read. It can be a relative or
                                   absolute path. e.g. dir='data/'.
                                   If not specified then the data are read
                                   from the user's curent working directory.

                  tdt (string)   - the tdt number associated with the
                                   observation. For example if the tdt number
                                   is 44700574 then the routine will look for
                                   data files l*44700574.fits.
                                   If not specified the routine assumes that
                                   files to be read are called l*.fit (viz
                                   the SOC processed files from the CD_ROM).

                  mc             - optional
                                   If set, the routine reads the MC-FITS
                                   format data files from the ARC_DAT
                                   directory. Only expected to be used by
                                   the instrument team.

Expected usage:   IDL>  inspect_ipd,tdt='44700574',dir='/mydisk/mydata/'

Output:           Statistics for each closed illuminator flash and the
                  associated dark measurement are displayed to the user
                  for each detector.
```



Illuminator & Dark current data: TDT 48902002, SW1 NGC 7023 (AOT – L01)
Photocurrent (Amps)
10^{-14}
10^{-15}
Dark 0
Level 180
Dark 1
Dark Current (Amps)
1.4×10^{-15}
1.2×10^{-15}
1.0×10^{-15}
8.0×10^{-16}
6.0×10^{-16}
0
31
0
23
Time (seconds)



Illuminator & Dark current data: TDT 48902002, LW1 NGC 7023 (AOT – L01)
Photocurrent (Amps)
10^{-14}
10^{-15}
10^{-16}
Level 180
Dark 0
Dark 1
Dark Current (Amps)
3.5×10^{-16}
3.0×10^{-16}
2.5×10^{-16}
2.0×10^{-16}
0
31
0
23
Time (seconds)

```
Identifier inspect_drift

Purpose    examine the effects of the relative responsivity drift on AOT L01
           data.

Synopsis:    inspect_drift,tdt=tdt,dir=dir,mc=mc

Returns

Description    This routine allows the user to examine the effects of the
               relative responsivity drift on AOT L01 data. The contents of
               the LWS Standard Processed Data (SPD) are plotted against
               time of observation. The average photocurrent for each scan
               is plotted as an asterix symbol at the scan midpoint. The
               result of fitting a straight line to these scan averages
               is also shown for each group of data. The drift corrected
               data are overplotted to show the magnitude of the correction.

               It should be useful for demonstrating the success or otherwise
               of the drift correction procedure.


Data files used:        -   lgif, lsca, lspd

Arguments:      Name      I/O  Type        Description
              --------------------------------------------------------

Inputs keywords:  dir (string) - the directory from which the input
                                 files are to be read. It can be a relative
                                 or absolute path. e.g. dir='data/'.
                                 If not specified then the data are read
                                 from the user's current working directory.

                  tdt (string) - the tdt number associated with the
                                 observation. For example if the tdt number
                                 is 44700574 then the routine will look for
                                 the files l*44700574.fits.
                                 If not specified the routine assumes that
                                 files to be read are called l*.fit (viz
```

the SOC processed files from the CD_ROM).

mc - optional
If set, the routine reads the MC-FITS format data files from the ARC_DAT directory. Only expected to be used by the instrument team.

Dependencies:

Comment

Example

Category LIA

Filename inspect_drift.pro

Author Bruce Swinyard, S.D.Sidher

Version 1.0

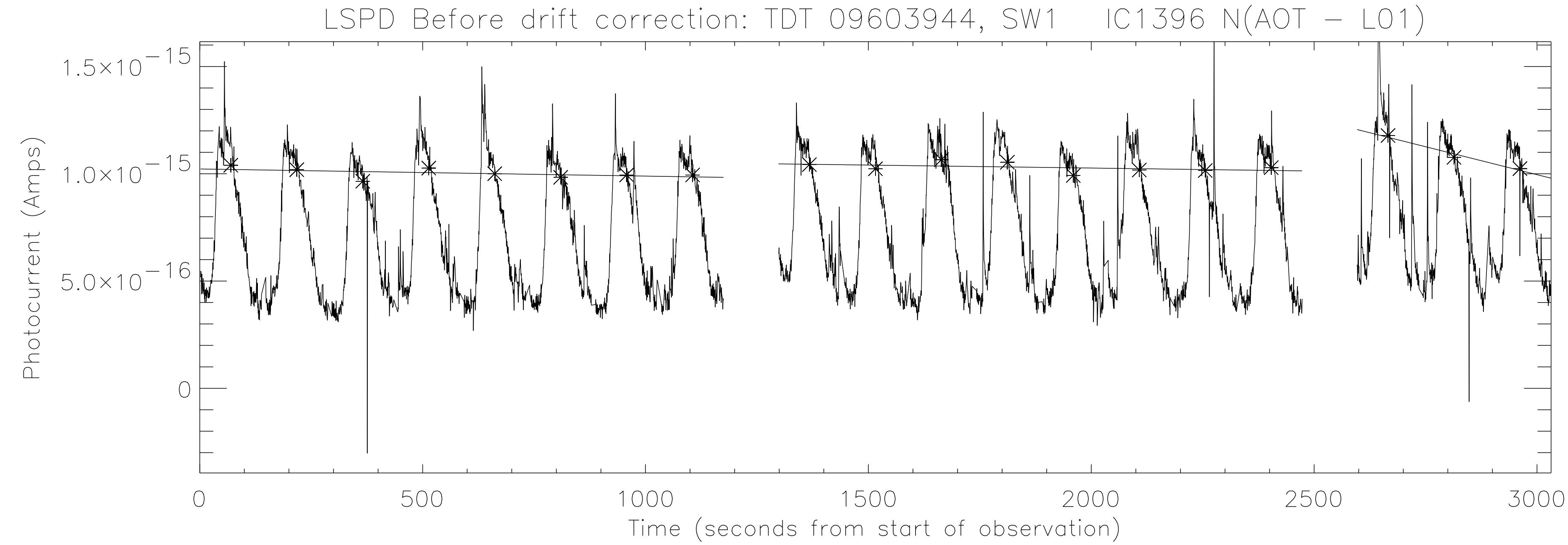
History

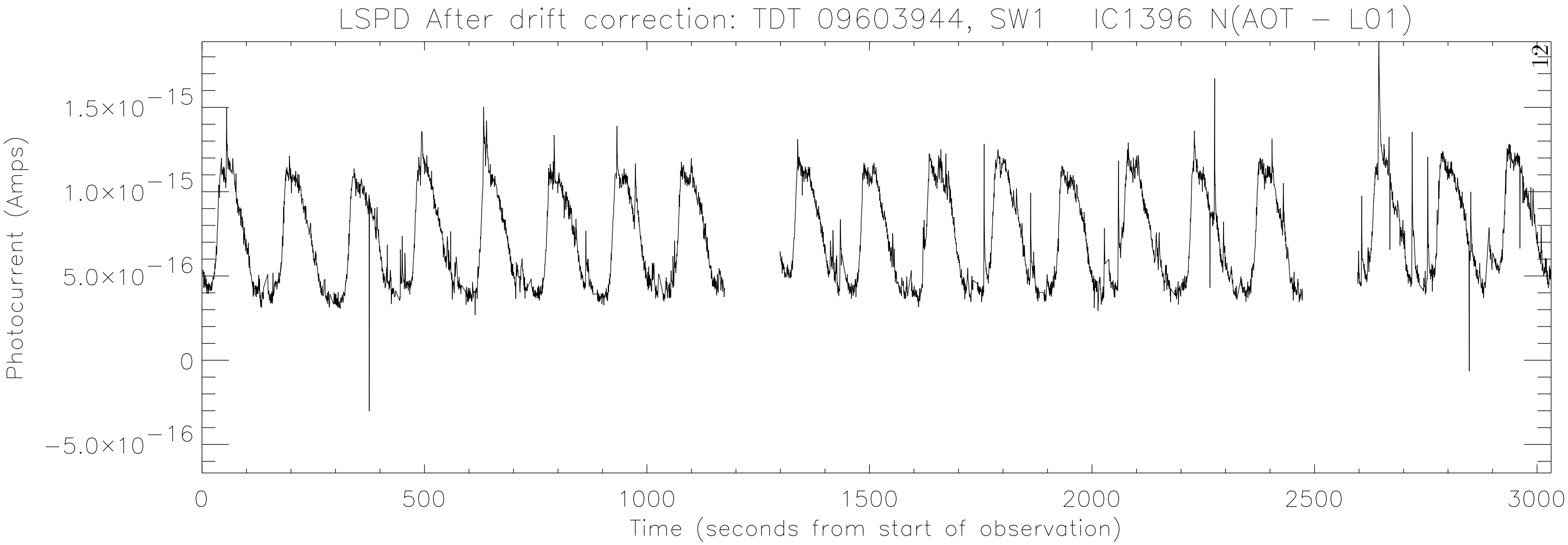
LWS Data Products Inspection Routines
(5)

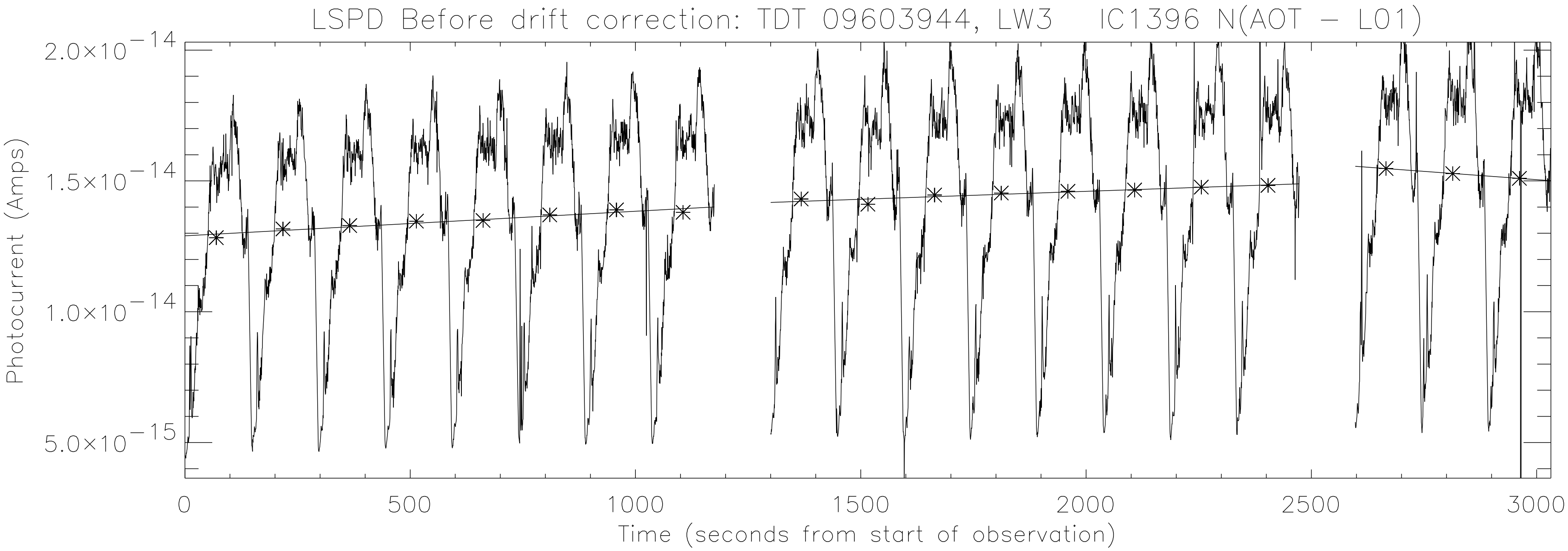
INSPECT_DRIFT

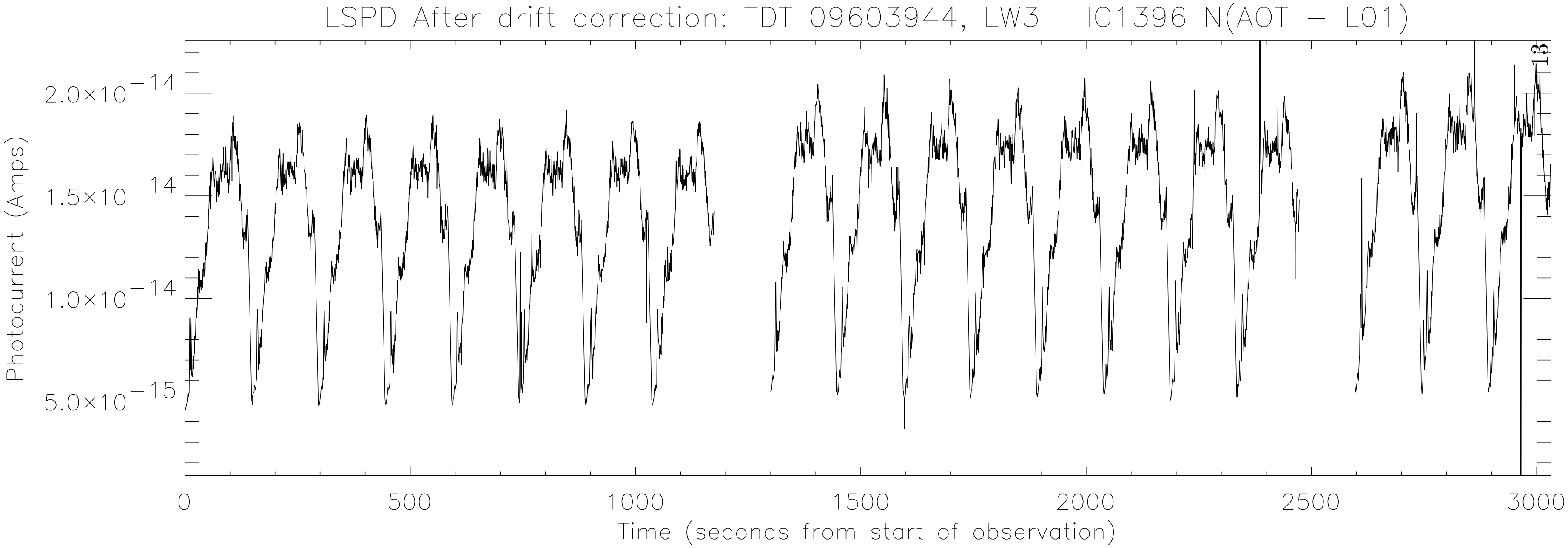
Expected usage: IDL> inspect_drift,tdt='44700574',dir='/mydisk/mydata/'

Output: Plot of the data before and after drift correction.

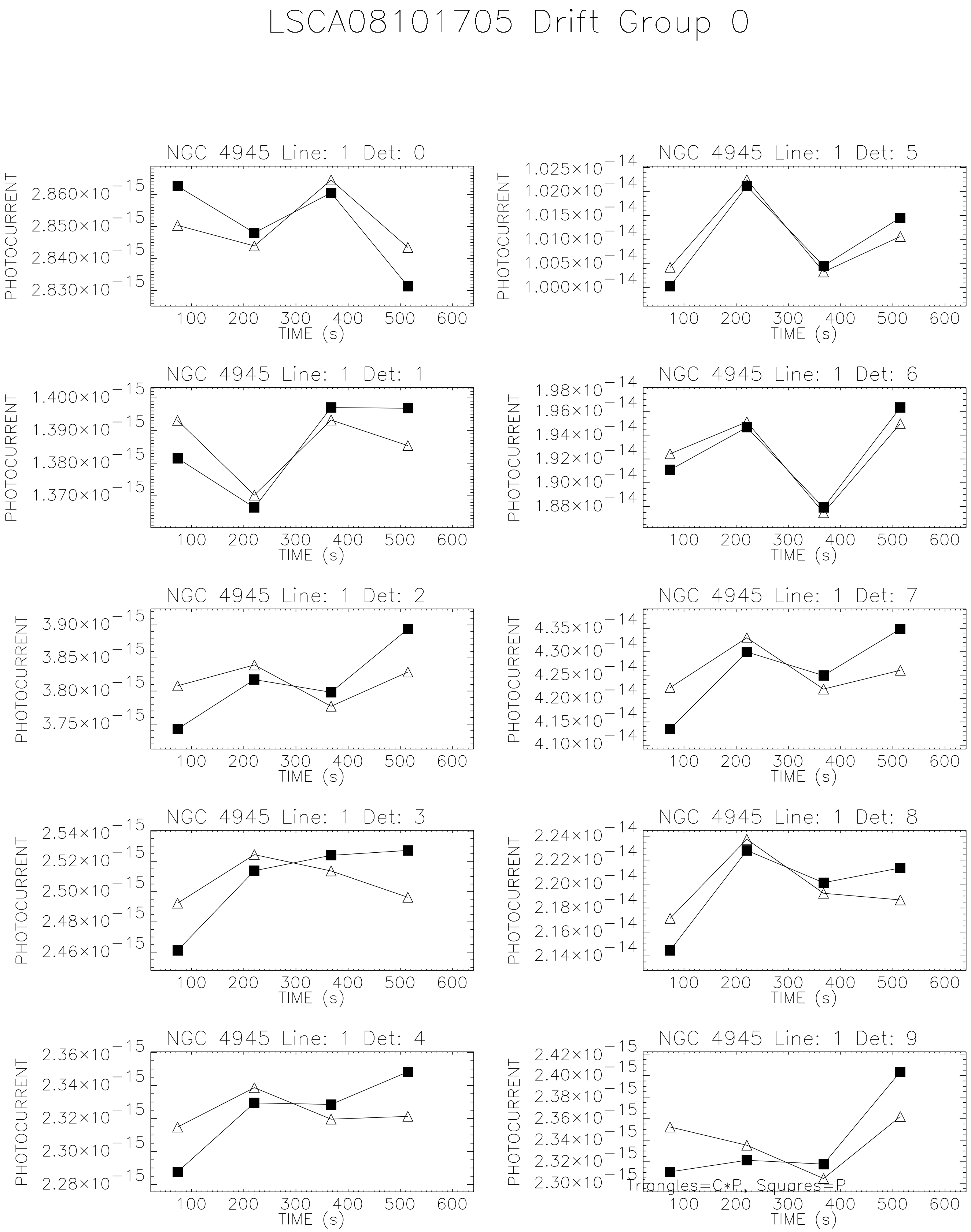

LSPD Before drift correction: TDT 09603944, SW1 IC1396 N(AOT − L01)
Photocurrent (Amps)
Time (seconds from start of observation)


LSPD After drift correction: TDT 09603944, SW1 IC1396 N(AOT − L01)
Photocurrent (Amps)
Time (seconds from start of observation)


LSPD Before drift correction: TDT 09603944, LW3   IC1396 N(AOT – L01)
Photocurrent (Amps)
2.0×10^−14
1.5×10^−14
1.0×10^−14
5.0×10^−15
0
500
1000
1500
2000
2500
3000
Time (seconds from start of observation)


LSPD After drift correction: TDT 09603944, LW3   IC1396 N(AOT – L01)
Photocurrent (Amps)
2.0×10^−14
1.5×10^−14
1.0×10^−14
5.0×10^−15
0
500
1000
1500
2000
2500
3000
Time (seconds from start of observation)

Identifier	inspect_scan_drift
Purpose	To read in data from the lsca and lgif files containing information about the scans and groups for a product. Each group has scan data for all 10 LWS detectors. The mean of the signals for each scan for every detector within a group is plotted against the mid point of the scan in ITK units.
Synopsis	
Category	ISAP
Filename	inspect_scan_drift.pro
Author	J. Brauher (IPAC), Steve Lord (IPAC)
Version	1.0
History	


LSCA08101705 Drift Group 0
NGC 4945 Line: 1 Det: 0
NGC 4945 Line: 1 Det: 1
NGC 4945 Line: 1 Det: 2
NGC 4945 Line: 1 Det: 3
NGC 4945 Line: 1 Det: 4
NGC 4945 Line: 1 Det: 5
NGC 4945 Line: 1 Det: 6
NGC 4945 Line: 1 Det: 7
NGC 4945 Line: 1 Det: 8
NGC 4945 Line: 1 Det: 9
PHOTOCURRENT
TIME (s)
Triangles=C*P, Squares=P

```
Identifier inspect_abs

Purpose     examine the absolute responsivity correction factors.


Synopsis    inspect_abs,tdt=tdt,dir=dir,/same_scale,yrange=yrange,mc=mc

Returns

Description    This routine allows the user to examine the
               absolute responsivity correction factors.

               A ten panel plot shows the correction factors for
               each detector. Crosses with error bars are the
               measured factors for each closed illuminator flash.
               The diamonds represent the correction factors applied
               to each 'group' of data in the observation. These
               points are calculated by linear interpolation in
               time between surrounding flashes to the centre of each
               group. They should therefore normally lie on the straight
               line between the surrounding closed flashes.

               It should be useful for checking whether the factors
               are within a reasonable range.


Dependencies:

Comment

Example

Category    LIA

Filename    inspect_abs.pro

Author      A.S.Harwood, S.D.Sidher
```

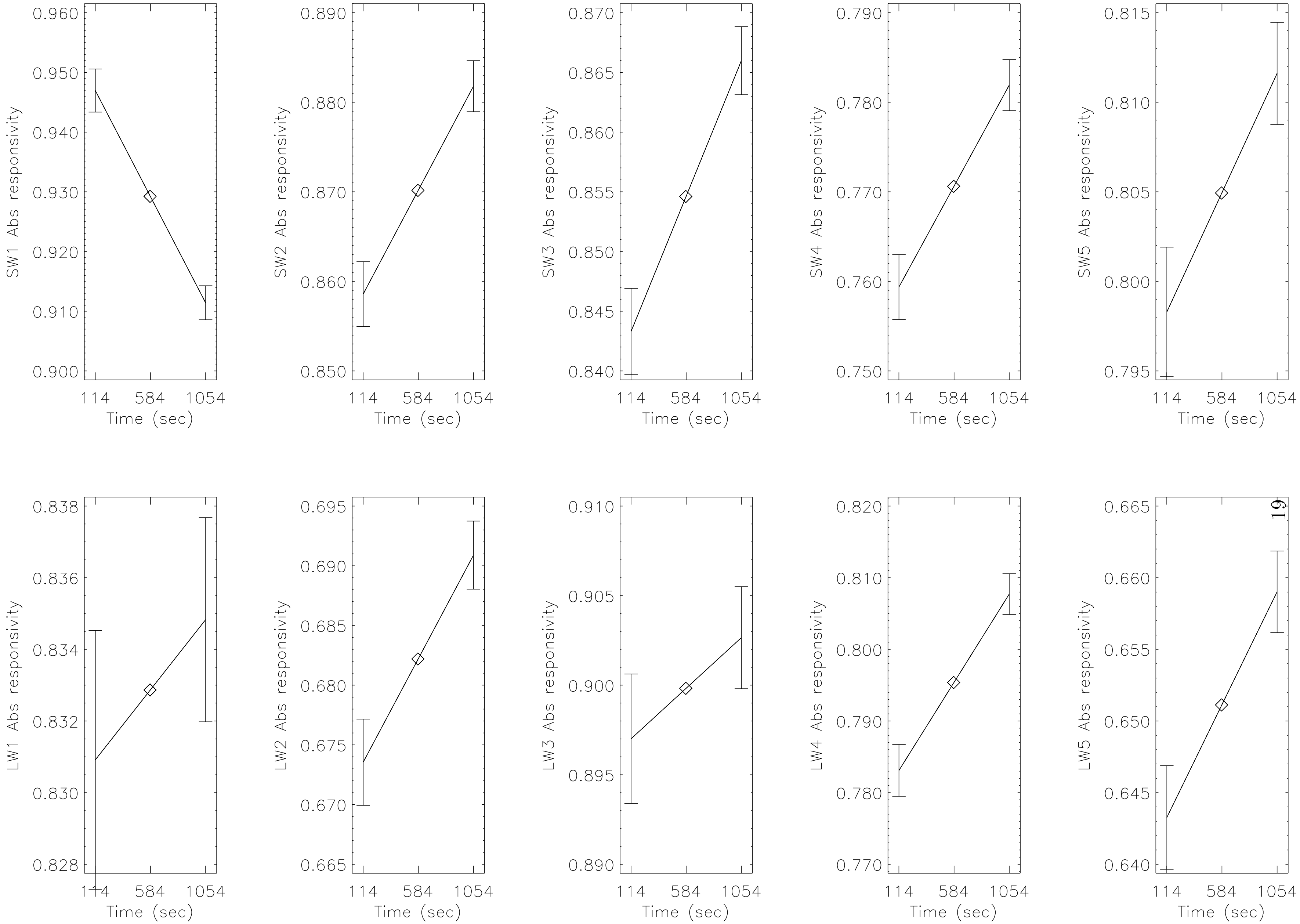
```
Version     1.0

History

Copyright (C) 1997, Rutherford Appleton Laboratory, UK


               LWS Data Products Inspection Routines
                              (6)

                          INSPECT_ABS


Data files used        -   liac, lgif


Arguments     Name      I/O  Type       Description
              ---------------------------------------------------------
Inputs keywords: dir (string)   - the directory from which the input
                                  files are to be read. It can be a
                                  relative or absolute path.
                                  e.g. dir='data/'.
                                  If not specified then the data are
                                  read from the user's current working
                                  directory.

                 tdt (string)   - the tdt number associated with the
                                  observation. For example if the tdt
                                  number is 44700574 then the routine
                                  will look for the files l*44700574.fits.
                                  If not specified the routine assumes that
                                  files to be read are called l*.fit
                                  (viz the SOC processed files
                                  from the CD_ROM).

                 same_scale     - optional
                                  if set, the plots for ALL ten detectors
                                  are plotted with the same y-scale for
                                  the absolute correction factors. Useful if
```

```
                        the user wants to get an idea as to which
                        detectors' responsivities are varying the
                        most (or least).

         yrange       - optional
                        if set, (e.g. yrange=[0.6,1.4]) then the
                        specified range is used for plotting the
                        absolute correction factors for all
                        detectors
         mc           - optional
                        If set, the routine reads the MC-FITS format
                        data files from the ARC_DAT directory. Only
                        expected to be used by the instrument team.
```

Expected usage: IDL> inspect_abs,tdt='44700574',dir='/mydisk/mydata/'

Output: Plot of the data before and after drift correction.

Absolute Responsivity Correction Factors: TDT 48902002 NGC 7023 (AOT – L01)



Identifier inspect_rsrf

Purpose To display two plots:
upper: Averaged LWS SPD data with the overplotted RSRF curve
lower Averaged LWS LSAN data

Synopsis inspect_rsrf,tdt=tdt,mc=mc,dir=dir, psym=psym

Returns

Description

Dependencies:

Comment

Example inspect_rsrf,tdt='22001101',psym=-4,dir='/mydisk/data/'

Category LIA

Filename inspect_rsrf.pro

Author Sunil Sidher, Andrew Harwood, Sarah Unger

Version 1.0

History

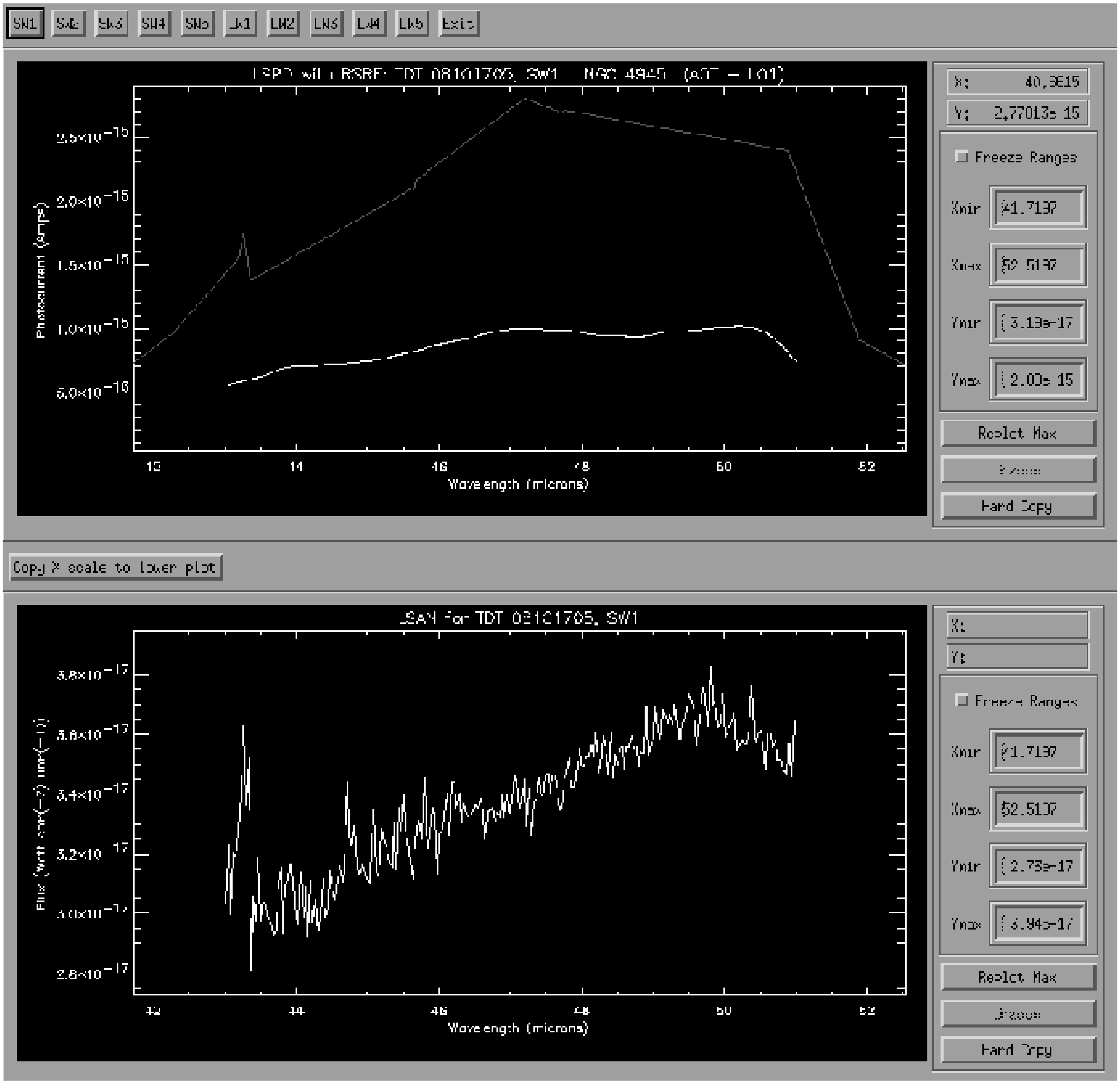
U.S. Government Sponsorship under NASA Contract NAS7-918 is acknowledged.

INSPECT_RSRF

Description - This routine allows the user to compare the wavelength calibrated LWS SPD with the LWS grating relative spectral response function (RSRF).

```
The plot in the upper panel for each detector shows the extracted LSPD
photocurrents (dark current subtracted and median clipped at 3-sigma)
versus wavelength and NORMALISED to the RSRF at the grating rest
position.

The LWS AAR (i.e. LSAN) in the lower panel are also median clipped and
plotted on the same wavelength scale.

(PLEASE NOTE that these wavelengths in the LSPD are NOT corrected for the
combined effects of the motion of the Earth and the ISO spacecraft. This
correction will be applied in the next release of inspect_rsrf. For the time
being it is worth noting that there may be wavelength shifts between the LSPD
and LSAN not exceeding 1/20th of a resolution element)

It should be useful for enabling the user to discriminate against
spurious features which may be present in the RSRF. The plots can be
zoomed on for closer inspection of data.

For raster observations, the user can select data for the raster point id of
interest from the pop-up widget.

For AOT LWS02, the user can choose the line number to display from the dataset
This is done from the IDL command line window.


Data files used          -  liac, lspd, lsan
Calibration files used   -  lcgb, lcgr

Inputs keywords:
 dir (string)    - the directory from which the input files are to be read.
                   It can be a relative or absolute path.
                   e.g. dir='data/'.
                   If not specified then the data are read from the user's
                   curent working directory.

 tdt (string)    - the tdt number associated with the observation. For example
                   if the tdt number is 44700574 then the routine will look for
                   the files l*44700574.fits.
```

```
                 If not specified the routine assumes that files to be
                 read are called l*.fit (viz the SOC processed files
                 from the CD_ROM).

 psym (integer) - optional
                 symbol to be used for plotting the data. If not specified
                 specified the points are simply connected together.

 mc             - optional
                 If set, the routine reads the MC-FITS format data files from
                 the ARC_DAT directory. Only expected to be used by
                 the instrument team.



Expected usage:
IDL>  inspect_rsrf,tdt='44700574',dir='/mydisk/mydata/'

Output:
Dark current subtracted from LSPD data. Also given in flux units (Watts
cm^-2 um^-1).

The display widget allows hardcopies of plots to be made by saving output as a
PostScript file.
```


SW1
SW2
SW3
SW4
SW5
LW1
LW2
LW3
LW4
LW5
Exit
Photocurrent (Amps)
Wavelength (microns)
Freeze Ranges
Xmin
Xmax
Ymin
Ymax
Replot Max
Hard Copy
Copy X scale to lower plot
LSAN for TDT 08101705, SW1
Wavelength (microns)
Freeze Ranges
Xmin
Xmax
Ymin
Ymax
Replot Max
Hard Copy

Identifier inspect_raster

Purpose Examine the coordinates (RA2000/Dec2000 or RA1950/Dec1950) for each of the raster points. Pointing observations can also be checked.

Synopsis inspect_raster,rp,ra,dec,iiph,tdt=tdt,dir=dir,/b1950,mc=mc

Arguments

```
Name      I/O  Type        Description
--------------------------------------------------------

dir (string) - the directory from which the input files are
   to be read.
   It can be relative or absolute path.
   e.g. dir='data/'.
   If not specified then the data are read from the user's
   curent working directory.

tdt (string) - the tdt number associated with the
   observation. For example if the tdt number is 44700574
   then the routine will look for
   the iiph file iiph44700574.fits.
   NOTE: THIS FILE IS NOT USED IN THE LWS OLP, SO IT IS
   VERY UNLIKELY TO HAVE THE TDT APPENDED TO ITS NAME.

   If not specified the routine assumes that file to be
   read is called iiph.fit (viz the SOC processed file
   from the CD_ROM).

/b1950 - If set then all coordinates returned and plotted
   are given for epoch 1950. Otherwise all coordinates are
   returned for J2000.

rp (string)   - string array containing the raster point ids.

ra (float)    - array of RAs
```

```
dec (float)   - array of Decs

iip - IDL structure containing the contents of the iiph file


mc    - optional
   If set, the routine reads the MC-FITS format data files from
   the ARC_DAT directory. Only expected to be used by
   the instrument team.
```

Returns

Description This routine allows the user with LWS raster observations
to examine the coordinates (RA2000/Dec2000 or RA1950/Dec1950)
for each of the raster points. Pointing observations can also
be checked.
Data files used - iiph (instrument instantaneous point history)

Dependencies:

Comment

Example inspect_raster,dir='/mydisk/mydata/'

Category   LIA

Filename   inspect_raster.pro

Author   S.D.Sidher

Version   1.0

History

```
 Identifier  lsnr_abs

 Purpose   Procedure to apply the absolute responsivity correction to the
           data in the LSNR file, given the LGIF file

 Synopsis   lsnr_abs,lsnr,lsnr_abs,tdt=tdt,dir=dir,/outfits,mc=mc

 Arguments     Name      I/O  Type        Description
               --------------------------------------------------------
Inputs keywords: dir (string)   - the directory from which the input files are
                  to be read. It can be a relative or absolute path.
                  e.g. dir='data/'.  If not specified then the data are
                  read from the user's current working directory.

                 tdt (string)   - the tdt number associated with the
                  observation. For example
                  if the tdt number is 44700574 then the routine will look
                  for the files l*44700574.fits.
                  If not specified the routine assumes that files to be
                  read are called l*.fit (viz the SOC processed files
                  from the CD_ROM).

                 mc    - optional
                  If set, the routine reads the MC-FITS format data files from
                  the ARC_DAT directory. Only expected to be used by
                  the instrument team.

         Output:
                 lsnr - returns the data in the lsnr file as a structure
                  (optional)

                 lsnr_abs  - the lsnr data but now corrected for the absolute
                  responsivity (optional)

               Output keyword:
               outfits - if set the routine creates an LSAN FITS file for
                  ISAP to read.
                  e.g. lsnr44700574_abs.fits or lsnr_abs.fits depending on
```

```
                    whether the keyword tdt is set or not.
                    Warning - it can take a few minutes to create a large
                    LSAN file (e.g. 10MB) .
```

Returns

Description This routine applies the absolute responsivity correction to the LSNR file (LSNR is the uncorrected version of the LSAN file). It should be particularly useful in cases where the drift correction applied in the LSAN file is inappropriate, i.e. in AOTs other than LWS01, or where the data are badly affected by glitches which may have escaped detection at the SPD stage.

Data files used - lsnr, lsan, lgif

Dependencies:

Comment

Example `lsnr_abs,tdt='44700574',dir='/mydisk/mydata/',/outfits`

Category LIA

Filename lsnr_abs.pro

Author S.D.Sidher

Version 1.0

History

```
Identifier  short_aal

Purpose   Procedure to subtract user supplied dark current (or default)
          - apply drift correction, wavelength correction and flux correction
          - i.e. a very truncated version of AAL for grating data ONLY


Synopsis   short_aal,wavel,flux,lsani,lsan,tdt=tdt,dir=dir,darks=darks,
                    /nodrift,/outfits,mc=mc

Arguments     Name      I/O  Type        Description
              -------------------------------------------------------
Inputs keywords:
              dir (string)   - the directory from which the input files are
                 to be read.
                 It can be a relative or absolute path.
                 e.g. dir='data/'.
                 If not specified then the data are read from the user's
                 current working directory.

              tdt (string) - the tdt number associated with the observation.
                 For example
                 if the tdt number is 44700574 then the routine will look
                 for the files l*44700574.fits.
                 If not specified the routine assumes that files to be
                 read are called l*.fit (viz the SOC processed files
                 from the CD_ROM).

              darks (float)  - optional
                 10 element array for the detector dark currents (Amps).
                 If not specified the routine uses a set of dark
                 currents determined from the PV phase.

              nodrift        - optional
                 If set (i.e. /nodrift) it skips responsivity drift
                 correction.

              mc             - optional
```

```
    If set, the routine reads the MC-FITS format data files from
    the ARC_DAT directory. Only expected to be used by
    the instrument team.

 Output:
 wavel (float)  - returns the 2-d wavelength array
    wavel(dets,data) (optional)

 flux (float) - returns the 2-d flux array flux(dets,data)
    (optional)

 lsani - IDL structure returned containing the original
    LSAN data
    (optional)

lsan - IDL structure returned containing the new short_aal
    created  LSAN data

Output keyword:
outfits - if set the routine creates an LSAN FITS file for
   ISAP to read.
    e.g. lsan44700574_short.fits or lsan_short.fits depending
    on whether the keyword tdt is set or not.
```

Returns

Description This routine is a truncated version of the SPD to AAR stage, restricted to use for just the grating data. It allows the user to input a different set of dark currents for subtraction from the LWS SPD photocurrents. The drift correction can also be switched off if required.

It should be useful in cases where inordinately high dark currents have been subtracted (as presently determined from the illuminator flash sequence data), and the user wants to override the standard OLP dark subtraction. Furthermore, the responsvity drift correction, if the user chooses to apply it here, is calculated and performed before the dark currents have been subtracted from the data.

Although the routine calculates the wavelengths for each data point and returns the wavelengths to the user, these wavelengths are NOT corrected for the motion of the Earth or the ISO spacecraft. However when the new LSAN file is created, the routine uses the wavelengths from the original LSAN file (which are velocity corrected) and copies them into the new LSAN file. In the next release of this routine the velocity correction will be done internally using the data in the LSPD file.

Data files used - lgif, lspd, lsca, lsan
Calibration files used - lcgb, lcgr

Dependencies:

Comment

Example
```
short_aal,tdt='44700574',dir='/mydisk/mydata/',/outfits
alternatively
short_aal,wavel,flux,lsani,lsano,tdt='44700574',$
dir='/mydisk/mydata/',/outfits
```

Category LIA

Filename short_aal.pro

Author S.D.Sidher

Version 1.0

History Version 1.0: 30/6/97
1.1: 21/7/97 - Allows the user to turn off the drift correction;
Author B.Swinyard - RAL

```
Version 1.2:  24/7/97
Modifications for handling different data file types
and for reading cal files.
Keyword Option to output lsan fits file
Drift correction applied individually to each group
- loops simplified
Drift correction comment line modified
Keywords in secondary header for abs and rel resp correction
also updated
```

```
Identifier:  calc_errors


Purpose:  To calculate LWS flux uncertainty

Synopsis: calc_errors,errs,flx,dflx,tdt=tdt,dir=dir,lam=lam,detn=detn,mc=mc

Arguments:

       Name      I/O  Type        Description
       --------------------------------------------------------
Input:  flx  - Flux in spectrum (optional)
        dflx - Uncertainty in flux in spectrum (optional)

Inputs keywords:
       dir (string) - the directory from which the input files are to be read.
                      It can be a relative or absolute path. e.g. dir='data/'.
                      If not specified then the data are read from the user's
                      current working directory.
       tdt (string) - the tdt number associated with the observation.
                      For example if the tdt number is 44700574 then the
      routine will look for the files l*44700574.fits.
                      If not specified the routine assumes that files to be
                      read are called l*.fit (viz the SOC processed files
                      from the CD_ROM).
       lam  (float) - if set, the results are returned for all possible
                      detectors covering the given wavelength.
       detn (string)- optional user supplied detector keyword (such as 'SW1').
      It is used only if lam has been specified. Otherwise the
                      results for all detectors are given.

Returns:

Description:
        This routine allows the user to get a meaningful estimate
        of the flux density uncertainty for an observation.
        It produces a tabular printout and returns an IDL structure for
        each group of observation. Each structure contains the following:
```

```
DET   - strarrr(10) Name of each detector
DELD  - fltarr(10)  Error in flux from dark current
DELF  - fltarr(10)  Square of the systematic part the flux error
DINF  - fltarr(10)  Dark currents in flux units (Watts cm^-2 um^-1)

Data files used        -   liac

Calibration files used -   lcgb, lcgr


Example A:
==================
e.g.  calc_errors,errs,tdt='44700574',dir='/mydisk/mydata/'

Output:

1) Textual information on the screen for each group:

Detector Wavelength    Dinf    DelD          Delf
SW1      46.0000  7.45174e-18  5.96193e-19   0.00257940
SW2      56.0800  5.06076e-18  3.19258e-19   0.00252211
SW3      66.0100  4.43011e-18  2.80561e-19   0.00257870
SW4      75.5900  4.09146e-18  3.14354e-19   0.00256242
SW5      84.7200  4.28921e-18  2.43042e-19   0.00257217
LW1      102.250  1.67596e-18  1.05544e-19   0.00256959
LW2      122.020  5.94175e-19  5.75952e-20   0.00257254
LW3      141.620  3.09975e-19  2.92759e-20   0.00255805
LW4      160.430  3.29390e-19  2.49980e-20   0.00257220
LW5      177.850  5.80679e-19  4.43933e-20   0.00256100

2) Structure array for each group in observation.

IDL> help,err,/str
** Structure <204218>, 4 tags, length=200, refs=1:
DET             STRING    Array(10)    -  LWS detector
DELD            FLOAT     Array(10)
DELF            FLOAT     Array(10)
DINF            FLOAT     Array(10)    -  Dark in flux units
```

```
IDL> print,err.det
SW1 SW2 SW3 SW4 SW5 LW1 LW2 LW3 LW4 LW5

IDL> print,err.deld
5.96193e-19  3.19258e-19  2.80561e-19  3.14354e-19
2.43042e-19  1.05544e-19  5.75952e-20  2.92759e-20
2.49980e-20  4.43933e-20

IDL> print,err.delf
0.00256100   0.00256100   0.00256100   0.00256100
0.00256100  0.00256100
0.00256100   0.00256100   0.00256100   0.00256100

IDL> print,err.dinf
7.45174e-18  5.06076e-18  4.43011e-18  4.09146e-18
4.28921e-18  1.67596e-18 5.94175e-19  3.09975e-19
3.29390e-19  5.80679e-19
```

```
Example B:
==================

IDL>  calc_errors,errs,tdt='44700574',dir='/mydisk/mydata/',lam=157.0

Detector Wavelength    DINF    DELD          DELF
(microns)     (W/cm^2/um)           (Ratio)

LW3      157.000  5.75595e-19  5.43632e-20   0.00255825
LW4      157.000  3.35600e-19  2.54667e-20   0.00257104
```

Here the user can specify the wavelength at which the flux
uncertainty is required. All LWS detectors for which the
user specified wavelength is available AND where there is a
non-zero RSRF, the various uncertainty terms are calculated.
The optimum detector for the wavelength is indicated to the user.

Estimating flux uncertainty from these results

```
Continuum
---------
The flux density uncertainty is given by:

Delta F_c (W/cm^2/um) = { [(dF_w/F_w)^2 + DELF]*F_w^2 + DELD^2 } ^ 0.5 (Eqn 1)

           where F_w and dF_w are the continuum flux mean and the
           associated rms.  dF_w/F_w is determined by the user using
           the baseline fit option in ISAP GUI for the required
           wavelength/detector.

In summary, substitute DELF and DELD from the table,
and dF_w/F_w from the ISAP GUI into Eqn 1, and the result
will be the flux density uncertainty in units of W/cm^2/um.

Lines
-----
Here the error in the dark current is eliminated by the
baseline subtraction. The best approach is to determine the
signal-to-noise ratio (SNR) using the ISAP GUI line fitting routine,
and then computing the uncertainty as follows:

        Delta F_l (W/cm^2) = { (1/SNR)^2 + DELF } ^ 0.5  * F_l

           See user note for full explanation.


Notes:
      LCGB - is file with grating resolution element and
             detector name in
      LCGR - is file with responsivity vs. wavelength and wavelength in
             Hard coded grating rest position as 2173.0
             Hard coded uncertainty in Uranus model is 5%

Comment:

Example: calc_errors,tdt='22001101',dir='/mydisk/data/'
```

```
Category: LIA

Filename: calc_errors.pro

Author: Bruce Swinyard, S.D.Sidher

Version: 2.0

History:

   Version: 1.0  24/7/97 Mostly ripped from Sunil's INSPECT_IPD
            2.0  31/7/97 Now allows user to input Wavelength and
                         flux and uncertainty

            2.1  27/8/97 Several modifications. User can enter a single
                         wavelength (keyword lambda). If the keyword detn is
                         not specified, the program returns results for all
                         dets with valid RSRF and wavelengths, indicating
 which det is the optimum one. If the keyword detn
 is specified along with lambda then only the results
 for this det/lambda set are returned, as long as they
 are valid. If the keyword detn is specified on its
 own then it has no effect - the results are returned
 for ALL dets.
                         S.D.Sidher - RAL

Copyright

       (C) 1997, Rutherford Appleton Laboratory, UK
            LWS Data Products Inspection Routines
                           (6)
```