omichain

August 16, 2005

Abstract

Run the OM imaging mode pipeline.

1 Instruments/Modes

Instrument	Mode
OM	Imaging

2 Use

pipeline processing	yes
interactive analysis	no

3 Description

This package contains a PERL script which takes a set of image mode OM ODF files in a single directory and processes them in a pipeline to produce OM image mode pipeline products **see Section 9** . Given a directory with a set of ODF files that conform to the filename specification given in the ODF ICD the PERL script will process the image files and output files conforming to the ICD specifications.

Through reading the SAS summary file, the perl scrip first produces a list of the filters for the OM data. The perl-script loops through each filter and produces a list of exposures for the filter to be processed.

This is followed by the creation of the flatfield (currently a static flat from the CAL data) by **omflatgen**.

The chain then scans the input area to check that the necessary auxilliary files (e.g. tracking history, window files, housekeeping files etc) are present, exiting if any key files are absent.

Figure 1 shows the overall operation of the omichain

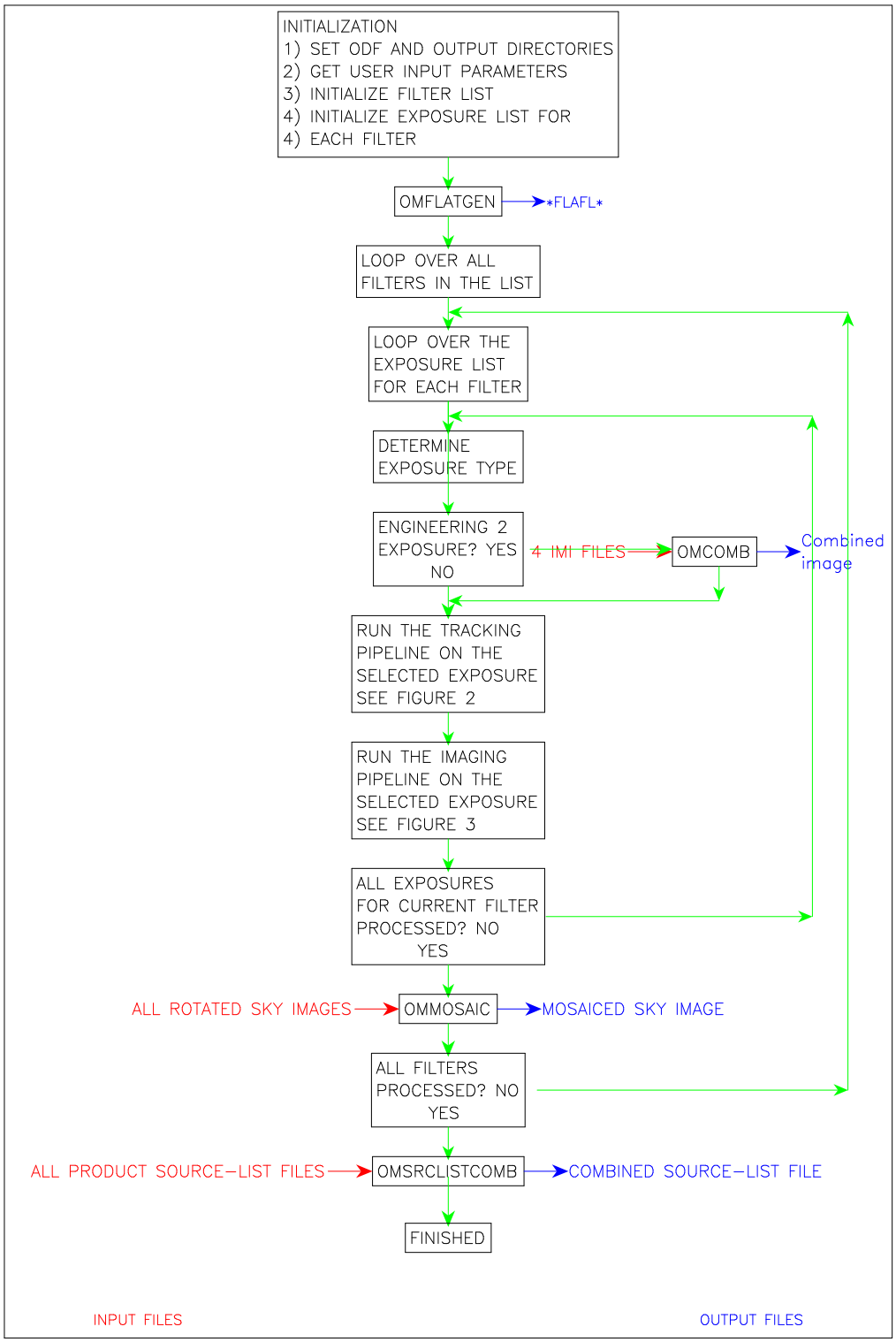

Figure 1: The OM IMAGING CHAIN

Omichain then cycles through each exposure for the filter being processed. It first checks to see if the exposure is a full-frame low resolution mode, and if so it runs **omcomb** to combine the four separate image segments into a single full-frame image.

The tracking-history pipeline is run to produce tracking history information using **omprep**, **omdrifthist**

and **omthconv**.

The imaging pipeline is then run to reduce the exposure image

(2 for Rudi-5 and 1 for Engineering-2 data), using **omprep**, **omcosflag**, **omflatfield**, **ommodmap**, **omdetect**, **ommag** and **omatt**. When all the exposures for a given filter have been processed, **ommosaic** is used to combine the low-resolution sky-coordinate images into a single full-field image.

Finally, outside the filter processing loop, **omsrclistcomb** runs to combine the source lists from separate exposures into a single master list.

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Finally, outside the filter processing loop, **omsrclistcomb** runs to combine the source lists from separate exposures into a single master list.

Using the default parameter settings the omichain will process all the image files in the data directory. However, if only the images of particular exposures are required to be processed, or the images for particular filters, the parameters **exposures** and **filters**, respectively, can be used to achieve this.

Some of the parameters for individual tasks can be set using the appropriate omichain parameter - the parameter names are the same as the task name, prefixed with the name of the task.

Figure 2 shows the operation of the tracking-history pipeline and also that of the imaging pipeline

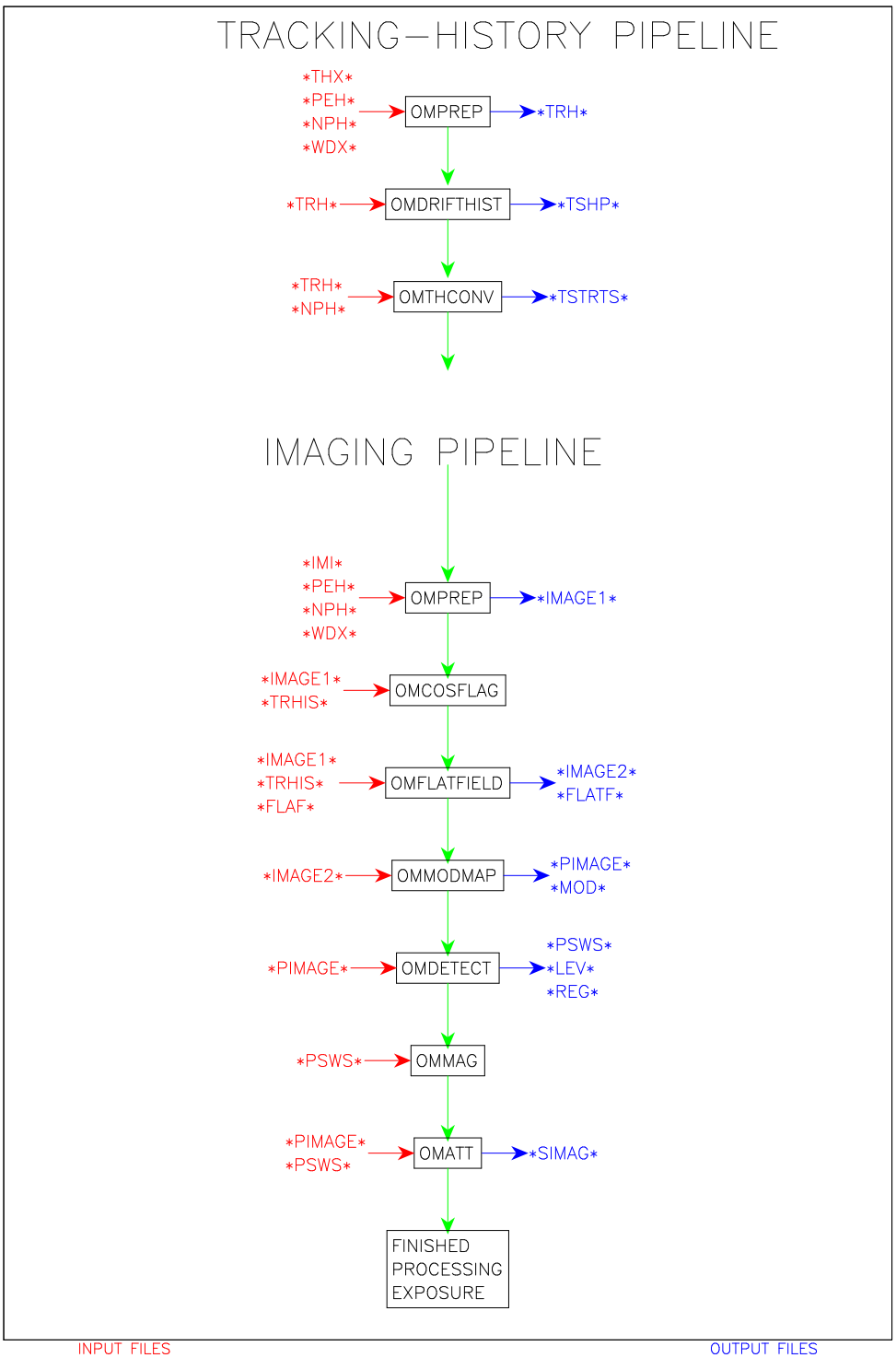

Figure 2: The Tracking-History and Imagining Pipe-Lines (Part of the OM Imaging Chain)

4 Parameters

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

Parameter	Mand	Type	Default	Constraints
inpdirectory	no	string	current directory	

Path/name of the input files directory

outdirectory	no	string	inpdirectory	

Path/name of the output files directory

comment	no	string	User comment	

User comment to output

filters	no	List of filters		

List of OM filters to be processed

exposures	no	List of exposures		

List of OM exposures to be processed

ommodmapnbox	no	integer	16	

ommodmap - Size of sliding box in units of 8 pixels

ommodmapnsig	no	integer	3	

ommodmap - Significance level for sigma clipping

omdetectnsigma	no	float	2.	1.0:

omdetect - number of σ above background mode required for a pixel to be regarded as being part of a source

omdetectdetectextended	no	boolean	T	

omdetect - Run the algorithm that looks for extended sources

omdetectminsignificance	no	float	3.	1.0:

omdetect- Minimum significance of a source to be included in the source-list file

omattusecat	no	boolean	T	

omatt - Use the USNO-SA 1 catalog for correcting the star positions

omattcatfile	no	string	usno-catalogue file	

File name of usno-catalogue fits file

omattrotateimage	no	boolean	T	

omatt - Create the rotated sky-image

ommosaicexposure	no	float	1000	

ommosaic- Exposure time (secs) for mosaiced image

ommosaicexposuremap	no	boolean	none	false

ommosaic- is the exposure map required to be saved in the output file

omsrclistcombnsigma	no	float	3.0	

omsrclistcomb- number of σ above which two sources are treated as different

omsrclistcombusecat	no	boolean	T	

omsrclistcomb - Use the USNO-SA 1 catalog for correcting the star positions NB Currently disabled

maxradecerr	no	real	1.0	

Maximum allowed RA/dec error in astrometry fit.

maxrmsres	no	real	1.5	

Maximum allowed rms residual in astrometry fit.

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 open SAS SUMMARY File *(fatal)*
The SAS summary file (ie the summary file produced by odfingest that contains a summary of the observations and odf data files) could not be opened, probably because it is not located in the directory where **omichain** expected it to be

Task Failure *(fatal)*
There has been a failure in the specified task, preventing the **omichain** from continuing

Unable to open inp_directory *(fatal)*
The specified input directory for the ODF files could not be opened, probably because it has been incorrectly specified

The ODF does NOT contain a Periodic Housekeeping file *(fatal)*
The **omichain** cannot proceed further because it needs to use information from the periodic housekeeping file

The ODF does NOT contain a Non-Periodic Housekeeping file *(fatal)*
The **omichain** cannot proceed further because it needs to use information from the non-periodic housekeeping file

6 Input Files

1. rrrr_iiiiiiiii_SCX00000SUM.SAS - SAS summary file- produced by odfingest
2. rrrr_iiiiiiiii_SCX00000NPH.FIT - OM Non-periodic Housekeeping file
3. rrrr_iiiiiiiii_SCX00000PEH.FIT - OM Periodic Housekeeping file
4. rrrr_iiiiiiiii_SCX00000TCS.FIT - Spacecraft time correlation file
5. rrrr_iiiiiiiii_SCX00000ATS.FIT - Spacecraft attitude history file
6. rrrr_iiiiiiiii_SCX00000RFX.FIT -

For each exposure to be processed there are also files:

1. rrrr_iiiiiiiii_OMSeeewwTHX.FIT - OM Tracking History Data Auxiliary file
2. rrrr_iiiiiiiii_OMSeeewwWDX.FIT - OM Priority Window Data Auxiliary file

where **rrrr** is the 4 digit XMM rev. number, **iiiiiiiii** is the 10 digit observation id, **eee** is the exposure number (e.g. 006 etc.), and **ww** is the window identifier (00 or 01).

If **THX**-file are not present, no tracking corrections can be applied but this is often not critical since XMM's tracking appears to be good to around 1 arc-second. If **THX** files are absent, a dummy file is created by *omprep*.

7 PPS Output Files

All product files begin with the letter **P**.

1. PPS PPS OSW Flatfield Image - eg P00700123700101X000FLAFLD0000.FIT
2. PPS Tracking History Plot PDF file - eg P0123700101OMS004TSHPLT0000.PDF
3. PPS Tracking History Plot postscript file - eg P0123700101OMS004TSHPLT0000.ps
4. PPS Track Star Time Series (fits file)- eg P0123700101OMS004TSTRTS0000.FIT
5. PPS OSW Image (unrotated) (fits file) - eg P0123700101OMS004IMAGE_2000.FIT
6. PPS OSW Sky-coord Image (rotated) (fits file) - eg P0123700101OMS004SIMAGE2000.FIT
7. PPS OSW Sky Source List (fits file) - eg P0123700101OMS005SWSRLI2000.FIT
8. PPS Observation Sky Source List (fits file) - eg P0123700101OMS000OBSMLI0000.FIT
9. PPS Composite images for each filter (fits file) - eg P0123700101OMSXXSIMAGE2000.FIT, where XX=UB for U filter, BB for B filter, VB for V filter, WL for WHITE (unfiltered), W1 for UVW1, M2 for UVM2 and W2 for UVW2.

8 Intermediate Output Files

All intermediate files begin with the letter **I**.

1. Intermediate tracking-history file (fits file) - eg I0000110101OMS004TRHIS0000.FIT
2. Intermediate image file produced by omprep (fits file) - eg I0000110101OMS004IMAGE10000.FIT
3. Intermediate image file produced by omflatfield (fits file) - eg I0000110101OMS004IMAGE20000.FIT
4. Intermediate flat-field image file produced by omflatfield (fits file) - eg I0000110101OMS004FLATF0000.FIT
5. Intermediate mod-8 image file produced by ommodmap (fits file) - eg I0000110101OMS004MOD80000.FIT
6. Intermediate level-image file produced by omdetect (fits file) - eg I0000110101OMS004LEVEL80000.FIT
7. Intermediate source-list file produced by omdetect (fits file) - eg I0000110101OMS004LEVEL80000.FIT
8. Intermediate region file produced by omdetect (ascii file) - eg I0000110101OMS004REGION0000.ASC
9. For engineering-2 mode data, the four image segments are combined into a composite image by omcomb (fits file, eg I0135720601OMS01700E2I.FIT) which is then processed in the normal way.

9 Running The Pipeline

The location of the ODF files is specified by either setting the environment variable SAS_ODF (setenv SAS_ODF directory_path), or by specifying the input directory (omfchain inpdirectory=directory path), or by setting the environment variable SAS_ODF to a SAS summary file. For the latter, the omichain will extract the directory path from the SAS summary file.

1. Use command 'omichain' to process the ODF data set in the current directory or to where SAS_ODF has been set to, and to place the product files in the current directory.
2. Use command 'omichain inpdirectory=input-directory-path' to process the OM ODF data set in the specified directory, and to place the product files in the current directory.
3. Use command 'omichain outdirectory=output-directory-path' to process the ODF data set in the current directory or to where SAS_ODF has been set to, and to place the output files in the specified directory.
4. Use command 'omichain inpdirectory=input-directory-path outdirectory=output-directory-path' to specify both the location of the ODF data set and the directory where the product files are to be placed.

10 Comments

- Pipeline product filenames have the extensions '.ps', '.PDF' and '.FIT'

11 Future developments

Presently, the tabulated source positions suffer from an unknown offset in RA and declination, which could be up to 10 arcsecs or more. The program omatt, which calculates the equatorial coordinates of the sources, can in fact calculate these offsets and correct the positions, but only if it has access to a star catalogue. Unfortunately, at present no catalogue is available and hence no correction can be applied. It is expected that in the near future a catalogue will be provided with each ODF set, enabling an astrometric correction to be made.

References