



### Workflow Instructions

- To run this workflow on the demo data:
- Turn on highlighting. Choose "Tools"-> "Animate at Runtime" from top menu and set it to "1".
  - Press the "Run" button OR `ctrl-R` to start the workflow.
- To run on a different data set:
- Click on `ROOT_DATA_DIR` and set as appropriate.
  - All subdirectories of `RAWDATA_DIR` will be searched for data.
  - If desired, change `END_PRODUCTS_DIR`.
  - Press the "Run" button OR `ctrl-R` to start the workflow.
- To monitor the progress of the workflow:
- Open "Window" -> "Runtime" to see the progress of the workflow.
  - Starting the workflow will create a new window for the workflow.
  - The "Loading File" has to be removed manually.

### Setup Directories

Input:

- `ROOT_DATA_DIR: /home/freudl/eflex/data/`
- `RAWDATA_DIR: $ROOT_DATA_DIR/eflex_input/lives_blue`

Working Directories:

- `BOOKKEEPING_DIR: $ROOT_DATA_DIR/eflex_book_keeping/lives_blue`
- `LOGS_DIR: $ROOT_DATA_DIR/eflex_logs/lives_blue`
- `TMP_PRODUCTS_DIR: $ROOT_DATA_DIR/eflex_tmp_products/lives_blue`

Output:

- `END_PRODUCTS_DIR: /home/freudl/eflex_end_products/lives_blue`

### Global Parameters

= actor with interactive option

- `FILE_VIEWER: fv` File viewer to use for the inspection of input/output products
- `ESORxdebug: --suppress-prefix=TRUE` esorex arguments
- `baseDir: false` Change "baseDir" to true to enable BOOKKEEPING\_DIR, TMP\_PRODUCTS\_DIR and LOGS\_DIR. When the workflow is run Lazy Made won't work anymore. This is set automatically
- `clean_files_after_run: true` This is set automatically

# Doing your own data reduction – pipelines at ESO

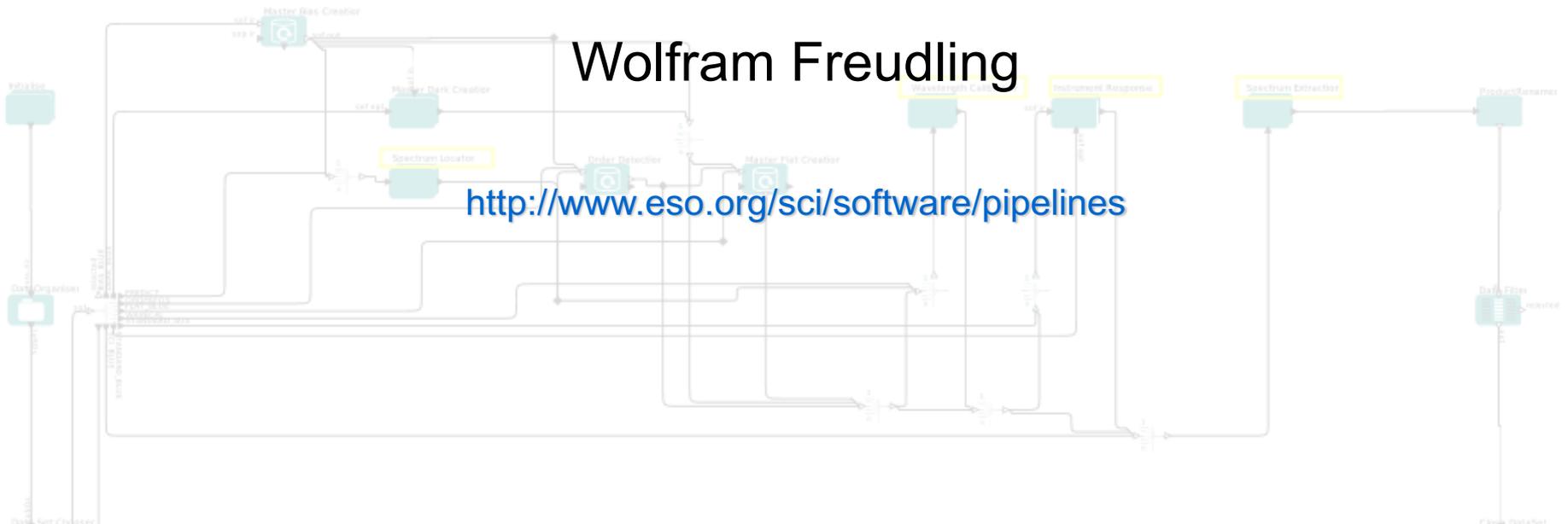
Step 1: Data Organisation and Selection

Step 2: Creation of Master Calibration Files

Step 3: Wavelength and Response Calibration

Step 4: Spectrum Extraction

Step 5: Output Organisation



Wolfram Freudling

<http://www.eso.org/sci/software/pipelines>





# What is Data Reduction and why should I worry about it?

Workflow Instructions

Setup Directories

Global Parameters

= actor with interactive option

To run this workflow on the demo data:  
- Turn on highlighting. Choose "Tools" -> "Animate at Runtime" from top menu and set it to "1".  
- Press the "Run" button OR ctrl-R to start the workflow.

Input:

\*ROOT\_DATA\_DIR: /home/efrost/keck/data  
\*SANDATA\_DIR: /ROOT\_DATA\_DIR/keck/keck\_data

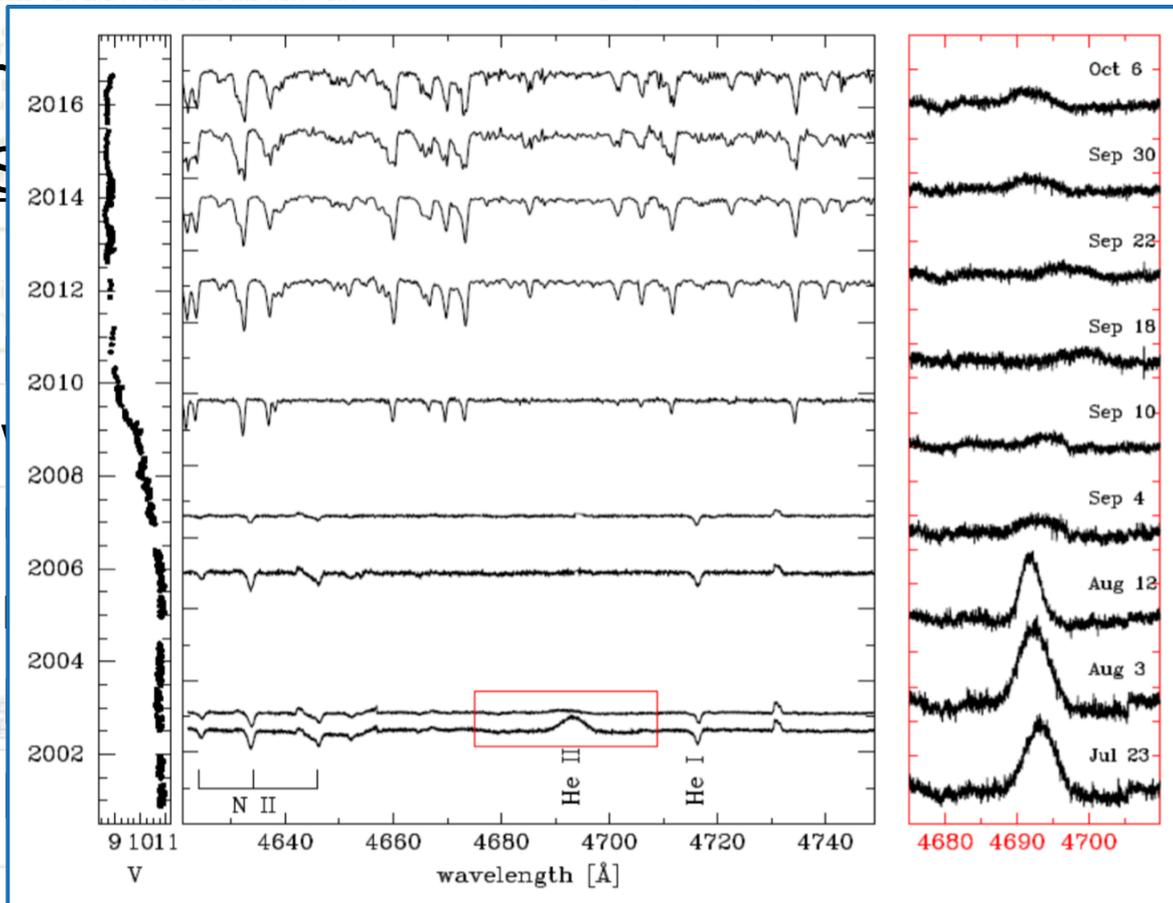
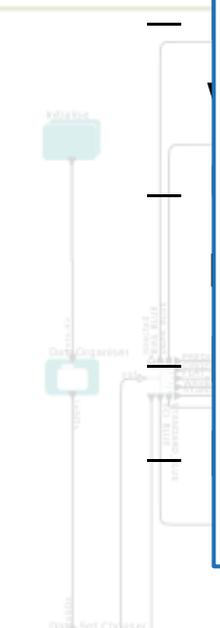
\*PDS\_VIEWER: tv

This viewer is used for the inspection of input/output products

To run on a different...  
- Click on ROOT\_DATA\_DIR  
- If required, click on SANDATA\_DIR  
- Press the "Run" button

To monitor the progress...  
- Open "Window" menu  
- Select "Monitoring"

Step 1: Data Organisation and Selection

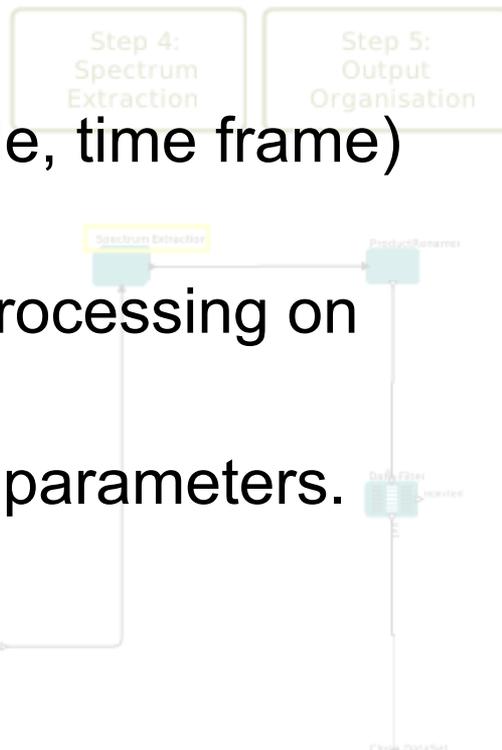


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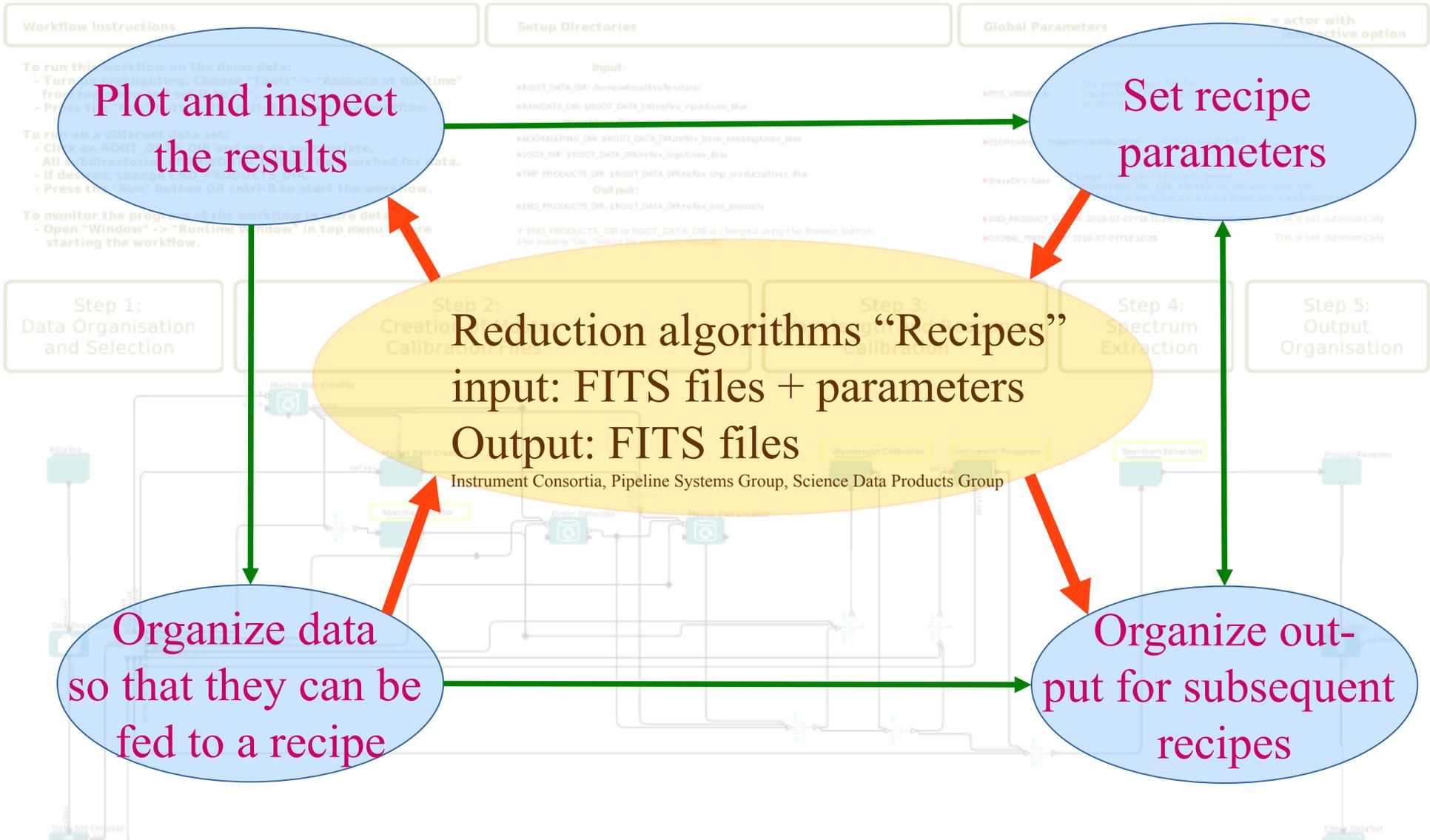
rocessing on

parameters.





# ESO Data Reduction System



## Workflow Instructions

To run this workflow on the demo data:

- Turn on highlighting. Choose "Tools"-> "Animate at Runtime" from top menu and set it to "1".
- Press the "Run" button OR cntrl-R to start the workflow.

To run on a different data set:

- Click on ROOT\_DATA\_DIR and set as appropriate. All subdirectories of RAW\_DATA\_DIR will be searched for data.
- If desired, change END\_PRODUCTS\_DIR.
- Press the "Run" button OR cntrl-R to start the workflow.

To monitor the progress of the workflow in more detail:

- Open "Window" -> "Runtime Window" in top menu before starting the workflow.

## Setup Directories

- ROOT\_DATA\_DIR: /sdp\_test\_data/mmeeser/eso-pipelines/data\_wkf/

### Input:

- RAW\_DATA\_DIR: \$ROOT\_DATA\_DIR/reflex\_input/hawki
- CALIB\_DATA\_DIR: /sdp\_test\_data/mmeeser/eso-pipelines/hawki-2.4.1/calib/ha...
- TWOMASS\_CATALOGUE\_DIR:
- PPMXL\_CATALOGUE\_DIR:
- LOCAL\_CATALOGUE\_DIR:

None of the directories below should be a subdirectory of RAW\_DATA\_DIR or CALIB\_DATA\_DIR

### Output:

- END\_PRODUCTS\_DIR: \$ROOT\_DATA\_DIR/reflex\_end\_products
- BOOKKEEPING\_DIR: \$ROOT\_DATA\_DIR/reflex\_book\_keeping/hawki
- LOGS\_DIR: \$ROOT\_DATA\_DIR/reflex\_logs/hawki
- TMP\_PRODUCTS\_DIR: \$ROOT\_DATA\_DIR/reflex\_tmp\_products/hawki
- BOOKKEEPING\_DB: \$BOOKKEEPING\_DIR/bookkeeping.db

### Working Directories:

- BOOKKEEPING\_DIR: \$ROOT\_DATA\_DIR/reflex\_book\_keeping/hawki
- LOGS\_DIR: \$ROOT\_DATA\_DIR/reflex\_logs/hawki
- TMP\_PRODUCTS\_DIR: \$ROOT\_DATA\_DIR/reflex\_tmp\_products/hawki
- BOOKKEEPING\_DB: \$BOOKKEEPING\_DIR/bookkeeping.db

## Catalogue Selection

Select catalogues (on local machine and/or CDS search). Input values must be within the allowed ranges; at least one photometric and one astrometric valid catalogues must be provided (either from local machine or for CDS search). If these criteria are not fulfilled, the workflow will stop. No check is done beforehand.

- ASTROM\_CATALOGUE: 1 Select catalogues on local machine
- PHOTOM\_CATALOGUE: 0 0: 2MASS; 1: PPMXL; 2: LOCAL
- CDS ASTROMETRIC CATALOGUE: wise CDS astrometric catalogue, <none | 2mass | usnob | ppmxl | wise>
- CDS PHOTOMETRIC CATALOGUE: 2mass CDS photometric catalogue, <none | 2mass | ppmxl | wise>

## Global Parameters

  = actor with interactive option

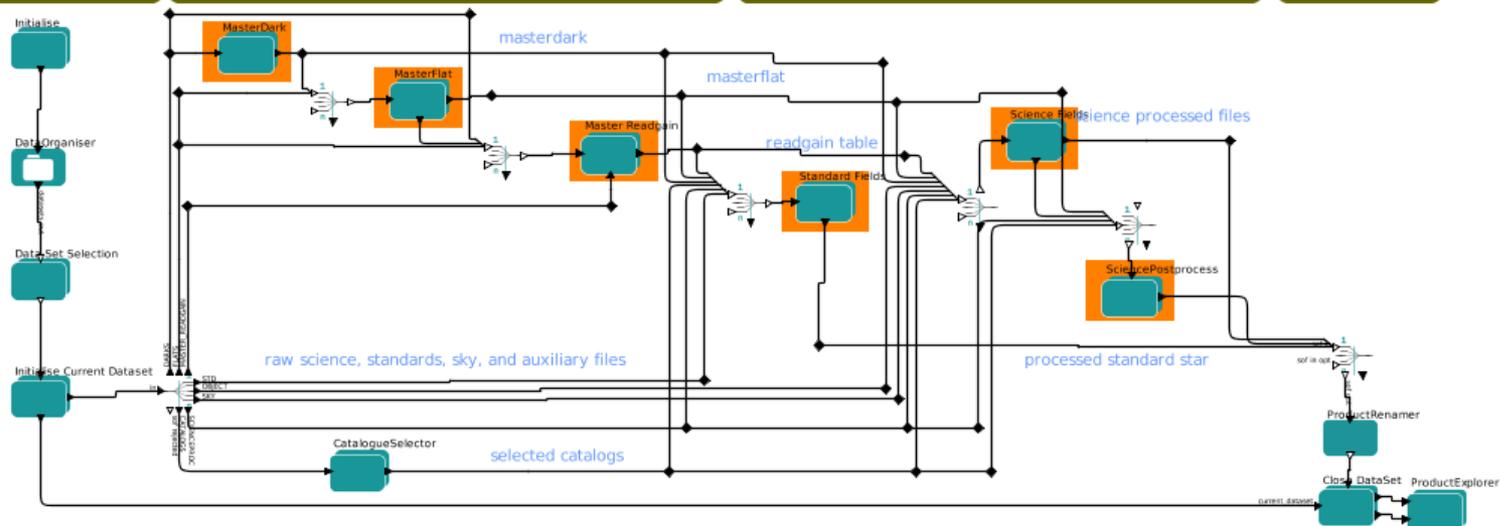
- RecipeFailureMode: Ask Global parameter for the behaviour when a recipe fails. 'Ask' means that each time a recipe fails, the choice to continue or stop will be presented. 'Continue' means that the workflow will ignore errors and continue. 'Stop' means the workflow will stop.
- EraseDirs: false Change "EraseDirs" to 'true' to erase BOOKKEEPING\_DIR, TMP\_PRODUCTS\_DIR and LOGS\_DIR each time the workflow is run (Lazy Mode will not work anymore)
- FITS\_VIEWER: fv Program to use for the inspection of input/output products. Use full path name if it is not in the standard path.
- GlobalPlotInteractivity: true Set to "false" to disable interactive GUIs for the whole workflow. Each interactive actor can specify its own setting, which overwrites the choice given here.
- SelectDatasetMethod: Interactive Specify how datasets for processing are selected ("All", "New" = never tried before, "Reduced" = successfully run before, "Failed"=unsuccessfully run before), or set to "interactive" for interactive selection.
- ProductExplorerMode: Triggered Specify when you want to see the ProductExplorer GUI. "Triggered" = show it after all data sets have been reduced. "Enabled" = show it after each dataset. "Disabled" = never show it
- Compute readgain table: false true: compute the readgain table from raw frames in the dataset. false: uses the readgain table from static calibrations. Default: false.

## Step 1: Data Organisation and Selection

## Step 2: Creation of Master Calibration Files

## Step 3: Standard Star and Science Images Reduction

## Step 4: Output Organisation



Auxiliary and debug parameters, please do not change: ● GLOBAL\_TIMESTAMP: 2016-11-21T11:50:29 ● ESORexArgs: --suppress-prefix=TRUE ● END\_PRODUCTS\_SUBDIR: 2016-02-18T15:55:12/HAWKI2008-11-18T00:22:15.321\_tpl ● N\_SELECTED\_DATASETS: 1



# FORS Workflow For Imaging Data (v. 5.1.4)

## Workflow Instructions

To run this workflow on the demo data:

- Turn on highlighting. Choose "Tools"--> "Animate at Runtime" from top menu and set it to "1".
- Press the "Run" button OR cntrl-R to start the workflow.

To run on a different data set:

- Click on RAW\_DATA\_DIR and set as appropriate. All subdirectories of RAW\_DATA\_DIR will be searched for data.
- If desired, change END\_PRODUCTS\_DIR.
- IMPORTANT: END\_PRODUCTS\_DIR should not be a subdirectory of the RAW\_DATA\_DIR, otherwise it will be searched for raw data!
- Press the "Run" button OR cntrl-R to start the workflow.

The general concepts of Reflex are described in Astron. Astrophys., 559, A96. Please credit this paper in publications on research that used Reflex.

Workflow tutorial and Fors pipeline manual can be found here: [http://www.eso.org/sci/software/pipelines/#reflex\\_workflows](http://www.eso.org/sci/software/pipelines/#reflex_workflows)

## Setup Directories

### Input:

- ROOT\_DATA\_DIR: \$HOME/reflex\_data/
- RAW\_DATA\_DIR: /opt/local/share/esopipes/datademo/fors/
- CALIB\_DATA\_DIR: /opt/local/share/esopipes/datastatic/fors-5.1.4/

Only change CALIB\_DATA\_DIR if you do NOT want to use the calibration data delivered with the pipeline:

### Output:

- END\_PRODUCTS\_DIR: \$ROOT\_DATA\_DIR/reflex\_end\_products

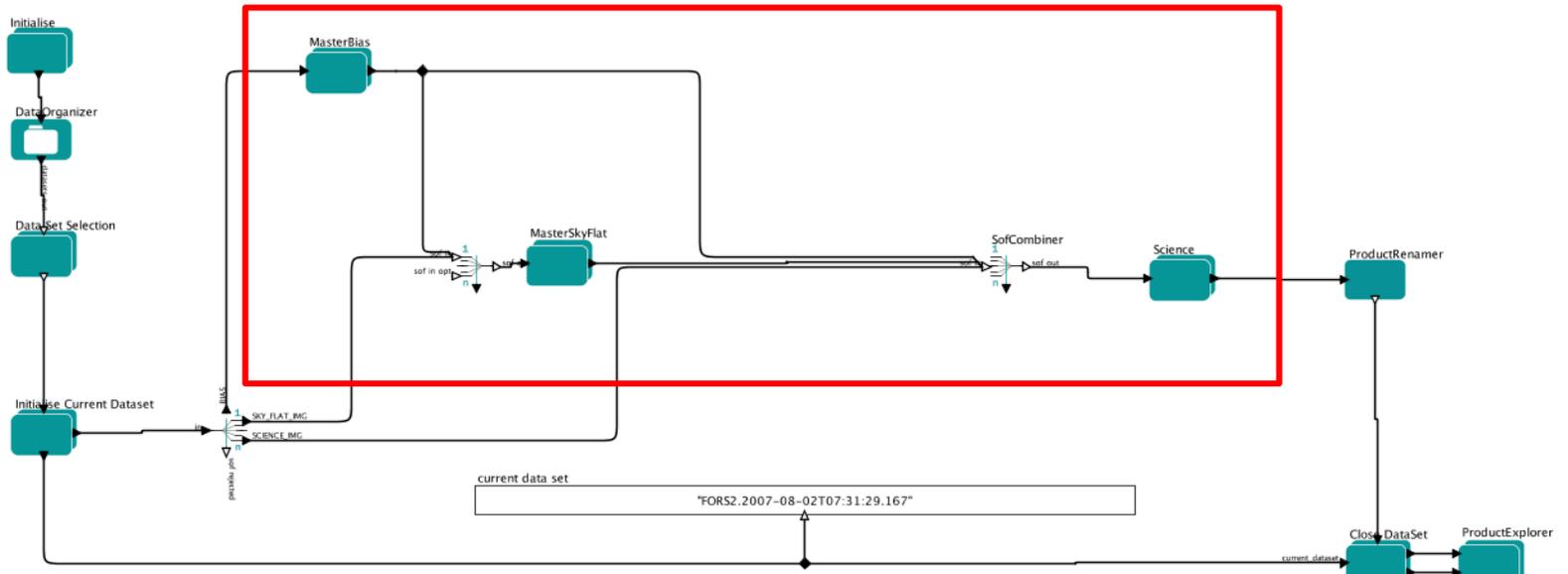
### Working Directories:

- BOOKKEEPING\_DIR: \$ROOT\_DATA\_DIR/reflex\_book\_keeping/fors-ima
- LOGS\_DIR: \$ROOT\_DATA\_DIR/reflex\_logs/fors-ima
- TMP\_PRODUCTS\_DIR: \$ROOT\_DATA\_DIR/reflex\_tmp\_products/fors-ima
- BOOKKEEPING\_DB: \$BOOKKEEPING\_DIR/bookkeeping.db

## Global Parameters

= actor with interactive option

- RecipeFailureMode: Ask  
Global parameter for the behaviour when a recipe fails. 'Ask' means that each time a recipe fails, the choice to continue or stop will be presented. 'Continue' means that the workflow will ignore errors and continue. 'Stop' means the workflow will stop.  
Change "EraseDirs" to 'true' to erase BOOKKEEPING\_DIR, TMP\_PRODUCTS\_DIR and LOGS\_DIR each time the workflow is run (Lazy Mode will not work anymore)
- EraseDirs: false
- FITS\_VIEWER: fv  
Program to use for the inspection of input/output products. Use full path name if it is not in the standard path.
- GlobalPlotInteractivity: true  
Set to "false" to disable interactive GUIs for the whole workflow. Each interactive actor can specify its own setting, which overwrites the choice given here.
- SelectDataSetMethod: Interactive  
Specify how datasets for processing are selected ("All", "New" = never tried before, "Reduced" = successfully run before, "Failed"=unsuccessfully run before), or set to "Interactive" for interactive selection.
- ProductExplorerMode: Triggered  
Specify when you want to see the ProductExplorer GUI. "Triggered" = show it after all data sets have been reduced. "Enabled" = show it after each dataset. "Disabled" = never show it



# FORS Workflow For Imaging Data (v. 5.1.4)

## Workflow Instructions

To run this workflow on the demo data:

- Turn on highlighting. Choose "Tools"-> "Animate at Runtime" from top menu and set it to "1".
- Press the "Run" button OR ctrl-R to start the workflow.

To run on a different data set:

- Click on RAW\_DATA\_DIR and set as appropriate. All subdirectories of RAW\_DATA\_DIR will be searched for data.
- If desired, change END\_PRODUCTS\_DIR.
- IMPORTANT: END\_PRODUCTS\_DIR should not be a subdirectory of the RAW\_DATA\_DIR, otherwise it will be searched for raw data!
- Press the "Run" button OR ctrl-R to start the workflow.

The general concepts of Reflex are described in Astron. Astrophys., 559, A96. Please credit this paper in publications on research that used Reflex.

Workflow tutorial and Fors pipeline manual can be found here: [http://www.eso.org/sci/software/pipelines/#reflex\\_workflows](http://www.eso.org/sci/software/pipelines/#reflex_workflows)

## Setup Directories

### Input:

- ROOT\_DATA\_DIR: \$HOME/reflex\_data/
  - RAW\_DATA\_DIR: /opt/local/share/esopipes/datademo/fors/
- Only change CALIB\_DATA\_DIR if you do NOT want to use the calibration data delivered with the pipeline:
- CALIB\_DATA\_DIR: /opt/local/share/esopipes/datademo/fors-5.1.4/

### Output:

- END\_PRODUCTS\_DIR: \$ROOT\_DATA\_DIR/reflex\_end\_products

### Working Directories:

- BOOKKEEPING\_DIR: \$ROOT\_DATA\_DIR/reflex\_book\_keeping/fors-ima
- LOGS\_DIR: \$ROOT\_DATA\_DIR/reflex\_logs/fors-ima
- TMP\_PRODUCTS\_DIR: \$ROOT\_DATA\_DIR/reflex\_tmp\_products/fors-ima
- BOOKKEEPING\_DB: \$BOOKKEEPING\_DIR/bookkeeping.db

## Global Parameters



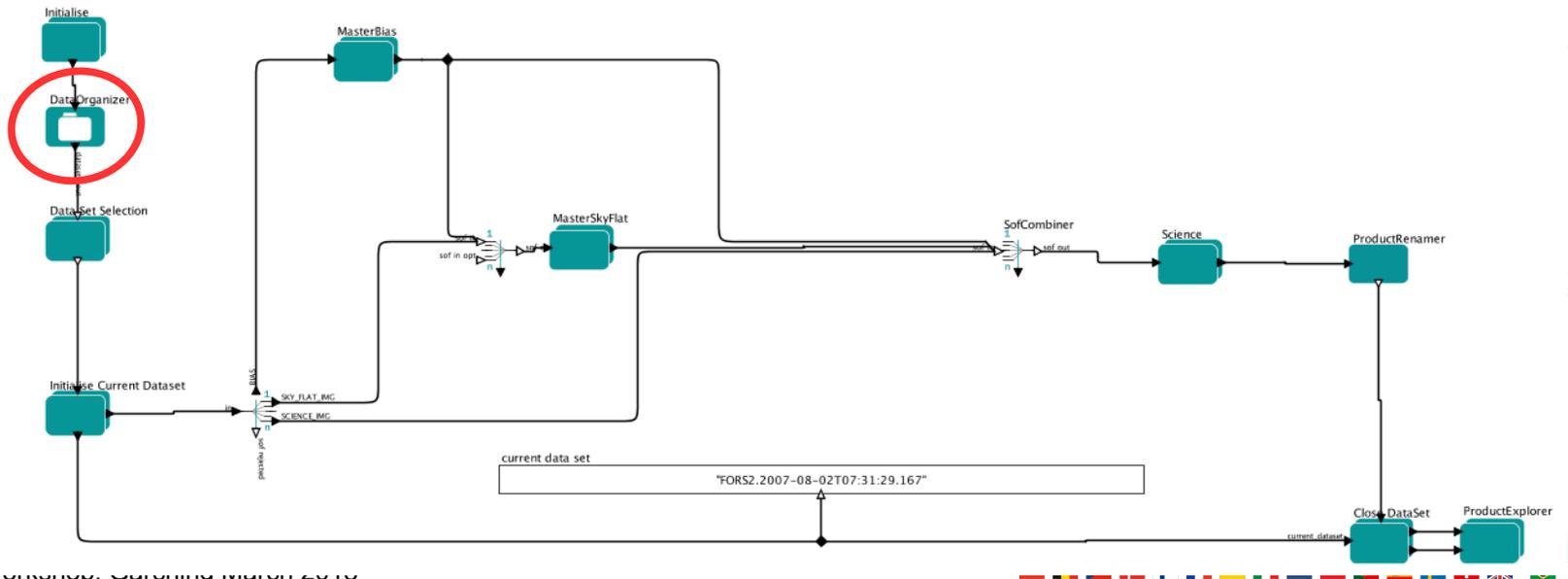
- RecipeFailureMode: Ask  
Global parameter for the behaviour when a recipe fails. 'Ask' means that each time a recipe fails, the choice to continue or stop will be presented. 'Continue' means that the workflow will ignore errors and continue. 'Stop' means the workflow will stop.
- EraseDirs: false  
Change "EraseDirs" to 'true' to erase BOOKKEEPING\_DIR, TMP\_PRODUCTS\_DIR and LOGS\_DIR each time the workflow is run (Lazy Mode will not work anymore)
- FITS\_VIEWER: fv  
Program to use for the inspection of input/output products. Use full path name if it is not in the standard path.
- GlobalPlotInteractivity: true  
Set to "false" to disable interactive GUIs for the whole workflow. Each interactive actor can specify its own setting, which overwrites the choice given here.
- SelectDataSetMethod: Interactive  
Specify how datasets for processing are selected ("All", "New" = never tried before, "Reduced" = successfully run before, "Failed"=unsuccessfully run before), or set to "Interactive" for interactive selection.
- ProductExplorerMode: Triggered  
Specify when you want to see the ProductExplorer GUI. "Triggered" = show it after all data sets have been reduced. "Enabled" = show it after each dataset. "Disabled" = never show it

## Step 1: Data Organisation and Selection

## Step 2: Creation of Master Calibration Files

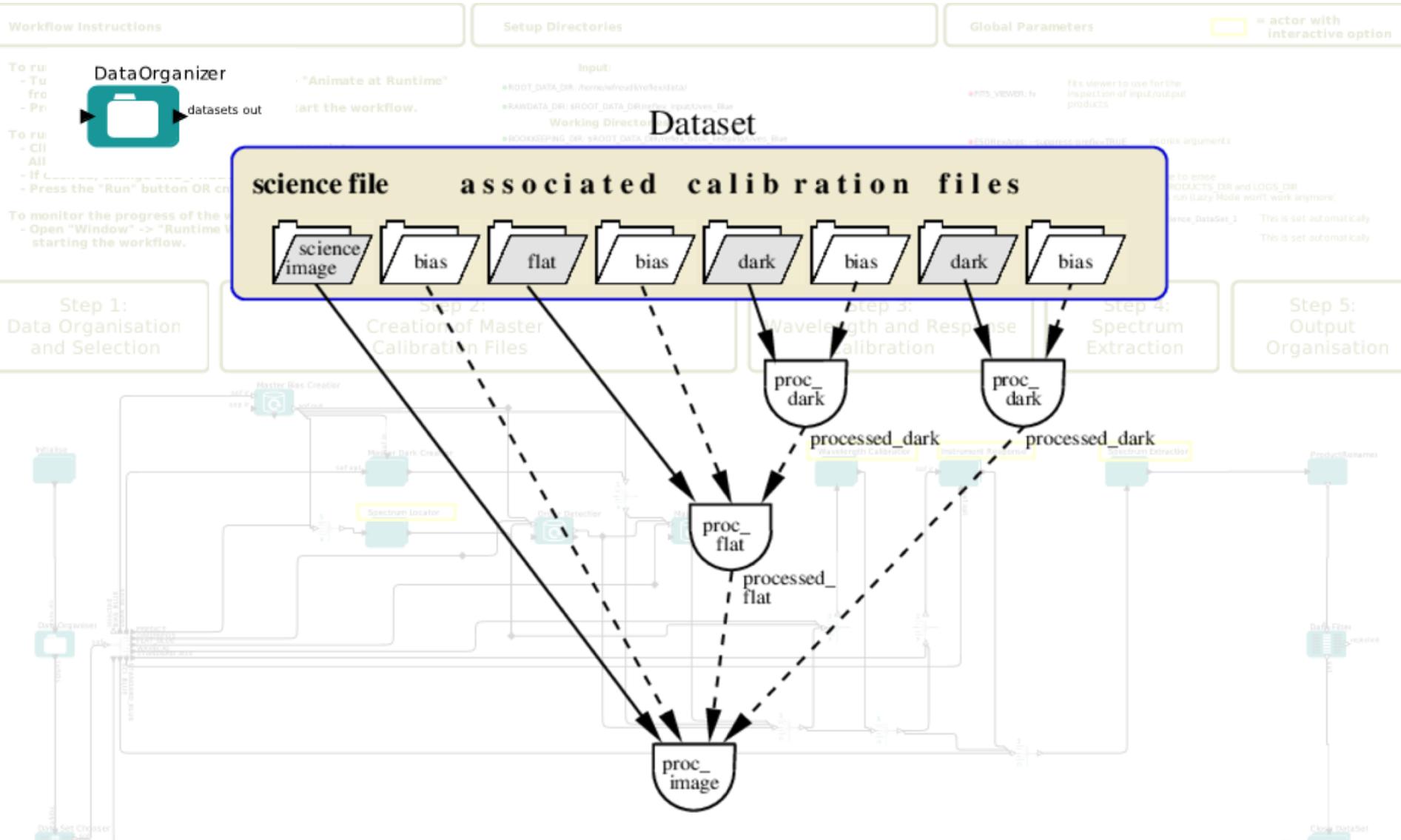
## Step 3: Science Reduction

## Step 4: Output Organisation





# Data Organisation





# OCA Rules

The screenshot shows the DataOrganizer interface with three main sections: 'Workflow Instructions', 'Setup Directories', and 'Global Parameters'. The 'Workflow Instructions' section includes a 'DataOrganizer' icon and text about running the workflow. The 'Setup Directories' section lists input and output paths. The 'Global Parameters' section lists various configuration options like 'ESORedops' and 'BaseDir'.

- Processing steps imply Data organization

- Data organisation defined in “OCA rules”: text file

- Three types of rules:

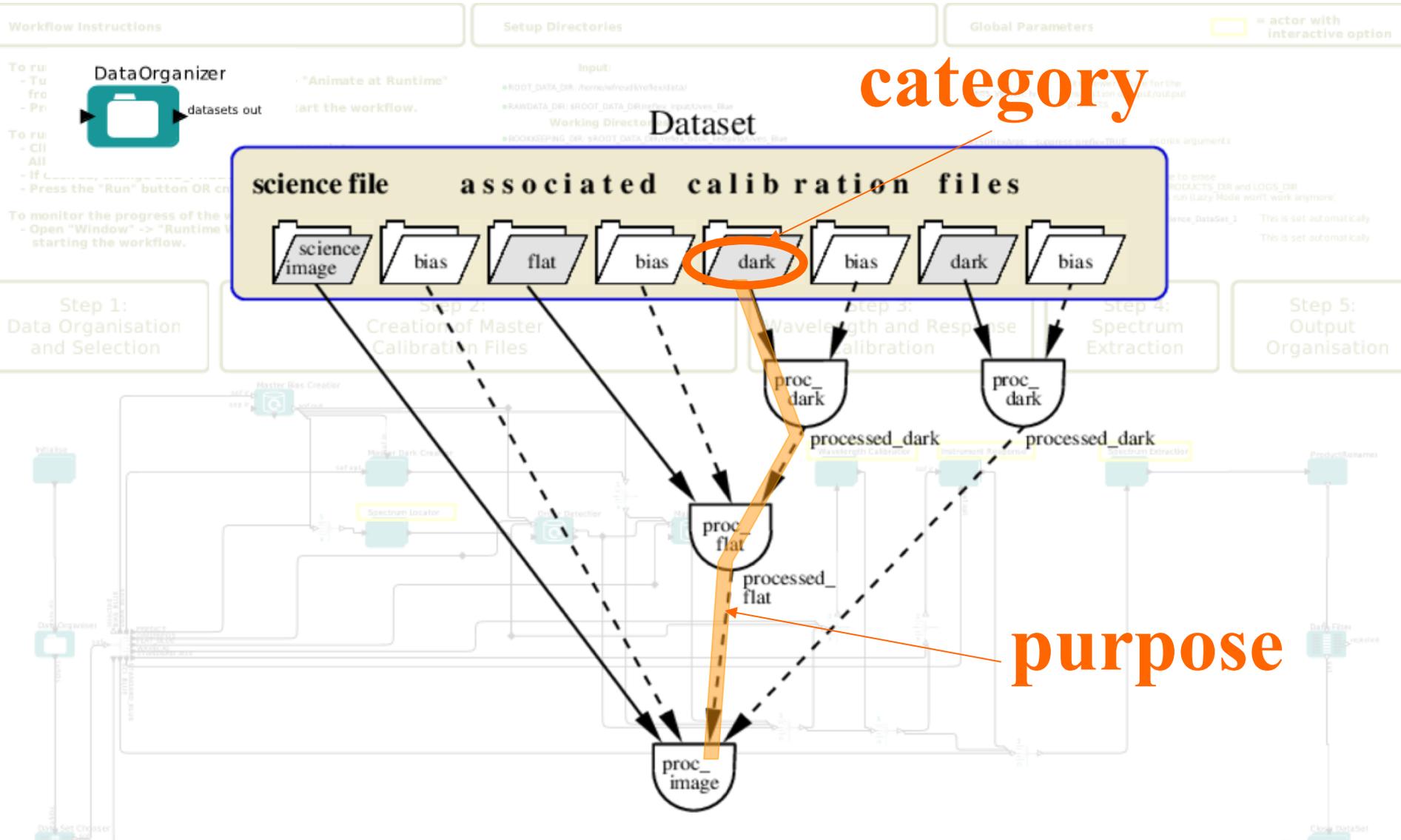
- Classification („This is a **Raw Dark**“)
- Organization („These **Raw Darks** are processed together“)
- Association (“select **Biases** based on properties of **Raw Darks**“)

- DO produces DataSets: set of science files that are processed together, plus all additional files that are needed for processing

- Each file in DataSet has a **category** (e.g. “raw bias”) and a **purpose** action1/action2/... (e.g. „MasterBias/MasterDark“)



# Data Organisation



# FORS Workflow For Imaging Data (v. 5.1.4)

## Workflow Instructions

To run this workflow on the demo data:

- Turn on highlighting. Choose "Tools"-> "Animate at Runtime" from top menu and set it to "1".
- Press the "Run" button OR cntrl-R to start the workflow.

To run on a different data set:

- Click on RAW\_DATA\_DIR and set as appropriate. All subdirectories of RAW\_DATA\_DIR will be searched for data.
- If desired, change END\_PRODUCTS\_DIR.
- IMPORTANT: END\_PRODUCTS\_DIR should not be a subdirectory of the RAW\_DATA\_DIR, otherwise it will be searched for raw data!**
- Press the "Run" button OR cntrl-R to start the workflow.

The general concepts of Reflex are described in Astron. Astrophys., 559, A96. Please credit this paper in publications on research that used Reflex.

Workflow tutorial and Fors pipeline manual can be found here: [http://www.eso.org/sci/software/pipelines/#reflex\\_workflows](http://www.eso.org/sci/software/pipelines/#reflex_workflows)

## Setup Directories

### Input:

- ROOT\_DATA\_DIR: \$HOME/reflex\_data/
- RAW\_DATA\_DIR: /opt/local/share/esopipes/datademo/fors/
  - Only change CALIB\_DATA\_DIR if you do NOT want to use the calibration data delivered with the pipeline:
- CALIB\_DATA\_DIR: /opt/local/share/esopipes/datastatic/fors-5.1.4/

### Output:

- END\_PRODUCTS\_DIR: \$ROOT\_DATA\_DIR/reflex\_end\_products

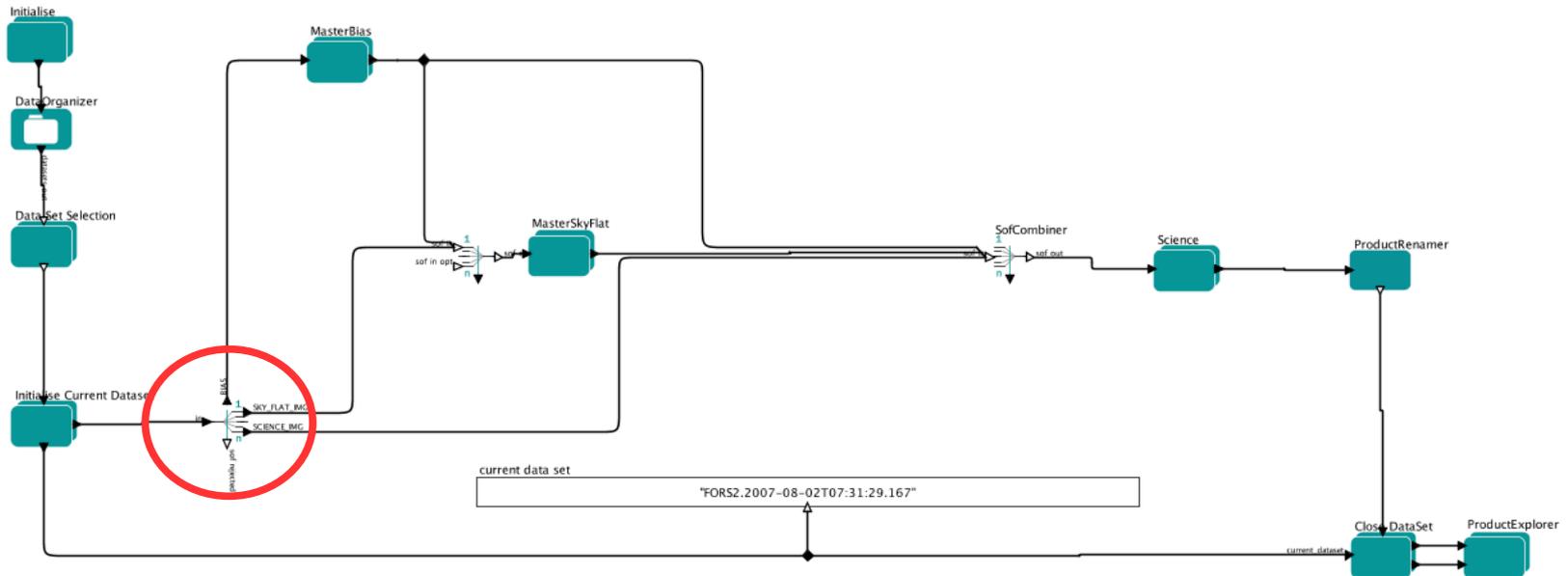
### Working Directories:

- BOOKKEEPING\_DIR: \$ROOT\_DATA\_DIR/reflex\_book\_keeping/fors-ima
- LOGS\_DIR: \$ROOT\_DATA\_DIR/reflex\_logs/fors-ima
- TMP\_PRODUCTS\_DIR: \$ROOT\_DATA\_DIR/reflex\_tmp\_products/fors-ima
- BOOKKEEPING\_DB: \$BOOKKEEPING\_DIR/bookkeeping.db

## Global Parameters

= actor with interactive option

- RecipeFailureMode: Ask  
Global parameter for the behaviour when a recipe fails. 'Ask' means that each time a recipe fails, the choice to continue or stop will be presented. 'Continue' means that the workflow will ignore errors and continue. 'Stop' means the workflow will stop.  
Change "EraseDirs" to 'true' to erase BOOKKEEPING\_DIR, TMP\_PRODUCTS\_DIR and LOGS\_DIR each time the workflow is run (Lazy Mode will not work anymore)
- EraseDirs: false
- FITS\_VIEWER: fv  
Program to use for the inspection of input/output products. Use full path name if it is not in the standard path.
- GlobalPlotInteractivity: true  
Set to "false" to disable interactive GUIs for the whole workflow. Each interactive actor can specify its own setting, which overwrites the choice given here.
- SelectDataSetMethod: Interactive  
Specify how datasets for processing are selected ("All", "New" = never tried before, "Reduced" = successfully run before, "Failed"=unsuccessfully run before), or set to "Interactive" for interactive selection.
- ProductExplorerMode: Triggered  
Specify when you want to see the ProductExplorer GUI. "Triggered" = show it after all data sets have been reduced. "Enabled" = show it after each dataset. "Disabled" = never show it





# FITS Router sorting by category

Workflow Instructions

To run this workflow on the demo data:  
- Turn on highlighting. Choose "Tools" -> "Animate at frame" from top menu and set it to "1".  
- Press the "Run" button OR ctrl-R to start the workflow.  
To run on a different data set:  
- Click on ROOT\_DATA\_DIR and set as appropriate.  
- All subdirectories of RAWDATA\_DIR will be searched for data.  
- If desired, you can also specify a list of files to be processed in the workflow.  
To monitor:  
- Open "Workflow" in more detail:  
- Press the "Start" button in top menu before starting

Setup Directories

Input:  
• ROOT\_DATA\_DIR: /home/efox/efox/data  
• RAWDATA\_DIR: \$ROOT\_DATA\_DIR/raw/epic/epic\_data  
Working Directories:  
• TMP\_PRODUCTS\_DIR: \$ROOT\_DATA\_DIR/products/tmp\_products\_dir  
• LOGS\_DIR: \$ROOT\_DATA\_DIR/logs  
If TMP\_PRODUCTS\_DIR or ROOT\_DATA\_DIR is changed using the Browse button, the leading file has to be removed manually.

Global Parameters

• FITS\_VIEWER: fv  
File viewer to use for the inspection of input/output products  
• baseDir: false  
Change "baseDir" to true to enable SCIENCE\_PATH, DIR, TMP\_PRODUCTS\_DIR and LOGS\_DIR each time the workflow is run (Lazy Mode won't work anymore).  
• IMG\_PRODUCT\_SUBDIR: 2010-07-07T18:10:29/Science\_DataSet\_1  
This is set automatically  
• GLOBAL\_TIMESTAMP: 2010-07-07T18:10:29  
This is set automatically

= actor with interactive option

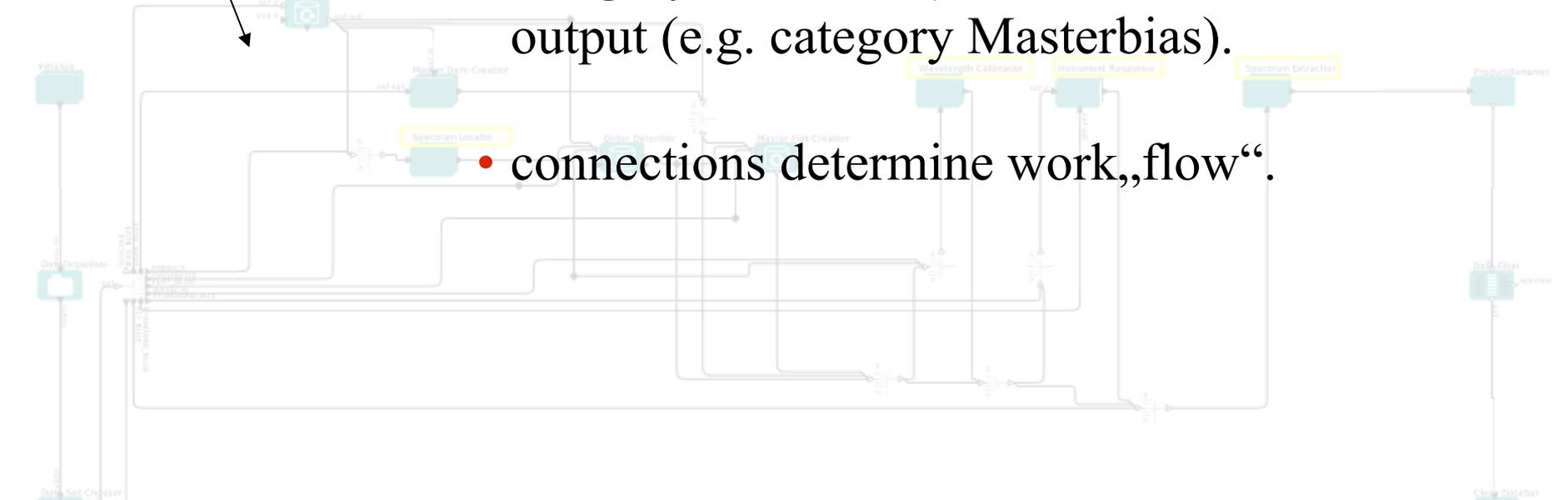
Step 1: Data Organisation and Selection

Step 2: Creation of Master Calibration Files

Step 3: Mastering and Response Calibration

Step 4: Extraction

Step 5: Output Organisation



- routing by category is explicit: specify what recipe needs

- each recipe needs well defined input (e.g. category raw biases) and creates well defined output (e.g. category Masterbias).

- connections determine work,,flow“.



# FORS Workflow For Imaging Data (v. 5.1.4)

## Workflow Instructions

To run this workflow on the demo data:

- Turn on highlighting. Choose "Tools"-> "Animate at Runtime" from top menu and set it to "1".
- Press the "Run" button OR cntrl-R to start the workflow.

To run on a different data set:

- Click on RAW\_DATA\_DIR and set as appropriate. All subdirectories of RAW\_DATA\_DIR will be searched for data.
- If desired, change END\_PRODUCTS\_DIR.
- IMPORTANT: END\_PRODUCTS\_DIR should not be a subdirectory of the RAW\_DATA\_DIR, otherwise it will be searched for raw data!
- Press the "Run" button OR cntrl-R to start the workflow.

The general concepts of Reflex are described in Astron. Astrophys., 559, A96. Please credit this paper in publications on research that used Reflex.

Workflow tutorial and Fors pipeline manual can be found here: [http://www.eso.org/sci/software/pipelines/#reflex\\_workflows](http://www.eso.org/sci/software/pipelines/#reflex_workflows)

## Setup Directories

### Input:

- ROOT\_DATA\_DIR: \$HOME/reflex\_data/
  - RAW\_DATA\_DIR: /opt/local/share/esopes/datademo/fors/
- Only change CALIB\_DATA\_DIR if you do NOT want to use the calibration data delivered with the pipeline:
- CALIB\_DATA\_DIR: /opt/local/share/esopes/datastatic/fors-5.1.4/

### Output:

- END\_PRODUCTS\_DIR: \$ROOT\_DATA\_DIR/reflex\_end\_products

### Working Directories:

- BOOKKEEPING\_DIR: \$ROOT\_DATA\_DIR/reflex\_book\_keeping/fors-ima
- LOGS\_DIR: \$ROOT\_DATA\_DIR/reflex\_logs/fors-ima
- TMP\_PRODUCTS\_DIR: \$ROOT\_DATA\_DIR/reflex\_tmp\_products/fors-ima
- BOOKKEEPING\_DB: \$BOOKKEEPING\_DIR/bookkeeping.db

## Global Parameters



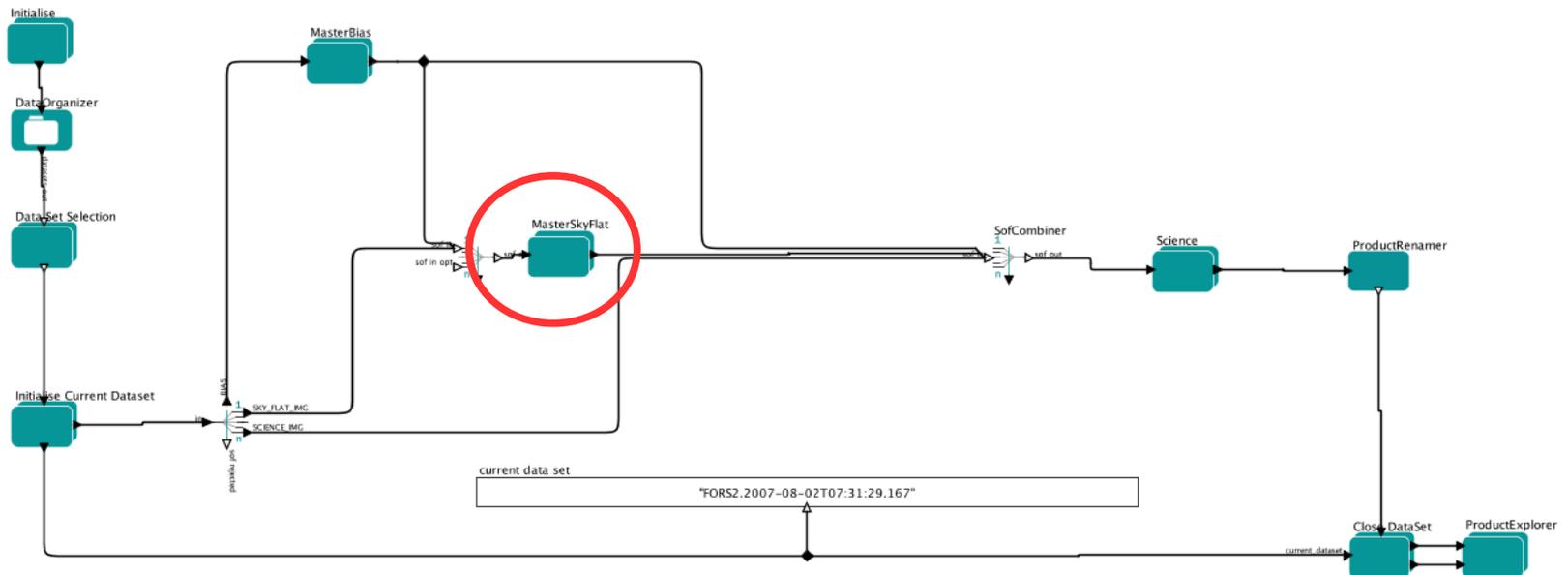
- RecipeFailureMode: Ask  
Global parameter for the behaviour when a recipe fails. 'Ask' means that each time a recipe fails, the choice to continue or stop will be presented. 'Continue' means that the workflow will ignore errors and continue. 'Stop' means the workflow will stop.
- EraseDirs: false  
Change "EraseDirs" to 'true' to erase BOOKKEEPING\_DIR, TMP\_PRODUCTS\_DIR and LOGS\_DIR each time the workflow is run (Lazy Mode will not work anymore)
- FITS\_VIEWER: fv  
Program to use for the inspection of input/output products. Use full path name if it is not in the standard path.
- GlobalPlotInteractivity: true  
Set to "false" to disable interactive GUIs for the whole workflow. Each interactive actor can specify its own setting, which overwrites the choice given here.
- SelectDataSetMethod: Interactive  
Specify how datasets for processing are selected ("All", "New" = never tried before, "Reduced" = successfully run before, "Failed"=unsuccessfully run before), or set to "Interactive" for interactive selection.
- ProductExplorerMode: Triggered  
Specify when you want to see the ProductExplorer GUI. "Triggered" = show it after all data sets have been reduced. "Enabled" = show it after each dataset. "Disabled" = never show it

## Step 1: Data Organisation and Selection

## Step 2: Creation of Master Calibration Files

## Step 3: Science Reduction

## Step 4: Output Organisation





# FORS Workflow For Imaging Data (v. 5.1.4)

<b>Workflow Instructions</b>	<b>Setup Directories</b>	<b>Global Parameters</b> <span style="background-color: orange; display: inline-block; width: 15px; height: 15px; vertical-align: middle;"></span> = actor with interactive option
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To run this workflow on the demo data:

- Turn on highlighting. Choose "Tools"-> "Animate at Runtime" from top menu and set it to "1".
- Press the "Run" button OR cntrl-R to start the workflow.

To run on a different data set:

- Click on RAW\_DATA\_DIR and set as appropriate. All subdirectories of RAW\_DATA\_DIR will be searched for data.
- If desired, change END\_PRODUCTS\_DIR.
- IMPORTANT: END\_PRODUCTS\_DIR should not be a subdirectory of the RAW\_DATA\_DIR, otherwise it will be searched for raw data!
- Press the "Run" button OR cntrl-R to start the workflow.

The general concepts of Reflex are described in Astron. Astrophys., 559, A96. Please credit this paper in publications on research that used Reflex.

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## Setup Directories

### Input:

- ROOT\_DATA\_DIR: \$HOME/reflex\_data/
- RAW\_DATA\_DIR: /opt/local/share/esopipes/datademo/fors/
- Only change CALIB\_DATA\_DIR if you do NOT want to use the calibration data delivered with the pipeline:
- CALIB\_DATA\_DIR: /opt/local/share/esopipes/datastatic/fors-5.1.4/

### Output:

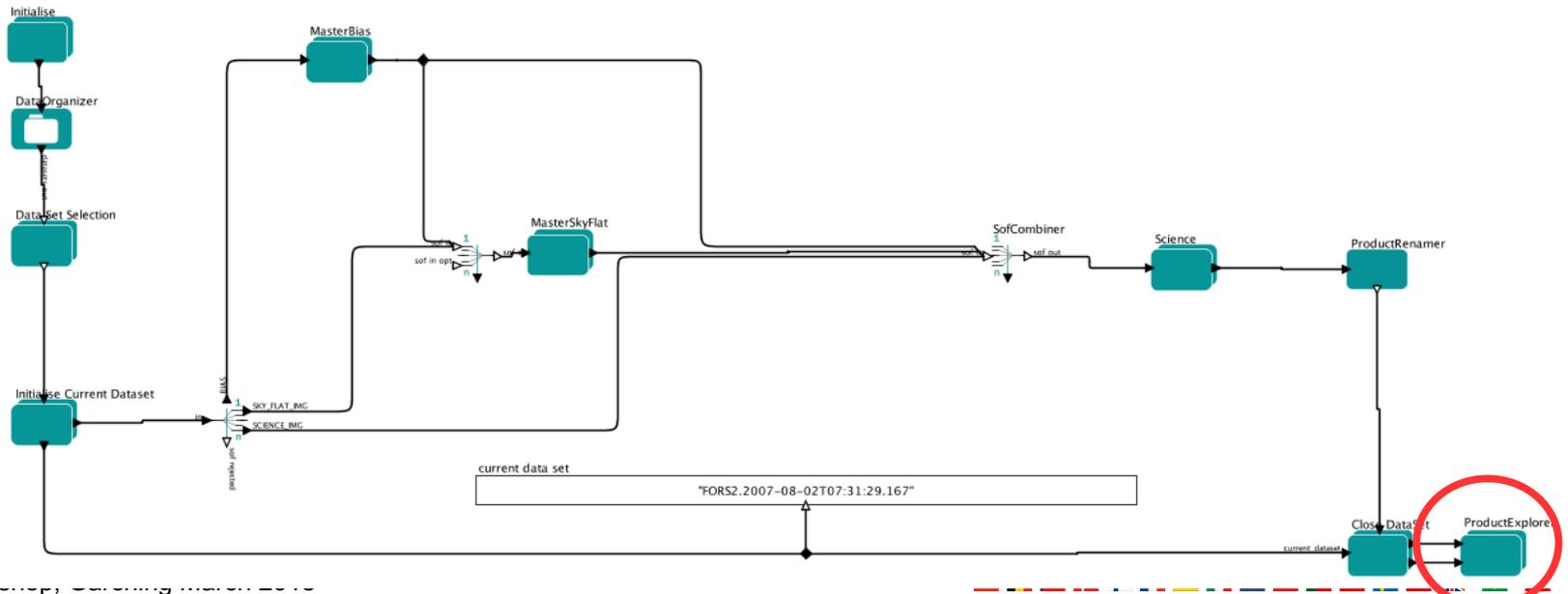
- END\_PRODUCTS\_DIR: \$ROOT\_DATA\_DIR/reflex\_end\_products

### Working Directories:

- BOOKKEEPING\_DIR: \$ROOT\_DATA\_DIR/reflex\_book\_keeping/fors-ima
- LOGS\_DIR: \$ROOT\_DATA\_DIR/reflex\_logs/fors-ima
- TMP\_PRODUCTS\_DIR: \$ROOT\_DATA\_DIR/reflex\_tmp\_products/fors-ima
- BOOKKEEPING\_DB: \$BOOKKEEPING\_DIR/bookkeeping.db

## Global Parameters

- RecipeFailureMode: Ask  
Global parameter for the behaviour when a recipe fails. 'Ask' means that each time a recipe fails, the choice to continue or stop will be presented. 'Continue' means that the workflow will ignore errors and continue. 'Stop' means the workflow will stop.
- EraseDirs: false  
Change "EraseDirs" to 'true' to erase BOOKKEEPING\_DIR, TMP\_PRODUCTS\_DIR and LOGS\_DIR each time the workflow is run (Lazy Mode will not work anymore)
- FITS\_VIEWER: fv  
Program to use for the inspection of input/output products. Use full path name if it is not in the standard path.
- GlobalPlotInteractivity: true  
Set to "false" to disable interactive GUIs for the whole workflow. Each interactive actor can specify its own setting, which overwrites the choice given here.
- SelectDataSetMethod: Interactive  
Specify how datasets for processing are selected ("All", "New" = never tried before, "Reduced" = successfully run before, "Failed"=unsuccessfully run before), or set to "Interactive" for interactive selection.
- ProductExplorerMode: Triggered  
Specify when you want to see the ProductExplorer GUI. "Triggered" = show it after all data sets have been reduced. "Enabled" = show it after each dataset. "Disabled" = never show it





# Exploring results

## Workflow Instructions

To run this workflow on the demo data:  
 - Turn on highlighting. Choose "Tools" -> "Animate at Runtime" from top menu and set it to "1".  
 - Press the "Run" button OR ctrl-R to start the workflow.

To run on a different data set:  
 - Click on ROOT\_DATA\_DIR and choose appropriate.  
 - All other fields are filled automatically.  
 - If desired, change the output directories.  
 - Press the "Run" button OR ctrl-R to start the workflow.

To monitor the progress of the workflow in more detail:  
 - Open "Window" -> "Runtime Window" in top menu before starting the workflow.

## Setup Directories

Input:  
 \*ROOT\_DATA\_DIR: /home/fof@kthelox/data/  
 \*RAWDATA\_DIR: \$ROOT\_DATA\_DIR/reflex\_input/ives\_blue  
 Working Directories:  
 \*BOOKKEEPING\_DIR: \$ROOT\_DATA\_DIR/reflex\_book\_keeping/ives\_blue  
 \*LOGS\_DIR: \$ROOT\_DATA\_DIR/reflex\_logs/ives\_blue  
 \*TMP\_PRODUCTS\_DIR: \$ROOT\_DATA\_DIR/reflex\_tmp\_products/ives\_blue  
 Output:  
 \*END\_PRODUCTS\_DIR: \$ROOT\_DATA\_DIR/reflex\_end\_products  
 If END\_PRODUCTS\_DIR or ROOT\_DATA\_DIR is changed using the Browse button, the leading file has to be removed manually.

## Global Parameters

= actor with interactive option

\*FITS\_VIEWER: fv      fits viewer to use for the inspection of input/output products  
 \*ESORedex: --suppress-prefix=TRUE      esorex arguments  
 \*BaseDir: false      Change "BaseDir" to true to enable BOOKKEEPING\_DIR, TMP\_PRODUCTS\_DIR and LOGS\_DIR each time the workflow is run (Lazy Mode won't work anymore).  
 \*END\_PRODUCT\_SUBDIR: 2010-07-07T18:10:29/Science\_DataSet\_1      This is set automatically  
 \*GLOBAL\_TIMESTAMP: 2010-07-07T18:10:29      This is set automatically

● Inspect final results

● Compare and keep track of different reduction runs

Data Organisation and Selection

Creation of Master Calibration Files

Wavelength and Response Calibration

Spectrum Extraction

Step 5: Output Organisation

● Explore Provenance

● Plot (and replot) final and intermediate products



## Workflow Instructions

To run this workflow on the demo data:

- Turn on highlighting. Choose "Tools"-> "Animate at Runtime" from top menu and set it to "1".
- Press the "Run" button OR cntrl-R to start the workflow.

To run on a different data set:

- Click on ROOT\_DATA\_DIR and set as appropriate. All subdirectories of RAW\_DATA\_DIR will be searched for data.
- If desired, change END\_PRODUCTS\_DIR.
- Press the "Run" button OR cntrl-R to start the workflow.

To monitor the progress of the workflow in more detail:

- Open "Window" -> "Runtime Window" in top menu before starting the workflow.

## Setup Directories

- ROOT\_DATA\_DIR: /sdp\_test\_data/mmeeser/eso-pipelines/data\_wkf/

### Input:

- RAW\_DATA\_DIR: \$ROOT\_DATA\_DIR/reflex\_input/hawki
- CALIB\_DATA\_DIR: /sdp\_test\_data/mmeeser/eso-pipelines/hawki-2.4.1/calib/ha...
- TWOMASS\_CATALOGUE\_DIR:
- PPMXL\_CATALOGUE\_DIR:
- LOCAL\_CATALOGUE\_DIR:

None of the directories below should be a subdirectory of RAW\_DATA\_DIR or CALIB\_DATA\_DIR

### Output:

- END\_PRODUCTS\_DIR: \$ROOT\_DATA\_DIR/reflex\_end\_products
- BOOKKEEPING\_DIR: \$ROOT\_DATA\_DIR/reflex\_book\_keeping/hawki
- LOGS\_DIR: \$ROOT\_DATA\_DIR/reflex\_logs/hawki
- TMP\_PRODUCTS\_DIR: \$ROOT\_DATA\_DIR/reflex\_tmp\_products/hawki
- BOOKKEEPING\_DB: \$BOOKKEEPING\_DIR/bookkeeping.db

### Working Directories:

- BOOKKEEPING\_DIR: \$ROOT\_DATA\_DIR/reflex\_book\_keeping/hawki
- LOGS\_DIR: \$ROOT\_DATA\_DIR/reflex\_logs/hawki
- TMP\_PRODUCTS\_DIR: \$ROOT\_DATA\_DIR/reflex\_tmp\_products/hawki
- BOOKKEEPING\_DB: \$BOOKKEEPING\_DIR/bookkeeping.db

## Catalogue Selection

Select catalogues (on local machine and/or CDS search). Input values must be within the allowed ranges; at least one photometric and one astrometric valid catalogues must be provided (either from local machine or for CDS search). If these criteria are not fulfilled, the workflow will stop. No check is done beforehand.

- ASTROM\_CATALOGUE: 1 Select catalogues on local machine
- PHOTOM\_CATALOGUE: 0 0: 2MASS; 1: PPMXL; 2: LOCAL
- CDS\_ASTROMETRIC\_CATALOGUE: wise CDS astrometric catalogue, <none | 2mass | usnob | ppmxl | wise>
- CDS\_PHOTOMETRIC\_CATALOGUE: 2mass CDS photometric catalogue, <none | 2mass | ppmxl | wise>

## Global Parameters

  = actor with interactive option

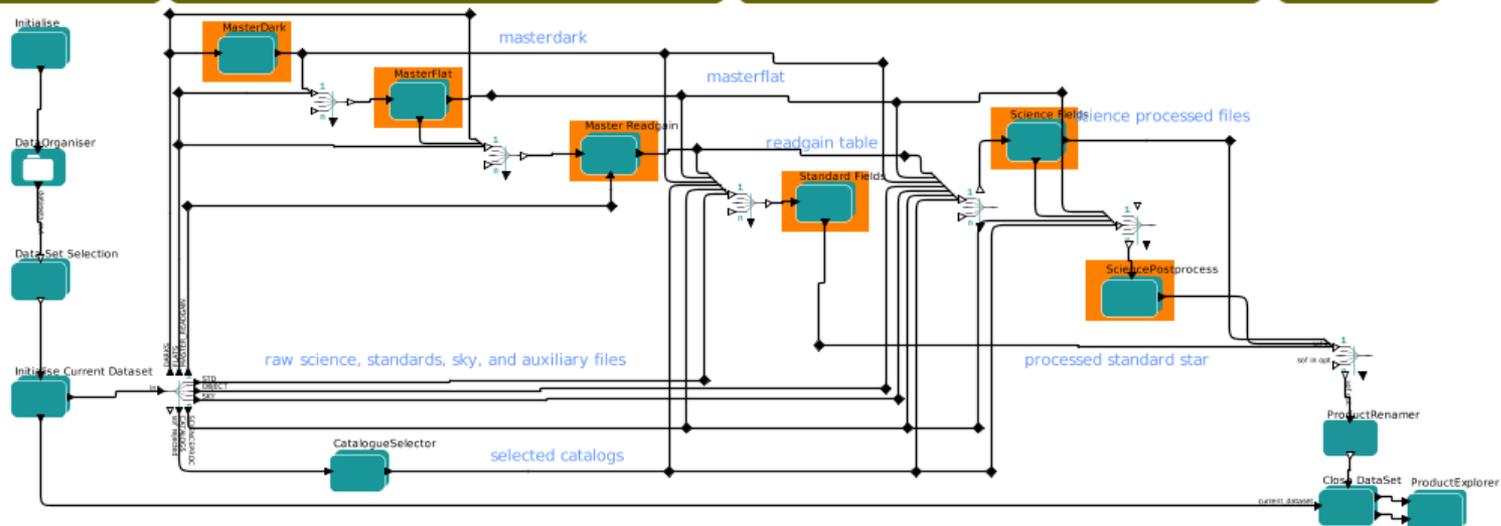
- RecipeFailureMode: Ask Global parameter for the behaviour when a recipe fails. 'Ask' means that each time a recipe fails, the choice to continue or stop will be presented. 'Continue' means that the workflow will ignore errors and continue. 'Stop' means the workflow will stop.
- EraseDirs: false Change "EraseDirs" to 'true' to erase BOOKKEEPING\_DIR, TMP\_PRODUCTS\_DIR and LOGS\_DIR each time the workflow is run (Lazy Mode will not work anymore)
- FITS\_VIEWER: fv Program to use for the inspection of input/output products. Use full path name if it is not in the standard path.
- GlobalPlotInteractivity: true Set to "false" to disable interactive GUIs for the whole workflow. Each interactive actor can specify its own setting, which overwrites the choice given here.
- SelectDatasetMethod: Interactive Specify how datasets for processing are selected ("All", "New" = never tried before, "Reduced" = successfully run before, "Failed"=unsuccessfully run before), or set to "interactive" for interactive selection.
- ProductExplorerMode: Triggered Specify when you want to see the ProductExplorer GUI. "Triggered" = show it after all data sets have been reduced. "Enabled" = show it after each dataset. "Disabled" = never show it
- Compute readgain table: false true: compute the readgain table from raw frames in the dataset. false: uses the readgain table from static calibrations. Default: false.

## Step 1: Data Organisation and Selection

## Step 2: Creation of Master Calibration Files

## Step 3: Standard Star and Science Images Reduction

## Step 4: Output Organisation



Auxiliary and debug parameters, please do not change: ● GLOBAL\_TIMESTAMP: 2016-11-21T11:50:29 ● ESORexArgs: --suppress-prefix=TRUE ● END\_PRODUCTS\_SUBDIR: 2016-02-18T15:55:12/HAWKI2008-11-18T00:22:15.321\_tpl ● N\_SELECTED\_DATASETS: 1



# Iteratively Improving Results

Workflow Instructions

Setup Directories

Global Parameters

= actor with interactive option

To run this workflow on the demo data:

- Turn on highlighting. Choose "Tools" -> "Animate" -> "Runtime" from the top menu.
- Press the "Run" button OR Ctrl+R to start the workflow.

To run on a different data set:

- Click on "Runtime" in the top menu.
- All sub-directories are highlighted.
- If desired, change LND\_PRODUCTS\_DIR.
- Press the "Run" button OR Ctrl+R to start the workflow.

To monitor the progress of the workflow:

- Open "Window" -> "Runtime Window" in top menu before starting the workflow.

Input:

Working Directories:

- BOOKKEEPING\_DIR: \$ROOT\_DATA\_DIR/refex\_peak\_tracking/vars\_dir
- LNDG\_DIR: \$ROOT\_DATA\_DIR/refex\_logfiles\_dir
- TMP\_PRODUCTS\_DIR: \$ROOT\_DATA\_DIR/refex\_tmp\_products\_dir

Output:

- ESOR\_products\_dir: \$ROOT\_DATA\_DIR/refex\_products\_dir
- ESOR\_products\_dir: \$ROOT\_DATA\_DIR/refex\_products\_dir
- ESOR\_products\_dir: \$ROOT\_DATA\_DIR/refex\_products\_dir

•PDS\_viewer: tv

File viewer to use for the inspection of input/output products

•ESORreflex: --suppress-prefix=TRUE

esorex arguments

•baseDir: false

Change "baseDir" to true to enable BOOKKEEPING\_DIR, TMP\_PRODUCTS\_DIR and LNDG\_DIR

•GLOBAL\_TIMESTAMP: 2010-07-07T18:00Z

This is set automatically

● Lazy mode: Don't redo unnecessary steps

● Lazy mode for recipes.

● It works by comparing the input of the current execution with *all* the previous recipe executions:

- All files must be the same
- All files must have the same checksum
- All files must have the same date
- All recipe parameters must be the same

● If a recipe at the beginning of the workflow is set to *Not-Lazy mode*, the input of the next recipes will be new and lazy mode will not be triggered.

● Lazy mode for DataOrganizer.

- It avoids the organization of all the data in subsequent workflow runs.
- It works similar to lazy mode for recipes

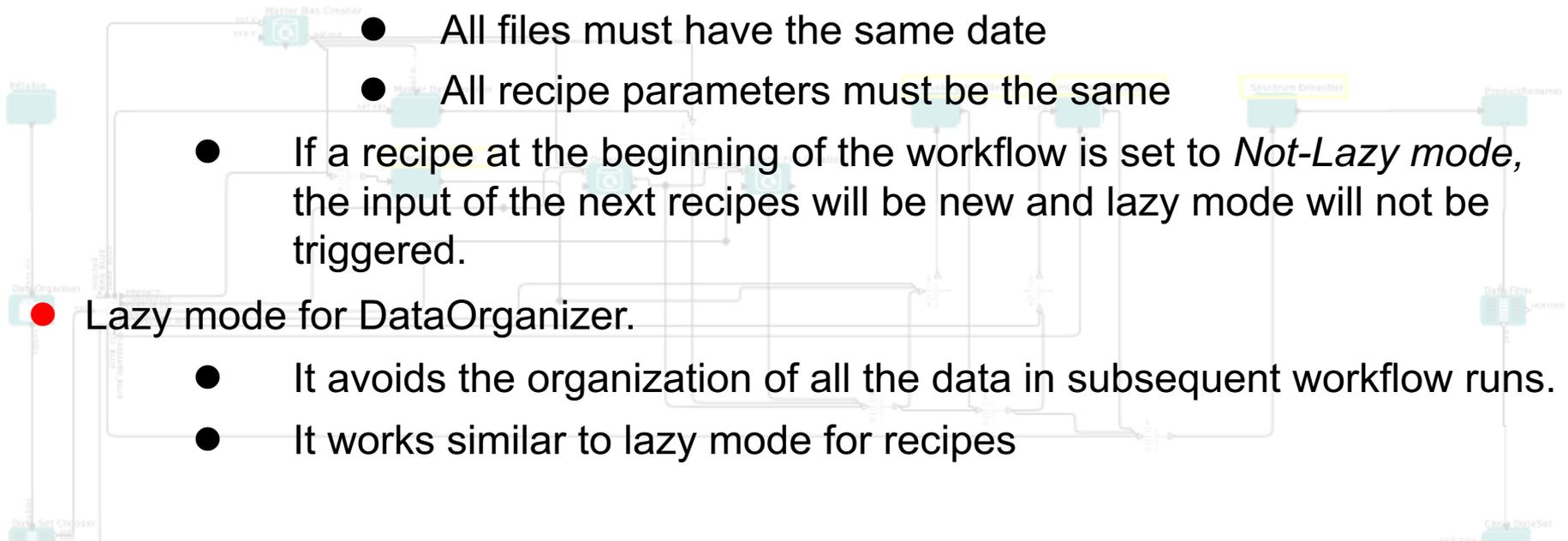
Step 1:  
Data Organisation  
and Selection

Creation of Master  
Catalog

Step 3:  
Wavelength and Response  
Correction

Step 4:  
Spectrum  
Extraction

Step 5:  
Output  
Organisation





# Summary

## Data Reduction with

### ESO Reflex

Workflow Instructions

Setup Dir

Global Parameters

= actor with interactive option

- Use the same recipes that are used at the telescope, for Quality Control and for the Production of Data Products in archive.

- Document dependencies.

- Organize data.

- Runs sequence of recipes with single click.

- Monitor progress.

- Do bookkeeping.

- Plot results.

- Allow pre-defined interaction.

- Allow insertion of user procedures in any language.

