rgsimplot

January 12, 2017

Abstract

Displays RGS Spectroscopy diagnostic plots.

1 Instruments/Modes

Instrument	Mode
RGS	Baseline Spectroscopy
RGS	High Time-resolution Spectroscopy

2 Use

pipeline processing	yes
interactive analysis	yes

3 Description

This task displays an RGS Spectroscopy spatial–dispersion plot (displaying photon position in beta or lambda space) and an energy–dispersion plot (displaying photon energy against beta angle or lambda in the dispersion direction) created from an RGS event list by **evselect**. These plots provide extremely useful diagnostics of RGS spectroscopy data, allowing the user to gauge the potential cross-contamination of the RGS orders by pileup, scattering and partial events.

Details of the observation are also displayed in each plot. These include the observation and exposure IDs and the observation start and stop times.

The plots may be displayed in monotone or using a number of colour tables (e.g grey-scale, rainbow, heat), and any valid PGPLOT graphics device may be specified for the output. A linear, sqrt or logarithmic colour mapping can be specified by the user.

rgsregions extraction region files are overlaid on the energy–dispersion and spatial–dispersion plots. Examples of these are shown in Figure 1. in which a spatial extraction region and order extraction regions are overlaid on the full images.

rgsimplot produces an energy-dispersion plot in a format defined by the device parameter.

4 Parameters

This section documents the parameters recognized by this task (if any).

Parameter	Mand	Type	Default	Constraints
withspatialset	no	boolean	T	

Is a spatial–dispersion imageset going to be given to the task?

spatialset	no	string		

Input spatial dispersion image (output of **evselect**)

withendispset	no	boolean	T	

Is an energy–dispersion imageset going to be given to the task?

endispset	no	string		

Input Energy–dispersion image (output of **evselect**)

srclistset	no	string		

Input sourcelist (produced by **rgssources**) containing source dependent extraction regions produced by **rgsregions**.

orderlist	no	string		

List of orders to be displayed.

withspatialregionsets	no	boolean	T	

If withspatialregionsets is true then the spatial extraction region for the source specified by sourceid will be read from the sourcelist and overlaid on the spatial–dispersion plot.

withendispregionsets	no	boolean	T	

If withendispregionsets is true then the order extraction regions for the first two orders of the source specified by sourceid will be read from the sourcelist and overlaid on the energy–dispersion plot.

srcidlist	no	string		

List of Source IDs in sourcelistset used to acquire source dependent extraction regions.

plotfile	no	string		

Name of hard copy plot file.

device	no	string	/XW	

A valid PGPLOT graphics device for the output (e.g /XSERVE, /CPS)

invert	no	boolean	False	

Invert colour table?

colourmap	no	string	LOG	

Choose a colour mapping type. either LIN, SQRT or LOG.

colour	no	integer	1	1–6

Defines the palette type to be used (gray scale, rainbow, heat, IRAF, AIPS, TJP)

paperxmin	no	real	0.1	0.0–1.0

Defines the position on the page of the bottom left corner of the image.

paperymin	no	real	0.15	0.0–1.0

Defines the position on the page of the top left corner of the image.

paperxmax	no	real	0.89	0.0–1.0

Defines the position on the page of the bottom right corner of the image.

paperymax	no	real	0.8	0.0–1.0

Defines the position on the page of the top right corner of the image.

5 Errors

This section documents warnings and errors generated by this task (if any). Note that warnings and errors can also be generated in the SAS infrastructure libraries, in which case they would not be documented here. Refer to the index of all errors and warnings available in the HTML version of the SAS documentation.

Unable to plot the coordinates of more than 3 sources *(warning)*

corrective action:

Unable to plot more than 11 fits regions in different colours *(warning)*

corrective action: Rest drawn in black

Failed to delete temporary file *(warning)*
Warn user
corrective action:

No spatial set supplied *(fatal)*
Spatial plot requested - not supplied

No energy dispersion supplied *(fatal)*
Energy dispersion requested

No Source list provided *(fatal)*
Region sets requested

No plot file supplied *(fatal)*
Hard copy device selected

Plot file already exists *(fatal)*
SAS-CLOBBER set

Unrecognised PGPLOT device *(fatal)*
value in device parameter not recognised

Nothing to plot *(fatal)*
no plots chosen

Invalid graph size *(fatal)*
paperxmin=paperxmax

Invalid graph size *(fatal)*
paperymin=paperymax

6 Input Files

1. PPS RGS Spatial–Dispersion FITS Image (output from **e**vselect)

1. PPS RGS Energy–Dispersion FITS Image (output from **e**vselect)

1. RGS FITS sourcelist (output from **r**egsregions)

7 Output Files

1. RGS Spectroscopy diagnostic plot.

8 Algorithm

```
subroutine rgsimplot

read parameters

check for hardcopy filename if device requires.

set up the plotting page and colourmap

IF spatial and energy--dispersion imageset both available THEN
     split page.
END IF

IF spatial imageset available

     get a handle on the image dataset
     read observation information keywords
     get a handle on the image array
     read plotting information keywords and set up pgplot transformation matrix
     set up plotting window and viewport
     plot the image
     annotate the plotting axis using plotting information keyword values
     annotate plot with observation information

     IF spatial extraction region sets available

          get a handle on the sourcelist dataset
          look for block containing spatial region for designated sources
          from srcids parameter

          IF block present

              if source = srcid parameter

                 plot region in red

              else

                 plot region in green

              end if

          ENDIF

     END IF

 ENDIF


IF energy--dispersion imageset available

     get a handle on the image dataset
     read observation information keywords
     get a handle on the image array
```

```
      read plotting information keywords and set up pgplot transformation matrix
      set up plotting window and viewport
      plot the image
      annotate the plotting axis using plotting information keyword values
      annotate plot with observation information

      IF order extraction region sets available

           get a handle on the sourcelist dataset

           FOR EACH  order look for block containing order region for designated source

               IF block present

                  if source = srcid parameter

                     plot region in red

                  else

                     plot region in green

                  end if

               ENDIF

           END FOR

      END IF

   ENDIF

end subroutine  rgsimplot
```

9 Comments

This task has now become purely a display task. **evselect** creates images from columns in the input eventlist.

10 Future developments

- It might be useful to allow the user to overlay more than just the target source extraction regions in order to judge contamination from other sources in the field of view.
- A list of source IDs could be given and looped internally, plotting each adiitional region with a different colour to the target source and an ID subscript. –NOW IMPLEMENTED–
- It might also be useful to add an aditional axis Channels describing the channels used to construct the spectrum so that this plot can be compared to the spectral plots produced by **rgsspecplot**.

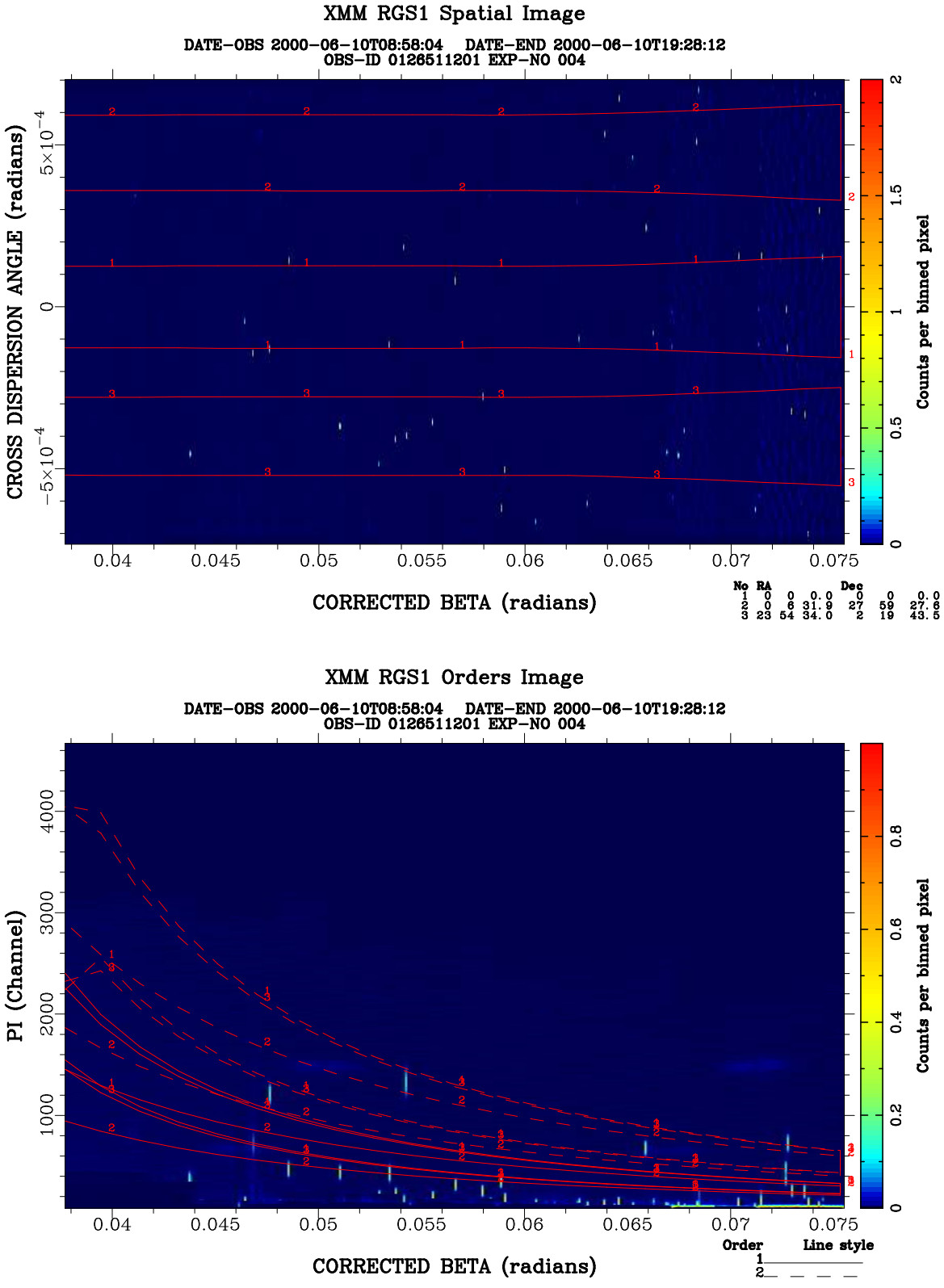

Figure 1: Examples of **rgsimplot** PPS product: Plot showing both diagnostic plots with overlaid extraction regions.

10.1 CAL usage

- None

References