



# The ESO Recipe Flexible Workbench EsoReflex

Sabine Moehler, Wolfram Freudling

[http://www.eso.org/sci/software/pipelines/reflex\\_workflows](http://www.eso.org/sci/software/pipelines/reflex_workflows)



# EsoReflex Project

## Make pipeline recipes accessible to general users

- Recommended environment to run ESO VLT pipeline “recipes”
- Gives users enough information how to run recipes
- Reflex is based on the Kepler Workflow engine (<https://kepler-project.org>), which provides a graphical user interface (Java)
- In case of problems please contact [usd-help@eso.org](mailto:usd-help@eso.org) (include information about workflow, data, operating system, see also last slide)



# Design Goals

- Document dependencies
- Organize data
- Run pipeline with single click
- Monitor progress
- Do bookkeeping
- Allow pre-defined interaction\*
- Allow insertion of user procedures in several command line languages

\**currently interactive python windows (python needed for installation)*



# Workflow driven Data Reduction

A&A 559, A96 (2013)

A&A 559, A96 (2013)  
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Astronomy  
&  
Astrophysics

## Automated data reduction workflows for astronomy

### The ESO Reflex environment

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#### ABSTRACT

*Context.* Data from complex modern astronomical instruments often consist of a large number of different science and calibration files, and their reduction requires a variety of software tools. The execution of such a chain of operations represents a complex workflow that needs to be tuned and supervised often by individual researchers that are not familiar with the specific software tools for any specific instrument.

*Aims.* The efficiency of data reduction can be improved by using automated workflows. To realize such efficiency gains, we designed a system that allows the definition of data reduction workflows, and has facilities for inspection and interaction with the workflow execution.

*Methods.* The European Southern Observatory (ESO) has developed Reflex, an environment that allows the definition of data reduction workflows. Reflex is implemented as a package of customized components for the Kepler workflow environment. It provides a graphical user interface to create and execute a sequence of data reduction steps, and a web-based interface for workflow presentation, execution, and modification.

*Results.* Reflex provides a graphical representation of the data reduction process. Key features include workflow visualization, data organization, workflow execution, and workflow modification. Reflex also provides a web-based interface for workflow presentation, execution, and modification. Reflex includes novel concepts to increase the efficiency of astronomical data processing. While Reflex is a specific implementation, the concepts can be applied to other astronomical data reduction environments.

*Conclusions.* Automated workflows can greatly increase the efficiency of astronomical data reduction. In Reflex, workflows are defined and executed as a first step. Subsequent optimization can then be carried out while transparently re-using all unchanged data products. We found that such workflows enable the reduction of complex data by non-expert users and minimizes mistakes and book-keeping errors.

*Conclusions.* Reflex includes novel concepts to increase the efficiency of astronomical data processing. While Reflex is a specific implementation, the concepts can be applied to other astronomical data reduction environments.

Pipeline manuals

Reflex tutorials  
<http://eso.org/reflex>

Forchi, V., Reflex User Manual,  
VLT-MAN-ESOs-19000-5037



# Basic Reflex Workflow

file:/scratch/smoehler/reflex\_dev/s...lex/workflows/fors-5.3.5/fors\_pmos.xml

File Edit View Workflow Tools Window Help

Components Data Outline

Search Components

Advanced S... Sources Cancel

All Ontologies and Folders

- Components
- Projects
- Statistics
- Demos
- Actors
- Dataturbine
- Directors
- Esoreflex
- Job
- Opendap
- Outreach
- R

Workflow

## FORS Workflow For PMOS Data (v. 5.3.5)

This is a basic workflow to help with data organisation and execution of the pipeline. The workflow was generated without a review of the quality of the science 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 RAW\_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.

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**

- ROOT\_DATA\_DIR: /scratch/smoehler/reflex\_dev/data/
- RAW\_DATA\_DIR: \$ROOT\_DATA\_DIR/reflex\_input/fors/
- CALIB\_DATA\_DIR: /scratch/smoehler/reflex\_dev/software/calib/fors-5.3.5/
- END\_PRODUCTS\_DIR: \$ROOT\_DATA\_DIR/reflex\_end\_products
- BOOKKEEPING\_DIR: \$ROOT\_DATA\_DIR/reflex\_book\_keeping/fors-pmos
- LOGS\_DIR: \$ROOT\_DATA\_DIR/reflex\_logs/fors-pmos
- TMP\_PRODUCTS\_DIR: \$ROOT\_DATA\_DIR/reflex\_tmp\_products/fors-pmos
- BOOKKEEPING\_DB: \$BOOKKEEPING\_DIR/bookkeeping.db

**Global Parameters**

- RecipeFailureMode: Ask
- EraseDirs: false
- FITS\_VIEWER: fv
- GlobalPlotInteractivity: true
- SelectDatasetMethod: Interactive
- ProductExplorerMode: Triggered

**Working Directories:**

Input:

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

Output:

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)

Program to use for the inspection of input/output products. Use full path name if it is not in the standard path.

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.

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.

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**

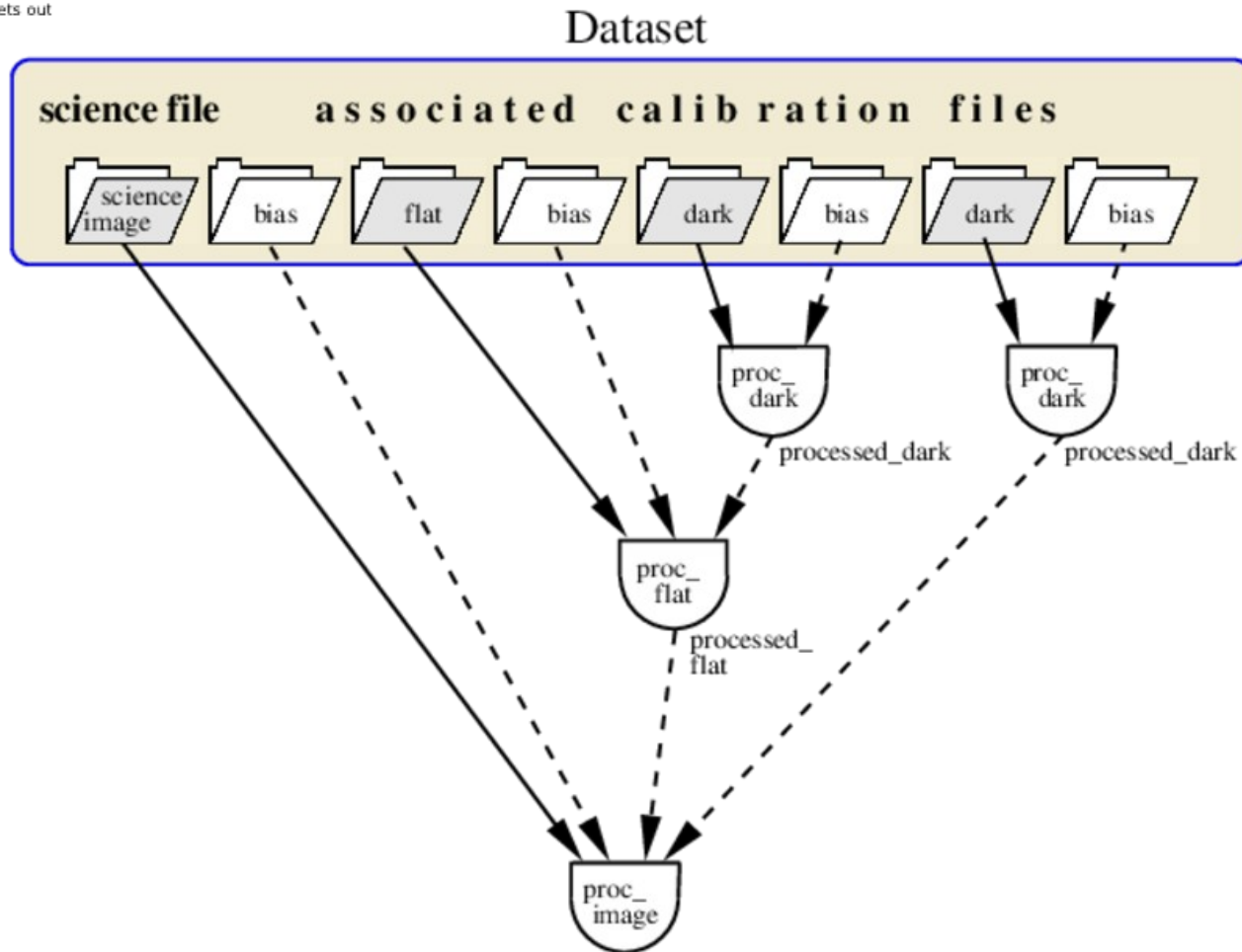
0 results found.

FORS Workflow For PMOS Data for 5.3.5

Workflow diagram showing steps: Initialise, Data Organisation, Data Set Selection, Initialise Current Dataset, MasterBias, ForsPmosCalib, ForsPmosScience, ProductRenamer, Close DataSet, ProductExplorer.



# Reflex Data Organisation





# Reflex OCA Rules



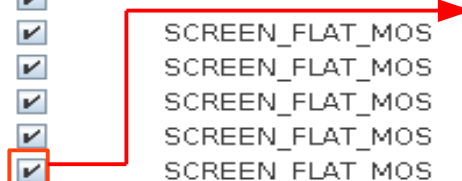
classifying, organizing and associating astronomical data based on their meta-data (FITS keywords).

- Processing steps imply Data Organization
- Data organization 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**“)



<input type="checkbox"/>	FORS2.2008-07-20T00:14:58.014.fits	<input checked="" type="checkbox"/>	SCIENCE_LSS
<input type="checkbox"/>	FORS2_GRS_600RI_19_GG435_81.fits	<input checked="" type="checkbox"/>	GRISM_TABLE
<input type="checkbox"/>	fors2_extinct_table.fits	<input checked="" type="checkbox"/>	EXTINCT_TABLE
<input type="checkbox"/>	FORS_GDT_600RI_GG435_C1.fits	<input checked="" type="checkbox"/>	GLOBAL_DISTORTION_TABLE
<input type="checkbox"/>	BIAS	<input checked="" type="checkbox"/>	
<input type="checkbox"/>	FORS2.2008-07-20T11:19:36.554.fits	<input checked="" type="checkbox"/>	BIAS
<input type="checkbox"/>	FORS2.2008-07-20T11:20:10.437.fits	<input checked="" type="checkbox"/>	BIAS
<input type="checkbox"/>	FORS2.2008-07-20T11:20:44.430.fits	<input checked="" type="checkbox"/>	BIAS
<input type="checkbox"/>	FORS2.2008-07-20T11:21:18.443.fits	<input checked="" type="checkbox"/>	BIAS
<input type="checkbox"/>	FORS2.2008-07-20T11:21:52.466.fits	<input checked="" type="checkbox"/>	BIAS
<input type="checkbox"/>	CAL_LSS	<input checked="" type="checkbox"/>	
<input type="checkbox"/>	FORS2.2008-07-20T11:11:24.872.fits	<input checked="" type="checkbox"/>	SCREEN_FLAT_LSS
<input type="checkbox"/>	FORS2.2008-07-20T11:12:17.616.fits	<input checked="" type="checkbox"/>	SCREEN_FLAT_LSS
<input type="checkbox"/>	FORS2.2008-07-20T11:13:10.651.fits	<input checked="" type="checkbox"/>	SCREEN_FLAT_LSS
<input type="checkbox"/>	FORS2.2008-07-20T11:14:02.655.fits	<input checked="" type="checkbox"/>	SCREEN_FLAT_LSS
<input type="checkbox"/>	FORS2.2008-07-20T11:14:55.700.fits	<input checked="" type="checkbox"/>	SCREEN_FLAT_LSS
<input type="checkbox"/>	FORS2.2008-07-20T11:16:47.320.fits	<input checked="" type="checkbox"/>	LAMP_LSS
<input type="checkbox"/>	FORS2_ACAT_600RI_19_GG435_81.fits	<input checked="" type="checkbox"/>	MASTER_LINECAT
<input type="checkbox"/>	FORS2_GRS_600RI_19_GG435_81.fits	<input checked="" type="checkbox"/>	GRISM_TABLE
<input type="checkbox"/>	BIAS	<input checked="" type="checkbox"/>	
<input type="checkbox"/>	STD_MOS	<input checked="" type="checkbox"/>	
<input type="checkbox"/>	FORS2.2008-07-20T01:13:46.301.fits	<input checked="" type="checkbox"/>	STANDARD_MOS
<input type="checkbox"/>	FORS2_GRS_600RI_19_GG435_81.fits	<input checked="" type="checkbox"/>	GRISM_TABLE
<input type="checkbox"/>	fors2_eg274.tfits	<input checked="" type="checkbox"/>	STD_FLUX_TABLE
<input type="checkbox"/>	fors2_extinct_table.fits	<input checked="" type="checkbox"/>	EXTINCT_TABLE
<input type="checkbox"/>	fors2_telluric_regions.fits	<input checked="" type="checkbox"/>	TELLURIC_CONTAMINATION
<input type="checkbox"/>	BIAS	<input checked="" type="checkbox"/>	
<input type="checkbox"/>	CAL_STDS	<input checked="" type="checkbox"/>	
<input type="checkbox"/>	FORS2.2008-07-20T11:32:36.861.fits	<input checked="" type="checkbox"/>	SCREEN_FLAT_MOS
<input type="checkbox"/>	FORS2.2008-07-20T11:33:23.695.fits	<input checked="" type="checkbox"/>	SCREEN_FLAT_MOS
<input type="checkbox"/>	FORS2.2008-07-20T11:34:10.680.fits	<input checked="" type="checkbox"/>	SCREEN_FLAT_MOS
<input type="checkbox"/>	FORS2.2008-07-20T11:34:57.653.fits	<input checked="" type="checkbox"/>	SCREEN_FLAT_MOS
<input type="checkbox"/>	FORS2.2008-07-20T11:35:44.697.fits	<input checked="" type="checkbox"/>	SCREEN_FLAT_MOS
<input type="checkbox"/>	FORS2.2008-07-20T11:37:37.658.fits	<input checked="" type="checkbox"/>	LAMP_MOS
<input type="checkbox"/>	FORS2_ACAT_600RI_19_GG435_81.fits	<input checked="" type="checkbox"/>	MASTER_LINECAT
<input type="checkbox"/>	FORS2_GRS_600RI_19_GG435_81.fits	<input checked="" type="checkbox"/>	GRISM_TABLE
<input type="checkbox"/>	BIAS	<input checked="" type="checkbox"/>	

untick to  
deselect file







# Reflex OCA Rules

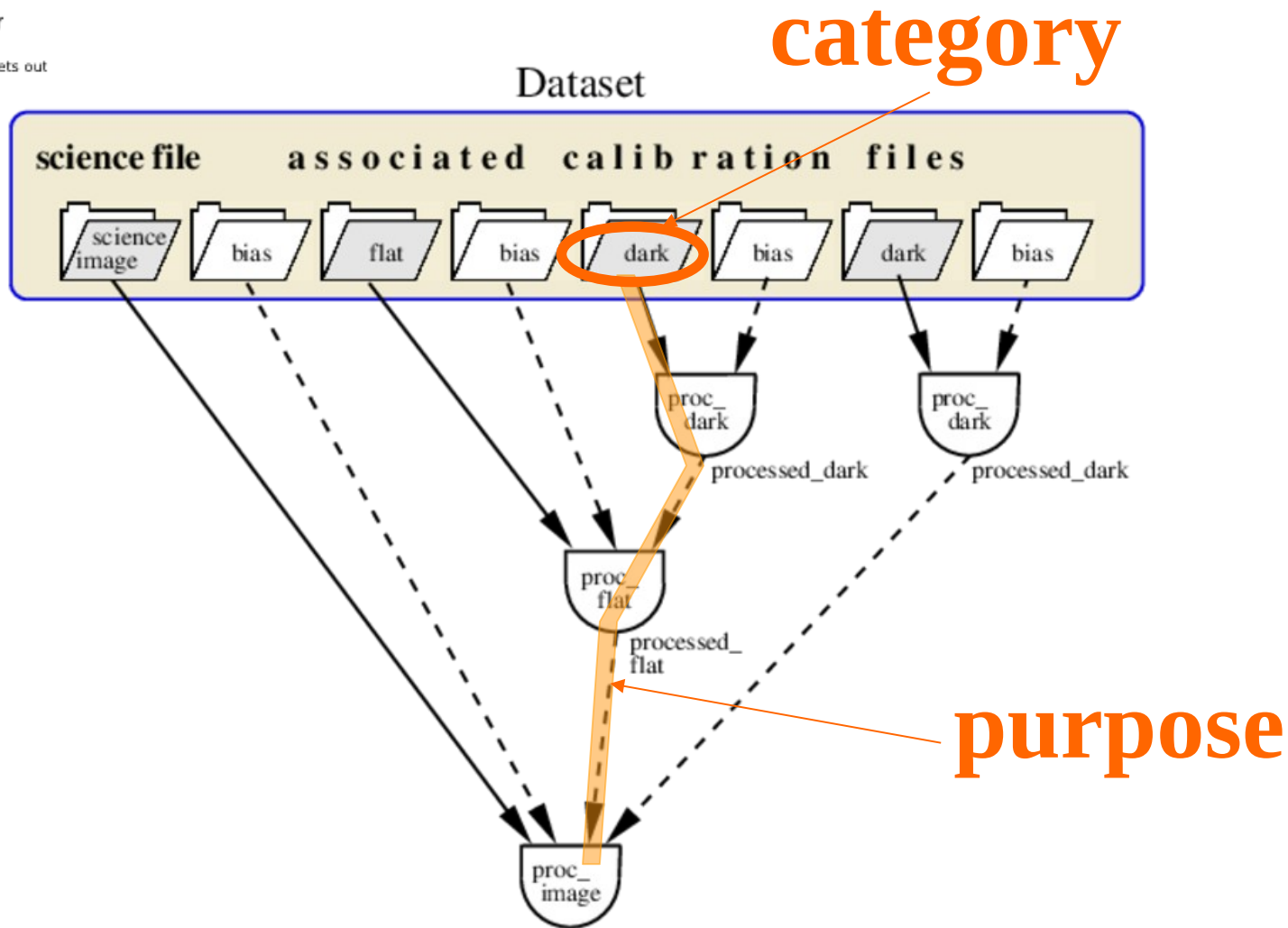


classifying, organizing and associating astronomical data based on their meta-data (FITS keywords).

- 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 to be processed together, plus all additional files needed for processing
- Each file in DataSet has a **category** (e.g. “raw bias”) and a **purpose** action1/action2/... (e.g. „MasterBias/MasterDark“)



# Reflex Data Organisation





```
RawFiles:
FORS2.2008-07-20T00:14:58.014.fits SCIENCE_LSS [SCI_LSS]
FORS2_GRS_600RI_19_GG435_81.fits GRISM_TABLE [SCI_LSS]
fors2_extinct_table.fits EXTINCT_TABLE [SCI_LSS]
FORS_GDT_600RI_GG435_C1.fits GLOBAL_DISTORTION_TABLE [SCI_LSS]
Action: BIAS
RawFiles:
  FORS2.2008-07-20T11:19:36.554.fits BIAS [BIAS/SCI_LSS]
  FORS2.2008-07-20T11:20:10.437.fits BIAS [BIAS/SCI_LSS]
  FORS2.2008-07-20T11:20:44.430.fits BIAS [BIAS/SCI_LSS]
  FORS2.2008-07-20T11:21:18.443.fits BIAS [BIAS/SCI_LSS]
  FORS2.2008-07-20T11:21:52.466.fits BIAS [BIAS/SCI_LSS]
Action: CAL_LSS
RawFiles:
  FORS2.2008-07-20T11:11:24.872.fits SCREEN_FLAT_LSS [CAL_LSS/SCI_LSS]
  FORS2.2008-07-20T11:12:17.616.fits SCREEN_FLAT_LSS [CAL_LSS/SCI_LSS]
  FORS2.2008-07-20T11:13:10.651.fits SCREEN_FLAT_LSS [CAL_LSS/SCI_LSS]
  FORS2.2008-07-20T11:14:02.655.fits SCREEN_FLAT_LSS [CAL_LSS/SCI_LSS]
  FORS2.2008-07-20T11:14:55.700.fits SCREEN_FLAT_LSS [CAL_LSS/SCI_LSS]
  FORS2.2008-07-20T11:16:47.320.fits LAMP_LSS [CAL_LSS/SCI_LSS]
  FORS2_ACAT_600RI_19_GG435_81.fits MASTER_LINECAT [CAL_LSS/SCI_LSS]
  FORS2_GRS_600RI_19_GG435_81.fits GRISM_TABLE [CAL_LSS/SCI_LSS]
  Action: BIAS
  RawFiles:
    FORS2.2008-07-20T11:19:36.554.fits BIAS [BIAS/CAL_LSS/SCI_LSS]
    FORS2.2008-07-20T11:20:10.437.fits BIAS [BIAS/CAL_LSS/SCI_LSS]
    FORS2.2008-07-20T11:20:44.430.fits BIAS [BIAS/CAL_LSS/SCI_LSS]
    FORS2.2008-07-20T11:21:18.443.fits BIAS [BIAS/CAL_LSS/SCI_LSS]
    FORS2.2008-07-20T11:21:52.466.fits BIAS [BIAS/CAL_LSS/SCI_LSS]
Action: STD_MOS
RawFiles:
  FORS2.2008-07-20T01:13:46.301.fits STANDARD_MOS [STD_MOS/SCI_LSS]
  FORS2_GRS_600RI_19_GG435_81.fits GRISM_TABLE [STD_MOS/SCI_LSS]
  fors2_eg274.tfits STD_FLUX_TABLE [STD_MOS/SCI_LSS]
  fors2_extinct_table.fits EXTINCT_TABLE [STD_MOS/SCI_LSS]
  fors2_telluric_regions.fits TELLURIC_CONTAMINATION [STD_MOS/SCI_LSS]
  Action: BIAS
  RawFiles:
  ----- FORS2_2008-07-20T00-14-58_014.txt Top 11 (Text)
```



# Reflex Data Organisation



- Status of Datasets
- Inspect Datasets
- Select which Datasets to process

Select Datasets

Selected	Data Set	#Files	Reduced	OBS.TARG.NAME	INS
<input checked="" type="checkbox"/>	FORS2.2008-07-20T00:14:58.014	25	-	RhoOphZc08-29I	GR
<input checked="" type="checkbox"/>	FORS2.2010-03-17T09:17:19.236	15	-	RCS2-1514_15.284181_10.05788	GR
<input checked="" type="checkbox"/>	FORS2.2010-03-22T06:55:17.701	30	-	BU1B	GR
<input checked="" type="checkbox"/>	FORS2.2010-05-03T03:36:35.486	30	-	VCC1684	GR
<input checked="" type="checkbox"/>	FORS2.2012-06-22T04:00:32.921	29	-	V707-Sc0	GR

Buttons: Save all, Inspect highlighted, Select complete, Deselect all, Filter: Continue, Stop

Select Datasets

Selected	Data Set	#Files	Reduced	OBJECT	SE
<input checked="" type="checkbox"/>	SHOOT.2009-11-15T02:27:32.567_tpl	119	-	8-oclock-A2	UVB
<input checked="" type="checkbox"/>	SHOOT.2009-11-15T02:27:37.699_tpl	93	-	8-oclock-A2	VIS
<input checked="" type="checkbox"/>	SHOOT.2009-11-15T02:27:41.138_tpl	73	-	8-oclock-A2	NIR
<input checked="" type="checkbox"/>	XSH00.2010-09-28T09:22:39.267	136	-	2MASS-J05405465-1112000	UVB
<input checked="" type="checkbox"/>	XSH00.2010-09-28T09:22:49.527	79	-	2MASS-J05405465-1112000	NIR
<input checked="" type="checkbox"/>	XSH00.2010-09-28T09:23:00.969	105	-	2MASS-J05405465-1112000	VIS
<input checked="" type="checkbox"/>	XSH00.2010-09-28T09:23:55.713_tpl	136	-	2MASS-J05405465-1112000	UVB
<input checked="" type="checkbox"/>	XSH00.2010-09-28T09:24:06.367_tpl	79	-	2MASS-J05405465-1112000	NIR
<input checked="" type="checkbox"/>	XSH00.2010-09-28T09:24:17.455_tpl	105	-	2MASS-J05405465-1112000	VIS
<input checked="" type="checkbox"/>	XSH00.2011-04-24T23:27:20.871	75	-	STD,TELLURIC	VIS
<input type="checkbox"/>	XSH00.2011-05-10T04:54:41.347_tpl	69	-	Cassowary-20-11i2	NIR
<input checked="" type="checkbox"/>	XSH00.2014-03-16T08:27:56.758	56	-	CINGC6121_LEE4613	VIS

Missing SKY\_SLIT\_NIR

Buttons: Save all, Inspect highlighted, Select complete, Deselect all, Filter: Continue, Stop

- Grey = Incomplete Dataset  
(calSelector recommended for download)



# Reflex FitsRouter

file:/scratch/smoehler/reflex\_devel/...lex/workflows/fors-5.3.5/fors\_pmos.xml

File Edit View Workflow Tools Window Help

Components Data Outline

Search Components Search

Advanced S... Sources Cancel

All Ontologies and Folders

- Components
- Projects
- Statistics
- Demos
- Actors
- Dataturbine
- Directors
- Esoreflex
- Job
- Opendap
- Outreach
- R

0 results found.

## Workflow

DDF Director

### FORS Workflow For PMOS Data (v. 5.3.5)

**This is a basic workflow to help with data organisation and execution of the pipeline. The workflow was generated without a review of the quality of the science 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 RAW\_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.

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

● ROOT\_DATA\_DIR: /scratch/smoehler/reflex\_devel/data/  
**Input:**

● RAW\_DATA\_DIR: \$ROOT\_DATA\_DIR/reflex\_input/fors/  
Only change CALIB\_DATA\_DIR if you do NOT want to use the calibration data delivered with the pipeline:

● CALIB\_DATA\_DIR: /scratch/smoehler/reflex\_devel/software/calib/fors-5.3.5/  
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

**Working Directories:**

- BOOKKEEPING\_DIR: \$ROOT\_DATA\_DIR/reflex\_book\_keeping/fors-pmos
- LOGS\_DIR: \$ROOT\_DATA\_DIR/reflex\_logs/fors-pmos
- TMP\_PRODUCTS\_DIR: \$ROOT\_DATA\_DIR/reflex\_tmp\_products/fors-pmos
- 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

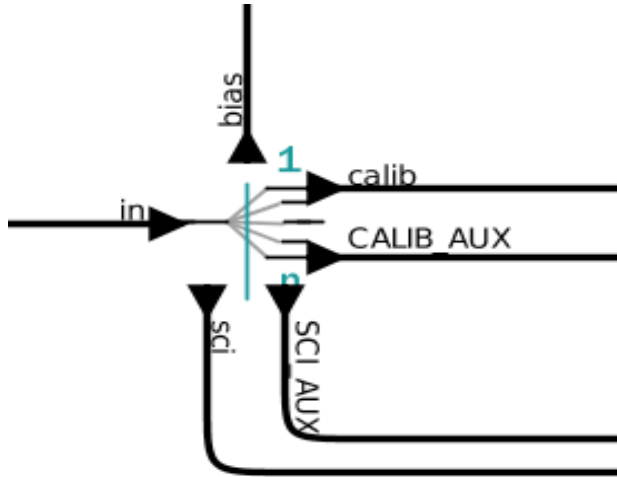
#### Step 4: Output Organisation

```
graph TD; Init[Initialise] --> DO[Data Organiser]; DO --> DSS[DataSet Selection]; DSS --> ICDS[Initialise Current Datasets]; ICDS --> MB[MasterBias]; ICDS --> FPC[ForsPmosCalib]; ICDS --> FPS[ForsPmosScience]; ICDS --> PR[ProductRenamer]; ICDS --> CD[Close DataSet]; ICDS --> PE[ProductExplorer]; MB --> FPC; FPC --> FPS; FPS --> PR; PR --> CD; CD --> PE;
```



# FitsRouter

## sorting by category



- 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. master bias)
- relations determine work"flow"

<b>bias_config:</b>	"BIAS"
<b>sci_config:</b>	"SCIENCE_PMOS,STANDARD_PMOS"
<b>calib_config:</b>	"SCREEN_FLAT_PMOS,LAMP_PMOS"
<b>CALIB_AUX_config:</b>	"MASTER_LINECAT,GRISM_TABLE,MASTER_DISTORTION_TABLE"
<b>SCI_AUX_config:</b>	"MASTER_LINECAT,GRISM_TABLE,RETARDER_WAVEPLATE_CHROMATISM,STD_PMOS_TABLE"



# Pipeline Recipes

file:/scratch/smoehler/reflex\_dev/s...lex/workflows/fors-5.3.5/fors\_pmos.xml

File Edit View Workflow Tools Window Help

Components Data Outline

Search Components Search

Advanced S... Sources Cancel

All Ontologies and Folders

- Components
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0 results found.

Workflow

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- Press the "Run" button OR cntrl-R to start the workflow.

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### Setup Directories

- ROOT\_DATA\_DIR: /scratch/smoehler/reflex\_dev/data/
- RAW\_DATA\_DIR: \$ROOT\_DATA\_DIR/reflex\_input/fors/
- CALIB\_DATA\_DIR: /scratch/smoehler/reflex\_dev/software/calib/fors-5.3.5/
- END\_PRODUCTS\_DIR: \$ROOT\_DATA\_DIR/reflex\_end\_products
- BOOKKEEPING\_DIR: \$ROOT\_DATA\_DIR/reflex\_book\_keeping/fors-pmos
- LOGS\_DIR: \$ROOT\_DATA\_DIR/reflex\_logs/fors-pmos
- TMP\_PRODUCTS\_DIR: \$ROOT\_DATA\_DIR/reflex\_tmp\_products/fors-pmos
- BOOKKEEPING\_DB: \$BOOKKEEPING\_DIR/bookkeeping.db

**Input:**

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

**Output:**

**Working Directories:**

### Global Parameters

- RecipeFailureMode: Ask
- EraseDirs: false
- FITS\_VIEWER: fv
- GlobalPlotInteractivity: true
- SelectDatasetMethod: Interactive
- ProductExplorerMode: Triggered

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).

Program to use for the inspection of input/output products. Use full path name if it is not in the standard path.

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.

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.

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

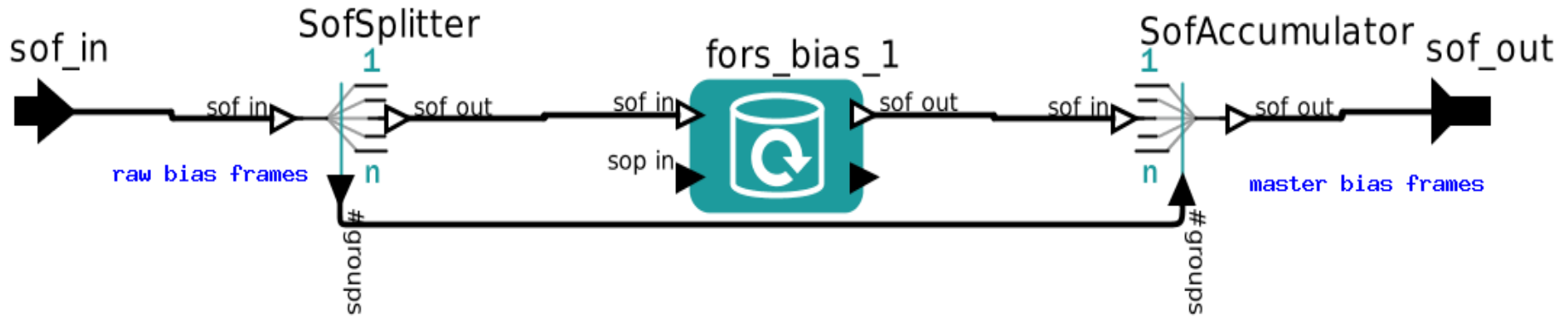
Step 2:  
Creation of Master  
Calibration Files

Step 3:  
Science Reduction

Step 4:  
Output  
Organisation



# SofSplitter: Sorting by Purpose

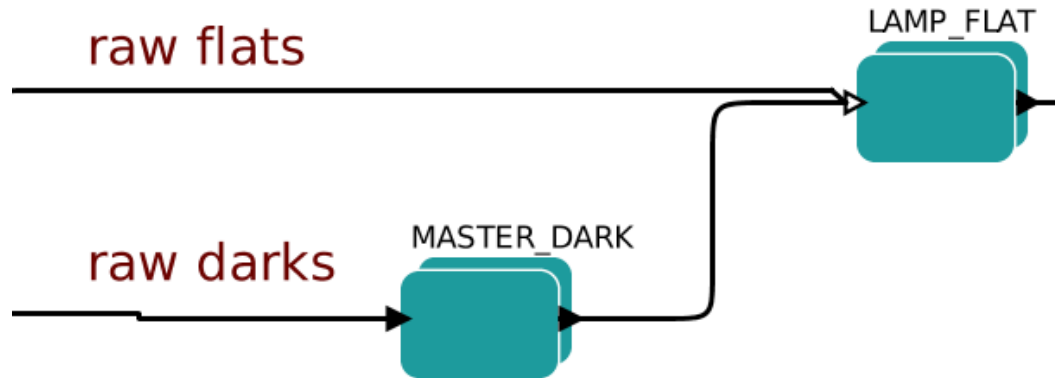


- Sorting by Purpose is implicit
- Purpose defined in OCA rules
- Assumes that each recipe has at least one unique file category





# Basic Reflex Workflow



- Information between actors\* is passed by tokens
- Reflex uses Set Of Files/Parameters (SOF/SOPs) as tokens
- SOFs include files, categories (like “normal” SoFs) + purpose
- Data Organizer organizes data in “DataSets”
- DataSets are SOFs that include everything needed to process one set of science observations

\*actor: A step in a workflow, i.e. a program that needs some external input to run.



# Looping over Datasets, Output Organisation

file:/scratch/smoehler/reflex\_dev/s...lex/workflows/fors-5.3.5/fors\_pmos.xml

File Edit View Workflow Tools Window Help

Components Data Outline

Search Components Search

Advanced Sources Cancel

All Ontologies and Folders

- Components
- Projects
- Statistics
- Demos
- Actors
- Dataturbine
- Directors
- Esoreflex
- Job
- Opendap
- Outreach
- R

**Workflow**

## FORS Workflow For PMOS Data (v. 5.3.5)

This is a basic workflow to help with data organisation and execution of the pipeline. The workflow was generated without a review of the quality of the science 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 RAW\_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.

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

● ROOT\_DATA\_DIR: /scratch/smoehler/reflex\_dev/data/  
**Input:**

● RAW\_DATA\_DIR: \$ROOT\_DATA\_DIR/reflex\_input/fors/  
Only change CALIB\_DATA\_DIR if you do NOT want to use the calibration data delivered with the pipeline:

● CALIB\_DATA\_DIR: /scratch/smoehler/reflex\_dev/software/calibfors-5.3.5/  
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

**Working Directories:**

● BOOKKEEPING\_DIR: \$ROOT\_DATA\_DIR/reflex\_book\_keeping/fors-pmos  
● LOGS\_DIR: \$ROOT\_DATA\_DIR/reflex\_logs/fors-pmos  
● TMP\_PRODUCTS\_DIR: \$ROOT\_DATA\_DIR/reflex\_tmp\_products/fors-pmos  
● 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

0 results found.





# Looping over Datasets, Output Organisation

Product Explorer

Search products

Show: All

Last: Hour

All

From: 20/02/16 16:06:29

To: 20/02/16 16:06:45

Dataset	#Exec	OBS.TARG.NAME	DPR.T
FOR2016.2015-02-26T07:56:45.429_tpl	5	WD 1620-391	STD
2016-02-20T16:06:34.574	OK	WD 1620-391	STD
2016-02-20T14:44:25.642	OK	WD 1620-391	STD
2016-02-20T14:41:23.787	OK	WD 1620-391	STD
2016-02-20T14:40:26.800	OK	WD 1620-391	STD
2016-02-20T14:37:57.939	OK	WD 1620-391	STD
FOR2016.2009-08-28T00:42:26.970_tpl	6	WD2039-202	OBJECT
2016-02-20T16:06:34.400	OK	WD2039-202	OBJECT
2016-02-20T14:44:25.541	OK	WD2039-202	OBJECT
2016-02-20T14:42:26.491	OK	WD2039-202	OBJECT
2016-02-20T14:41:23.672	OK	WD2039-202	OBJECT
2016-02-20T14:40:26.678	OK	WD2039-202	OBJECT
2016-02-20T14:37:57.813	OK	WD2039-202	OBJECT

Provenance Tree

- WD2039-202\_DISP\_COEFF\_SCI\_PMOS.fits
- WD2039-202\_MAPPED\_ALL\_SCI\_PMOS.fits
- WD2039-202\_MAPPED\_SCI\_PMOS.fits
  - mapped\_sci\_pmpos.fits
    - FOR2016.2009-08-28T00:42:26.970.fits
    - FOR2016.2009-08-28T00:48:11.917.fits
    - FOR2016.2009-08-28T00:53:56.964.fits
    - FOR2016.2009-08-28T00:59:41.900.fits
    - FOR2016.GRS\_1200B\_97\_free\_00.fits
    - for2016\_eps\_theta\_2009-01-25.fits
    - master\_bias.fits
    - curv\_coeff\_pmpos.fits
    - curv\_traces\_pmpos.fits
    - delta\_image\_pmpos.fits
    - disp\_coeff\_pmpos.fits
    - disp\_residuals\_table\_pmpos.fits
    - mapped\_norm\_flat\_pmpos.fits
    - mapped\_screen\_flat\_pmpos.fits
    - master\_norm\_flat\_pmpos.fits
    - master\_screen\_flat\_pmpos.fits
    - reduced\_lamp\_pmpos.fits
    - slit\_location\_pmpos.fits
    - spatial\_map\_pmpos.fits
    - spectral\_resolution\_pmpos.fits
    - wavelength\_map\_pmpos.fits

Category

- MAPPED\_SCI\_PMOS
- SCIENCE\_PMOS
- SCIENCE\_PMOS
- SCIENCE\_PMOS
- SCIENCE\_PMOS
- GRISM\_TABLE
- FETARDER\_WAVEPLATE\_CH
- MASTER\_BIAS
- CURV\_COEFF\_PMOS
- CURV\_TRACES\_PMOS
- DELTA\_IMAGE\_PMOS
- DISP\_COEFF\_PMOS
- DISP\_RESIDUALS\_TABLE\_PM
- MAPPED\_NORM\_FLAT\_PMOS
- MAPPED\_SCREEN\_FLAT\_PM
- MASTER\_NORM\_FLAT\_PMOS
- MASTER\_SCREEN\_FLAT\_PM
- REDUCED\_LAMP\_PMOS
- SLIT\_LOCATION\_PMOS
- SPATIAL\_MAP\_PMOS
- SPECTRAL\_RESOLUTION\_PM
- WAVELENGTH\_MAP\_PMOS

Keyword	Value
SIMPLE	T
BITPIX	16
NAXIS	2
NAXIS1	2048
NAXIS2	1034
ORIGIN	ESO
DATE	2009-08-28T00:47:29.458
MJD-OBS	55071.02947882
DATE-OBS	2009-08-28T00:42:26.970
EXPTIME	299.9800
CRVAL1	2058.71200
CRPIX1	1029.4
CTYPE1	PIXEL
CRVAL2	220.91200
CRPIX2	110.5
CTYPE2	PIXEL
BSCALE	1.000000000
BZERO	32768.0
EXTNAME	CHIP1
TELESCOP	ESO-VLT-U1
RA	310.645971
DEC	-20.07519
EQUINOX	2000.
RADECSYS	FK5
LST	66380.994
UTC	2547.000
OBJECT	WD2039-202
INSTRUME	FOR2016
CD1_1	2.000000000E+00
CD1_2	0.000000000E+00

Save commands

Continue

Inspect

Inspect with...



# Directories

## Setup Directories

● ROOT\_DATA\_DIR: /scratch/smoehler/reflex\_devel/data/

### Input:

● RAW\_DATA\_DIR: \$ROOT\_DATA\_DIR/reflex\_input/fors/

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

● CALIB\_DATA\_DIR: /scratch/smoehler/reflex\_devel/software/calib/fors-5.3.5/

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

### Working Directories:

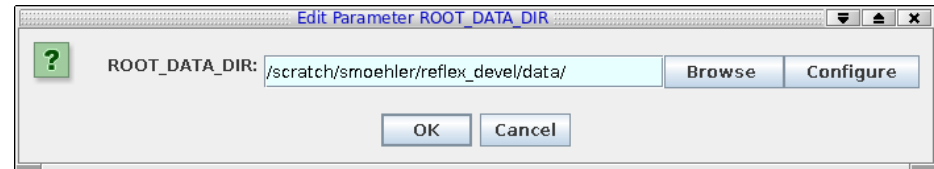
● BOOKKEEPING\_DIR: \$ROOT\_DATA\_DIR/reflex\_book\_keeping/fors-pmos

● LOGS\_DIR: \$ROOT\_DATA\_DIR/reflex\_logs/fors-pmos

● TMP\_PRODUCTS\_DIR: \$ROOT\_DATA\_DIR/reflex\_tmp\_products/fors-pmos

● BOOKKEEPING\_DB: \$BOOKKEEPING\_DIR/bookkeeping.db

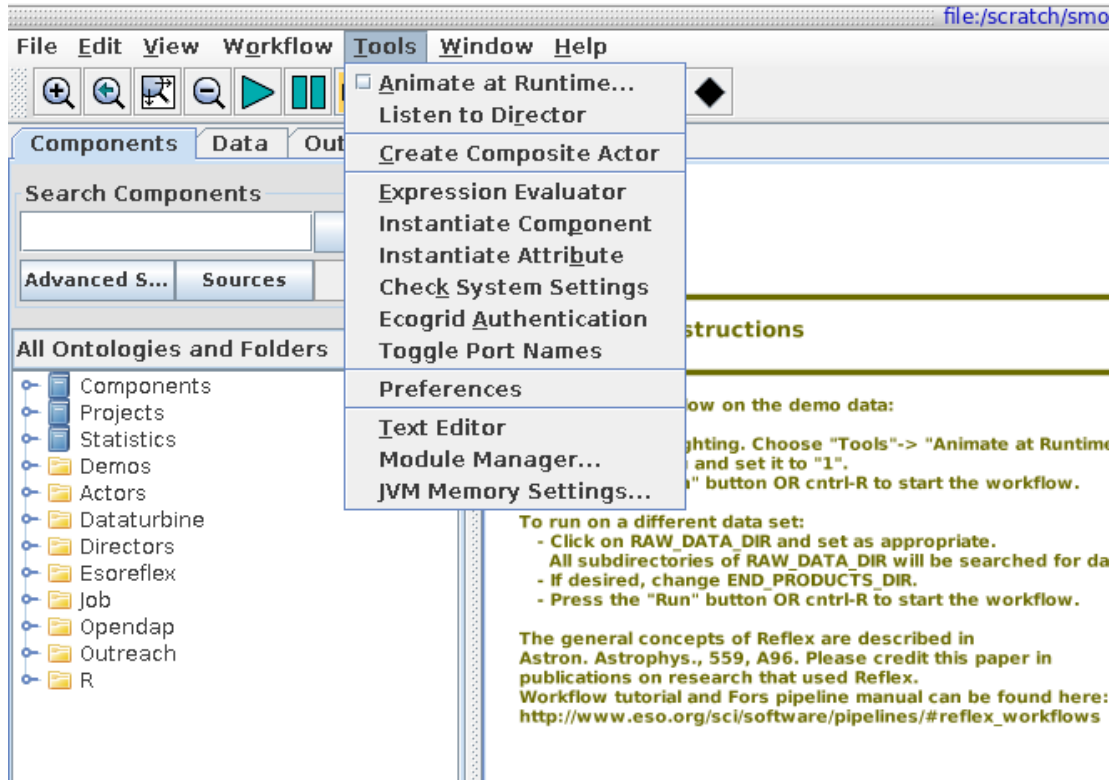
- Double-click on entry to change
- Avoid trailing blanks
- DO scans all files in RAW\_DATA\_DIR and CALIB\_DATA\_DIR



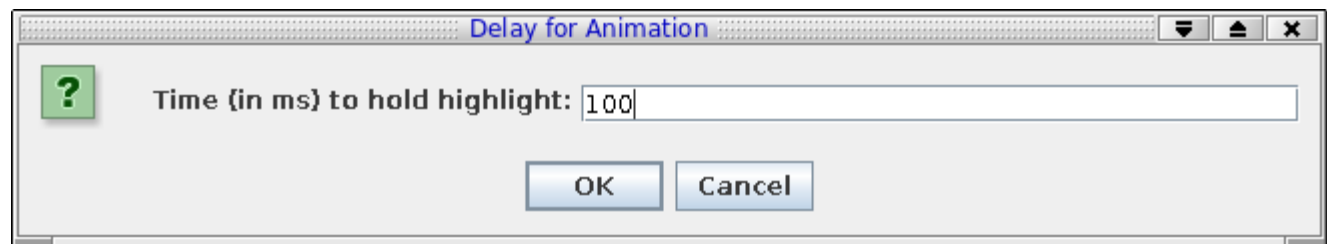
- Book keeping allows to skip already executed processing steps (if all files and parameters are the same as before)
- “Lazy Mode”



# Tools



■ “Animate at Runtime”  
to follow progress





# Parameters

## Global Parameters

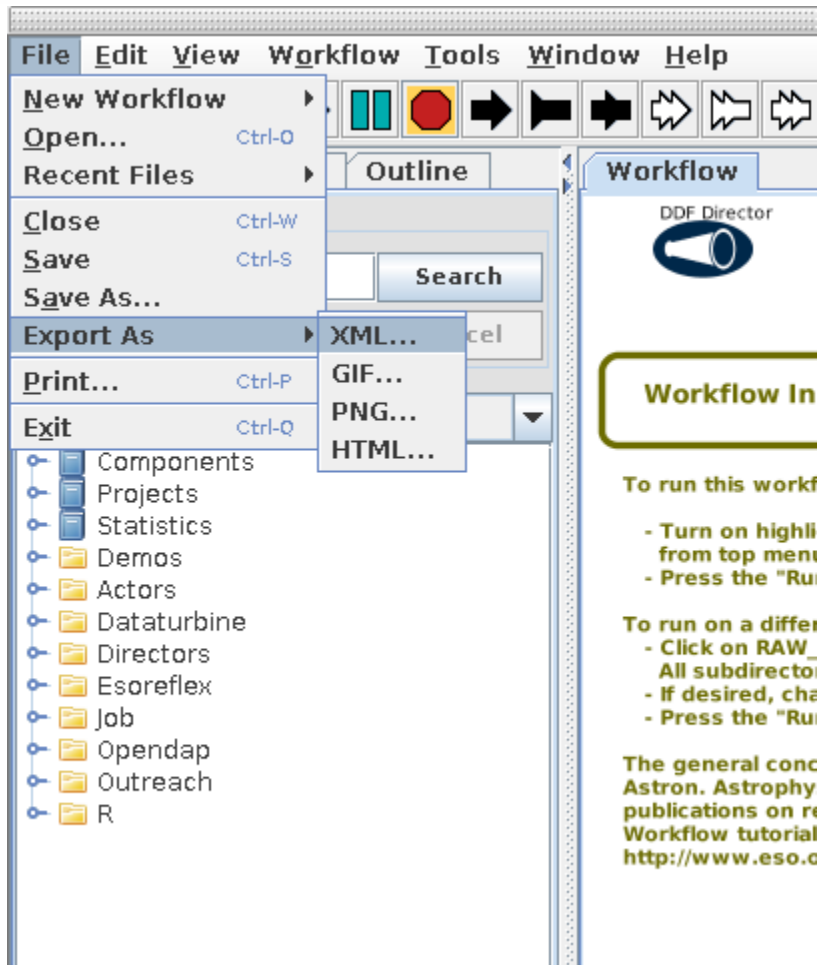
 = actor with interactive option

- **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

- Double-click on entry to change
- Important:  
GlobalPlotInteractivity  
RecipeFailureMode



# Saving a Workflow



- XML can be exchanged with others (ASCII file, “Save as” should be used only locally)
- Paths to python scripts and OCA rules are saved together with the workflow
- To share:
  - Make sure that the pipeline is installed in the target system
  - Export as XML
  - Edit the XML and change the python scripts/OCA file paths
  - Open the workflow and change the data paths

# Complex Workflows

## X-shooter Workflow for Physical Mode Data Reduction (v. 2.6.8)

### 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.
- 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.

To monitor the progress of the workflow in more detail:

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

The X-shooter workflow tutorial and demo data and the pipeline user 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: /scratch/home/moe/Her/reflexData
- RAW\_DATA\_DIR: \$ROOT\_DATA\_DIR/reflex\_input/xshooter
- Only change CALIB\_DATA\_DIR if you do NOT want to use the calibration data delivered with the pipeline:
- CALIB\_DATA\_DIR: /scratch/home/moe/Her/reflexSoftware/calib/xshooter-2.6.8

#### Output:

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

#### Working Directories:

- BOOKKEEPING\_DIR: \$ROOT\_DATA\_DIR/reflex\_book\_keeping/xshooter
- TMP\_PRODUCTS\_DIR: \$ROOT\_DATA\_DIR/reflex\_tmp\_products/xshooter
- LOGS\_DIR: \$ROOT\_DATA\_DIR/reflex\_logs/xshooter
- 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 it will stop.
- EraseDir: false  
Change "EraseDir" 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: tv  
Fits viewer to use for the inspection of input/output products.
- GlobalPlotInteractivity: true  
Disable interactive GUI for the whole workflow. Overrides in subworkflows have precedence. Enable cut of UVB spectrum at 350nm (Idzuchi). Overrides in subworkflows have precedence.
- GlobalCutUVBpectrum: true
- GlobalGenerateSDFFormat: true  
Enable generation of Science Data Products
- SelectDataSetMethod: interactive  
Selection method for the Data Set Chooser
- ProductExplorerEnabled: true  
Show Product Explorer window
- ProductExplorerMode: Triggered  
Product Explorer pops up after all datasets are finished

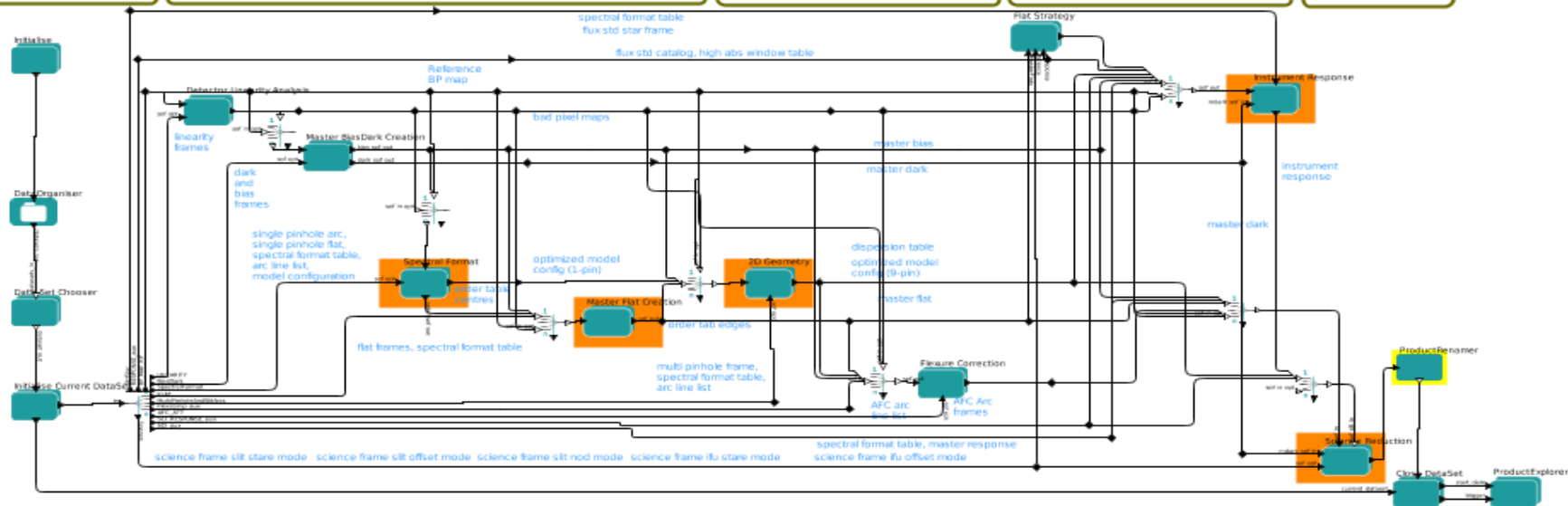
### Step 1: Data Organisation and Selection

### Step 2: Creation of Master Calibration Files

### Step 3: 2D map resampling, Spectral Power computation, flexure correction

### Step 4: Response computation, Science reduction

### Step 5: Output Organisation



Auxiliary and debug parameters, please do not change: ● GLOBAL\_TIMESTAMP: 2015-09-15T08:43:07 ● ESORArgs: --suppress-preio=TRUE ● END\_PRODUCTS\_SUBDIR: 2015-09-15T08:43:07/XSHOOT.2011-09-20T23:59:56.307\_tpl ● N\_SELECTED\_DATASETS: 8 ● DATASET\_NAME: XSHOOT.2011-09-20T23:59:56.307\_tpl





# Complex Workflows



## MUSE Workflow (v. 1.2.2)

### 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.

### Setup Directories

Input:

- ROOT\_DATA\_DIR: /disk1/cescaba/MUSE
- RAW\_DATA\_DIR: \$ROOT\_DATA\_DIR/raw/194

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

- CALIB\_DATA\_DIR: /disk1/cescaba/reflex2/2015-12-03T09:24:27/Local

Output:

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

Working Directories:

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

### Global Parameters

- RecipeFailureMode: Ask

- EraseDir: false

- FITS\_VIEWER: ds9

- GlobalPlotInteractivity: true

- SelectDatasetMethod: Interaction

- ProductExplorerMode: Triggered

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 "EraseDir" 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 to use for the inspection of input/output products.

Disable interactive GUIs for the whole workflow. Overrides in subworkflows have precedence.

Selection method for the Data Set Chooser.

Enabled - ProductExplorer pops up after each dataset is finished. Triggered - ProductExplorer pops up after all datasets are finished. Disabled - do no use ProductExplorer.

### Data reduction strategy parameters

- ComputeWCS: false

If true, it computes the astrometric solution from dedicated on-sky observations (if available). If false, it uses the solution from the static calibrations. Default=false.

- SkyMethod: auto

It specifies the method used to subtract the sky background. Valid entries are: <none | subtract-model | model | auto>. Default: auto.

- ComputeLSF: false

If true, it computes the instrumental Line Spread Function (LSF) from the raw arc lamp frames. If false, it uses the Instrumental Line Spread Function from master calibrations, which usually provide a good representation of the LSF. Default=false.

o none, the sky background subtraction is not performed.  
o subtract-model, precalculated sky lines and continuum are subtracted (e.g. from dedicated sky observations or static calibrations). We recommend to use this method if dedicated sky observations are available.  
o model, the sky is computed on a fraction of the field of view specified by the parameter SkyFr\_2 and then subtracted. We recommend to use this method if the sky background needs to be evaluated from the target field of view.

- SkyFr\_1: 0.03

Fraction of pixels to be considered as sky in dedicated offset-sky observations.

- LamMin: 4000

Wavelength range of the reconstructed cube in angstrom (default: from 4000 to 10000 Å).

- SkyFr\_2: 0.10

Fraction of pixels to be considered as sky in the target field of view or in sky mask.

- LamMax: 10000

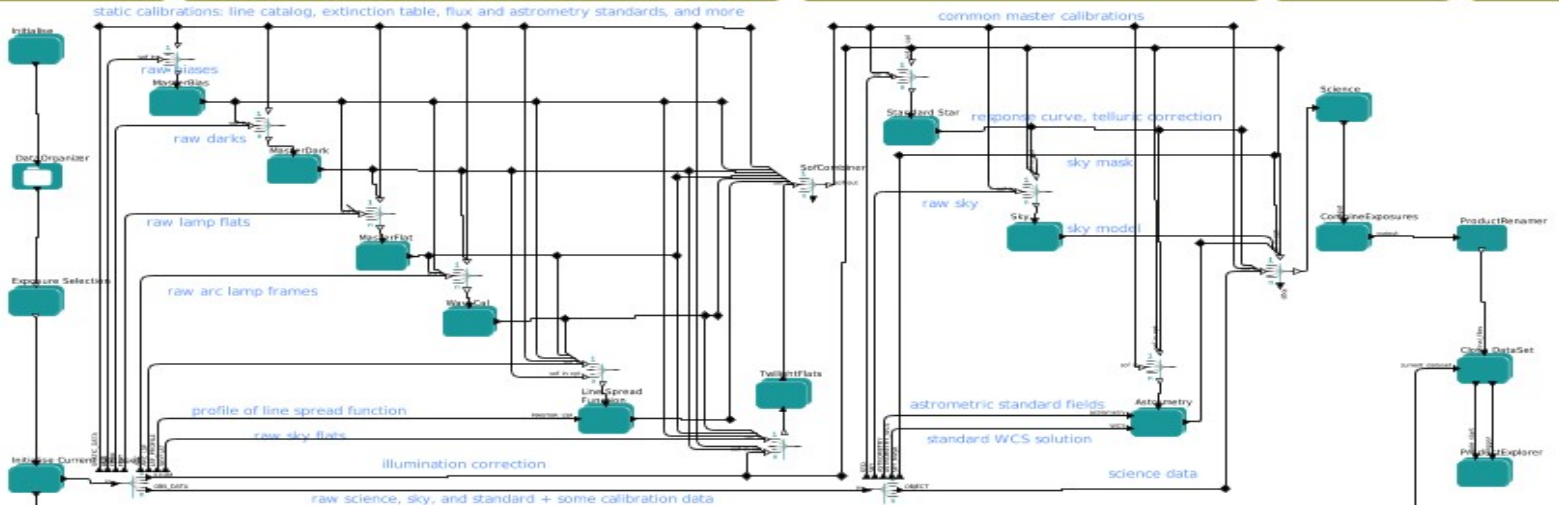
### Step 1: Data Organisation and Selection

### Step 2: Creation of Master Calibration Files

### Step 3: On-Sky Calibrations

### Step 4: Cube Creation and Combination

### Step 5: Organizing outputs



Auxiliary and debug parameters, please do not change:

• GLOBAL\_TIME\_STAMP: 2015-12-03T09:24:27 • ESOResArgs: -suppress-prefix=TRUE • UserInputSkyMethod: auto • END\_PRODUCTS\_SUBDIR: 2015-12-03T09:24:27/MUSE.2014-12-03T06:57:26.601\_combined... • N\_SELECTED\_DATASETS: 20 • DatasetName: MUSE.2014-12-03T06:57:26.601\_combined\_cubes





# Existing Reflex Workflows

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

Instrument	Release Notes	Source Kit	User Manual	Cookbook	Additional Documents	Additional Datasets	Reflex Tutorials	Status
AMBER	2016-04-01	4.3.4	4.3.4					Operational on hold
CRIRES	2016-02-15	2.3.3	1.13	Cookbook				Operational on hold
DETMON	2016-02-15	1.3.0	1.3.0					Operational on hold
EFOOSC	2016-04-01	2.2.5	1.0			Demo Data		End of maintenance
FORS	2016-04-01	5.3.5	5.3			Demo Data (29 MB)	Tutorial: 1.1 (FORS-IMG) Tutorial: 1.1 (FORS-PMOS) Tutorial: 1.9 (FORS-SPEC) Demo Data: 0.8	Operational on hold
GIRAFFE	2016-02-26	2.14.3	2.14.3	Cookbook		Standard Calibration Files page		Operational on hold
HAWKI	2016-04-04	1.8.21	1.12			Demonstration Package (2,5 GB)		Operational on hold
ISAAC	2016-02-15	6.1.5	1.4			Static Calibration Files (50 MB)		End of maintenance
KMOS	2016-04-15	1.3.18	2.18				Tutorial: 1.6 Demo Data: 1.2	Active
MIDI	2016-04-01	2.8.5	2.8.5					End of maintenance
MUSE	2016-04-18	1.6	1.6			MUSE IFU 6 trace tables Leagacy MUSE static calibrations	Tutorial: 9.0 Demo Data: 1.3	Active
NACO	2016-02-15	4.4.1	1.1					Operational on hold
SINFONI	2016-03-03	2.9.0	19.6		ADA IV 2006 paper	Calibration Database Example (255 MB) Demonstration Package (1.2 GB)	Tutorial: 1.6 Demo Data: 0.2	Operational on hold
SOFI	2016-02-15	1.5.6	1.2					End of maintenance
SPHERE	2016-03-02	0.18.0						Active
UVES	2016-03-03	5.7.0	22.12 (UVES) 18.6 (UVES-FIBRE)			Demonstration Package (2.0 GB)	Tutorial: 6.7 (UVES) Tutorial: 1.6 (UVES-FIBRE) Demo Data: 4.4	Operational on hold
VIMOS	2016-04-01	3.1.4	7.0			Demonstration Package (1.7 GB)	Tutorial: 2.3 (VIMOS-IFU) Tutorial: 2.0 (VIMOS-MOS) Demo Data: 0.4	Operational on hold
VISIR	2016-04-18	4.2.0	1.6				Tutorial: 1.1 Demo Data: 0.2	Operational on hold
XSHOOTER	2016-03-31	2.7.1	12.9			Additional NIR telluric model catalog (190 MB)	Tutorial: 2.8 Demo Data: 1.2	Operational on hold



# Upcoming Reflex Workflows

Most new instruments pipelines will come with workflows

VIMOS (imaging)  
HAWK-I  
VIRCAM  
SPHERE  
AMBER  
ESPRESSO  
FLAMES-GIRAFFE  
GRAVITY  
MATISSE



# Advanced Topics

- Recipe parameters
- Re-executing a recipe
- Command line interface
- Sharing workflows
- Debugging workflows



# Recipe parameters (I)

- The interactive windows use some default values as starting points. Right click on actor, select “Open Actor”, and change the INIT\_\* variables to change them

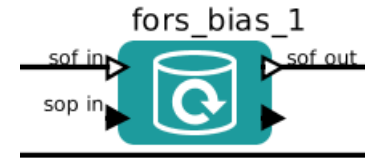


- INIT\_SKYGLOBAL: FALSE
- INIT\_SKYMEDIAN: FALSE
- INIT\_SKYLOCAL: TRUE
- INIT\_COSMICS: FALSE
- INIT\_SLIT\_MARGIN: 3
- INIT\_EXT\_RADIUS: 12
- INIT\_CONT\_RADIUS: 0
- INIT\_EXT\_MODE: 1
- INIT\_SKYALIGN: -1



# Recipe parameters (II)

- Right click on actor, select “Open Actor”
- Right-click on RecipeExecutor, select “Configure Actor”



Edit parameters for fors\_bias\_1

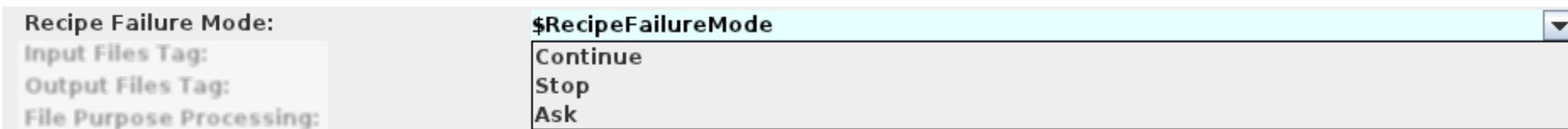
recipe:	fors_bias		
mode:	Run		
Lazy Mode:	<input checked="" type="checkbox"/>		
Recipe Failure Mode:	\$RecipeFailureMode		
Input Files Category:			
Output Files Category:			
File Purpose Processing:	Strip last		
Allow empty inputs:	<input type="checkbox"/>		
Pause before execution:	<input type="checkbox"/>		
Pause after execution:	<input type="checkbox"/>		
Clean Temporary Directories:	<input type="checkbox"/>		
Products Dir:	\$TMP_PRODUCTS_DIR	Browse	Configure
Logs Dir:	\$LOGS_DIR	Browse	Configure
Bookkeeping Dir:	\$BOOKKEEPING_DIR	Browse	Configure
EsoRex default args:	\$ESORexArgs		
Bookkeeping DB:	\$BOOKKEEPING_DB	Browse	Configure
recipe_param_1:	stack_method=minmax		
recipe_param_2:	minrejection=1		
recipe_param_3:	maxrejection=1		
recipe_param_4:	klow=3		
recipe_param_5:	khigh=3		
recipe_param_6:	kiter=999		

Commit Add Remove Defaults Preferences Help Cancel



# Re-executing a recipe

- Sometimes a recipe fails due a number of factors: bad parameters, wrong data, software bugs, etc...
- The workflow reacts to the failure of the recipe depending on parameter “Recipe Failure Mode”



- The Product Explorer allows to open the bookkeeping directory for a given product file with right-click on the file and  
open `xterm`
- Then you can re-execute the recipe with the same parameters and output path

`./cmdline.txt`



# Re-executing a recipe

- Re-execute the recipe with same parameters and output path:  
`./cmdline.txt`
- To change parameters edit the file  
`<recipe>.rc`
- To use defaults just call esorex  
`esorex <recipe> data.sof`





# Command line interface examples

- List all available workflows:

```
esoreflex -l
```

- Load kmos workflow:

```
esoreflex kmos
```

- Process all new data in my directory without interaction:

```
esoreflex -n xshooter -RAW_DATA_DIR=/data/xshooter_data
```

- Rerun all previously failed datasets with nonstandard workflow parameter:

```
esoreflex -n muse -RAW_DATA_DIR=/data/muse_data \  
-SelectDatasetMode=failed -recomputeWCS=true
```



# Additional Information

- Reflex page  
<http://www.eso.org/sci/software/reflex/>
- Data Reduction FAQ  
<http://www.eso.org/sci/data-processing/faq.html>
- ESO pipeline page  
<http://www.eso.org/sci/software/pipelines/>
- In case of problems please report to [usd-help@eso.org](mailto:usd-help@eso.org) and include: log (or description) of error/problem, data set id (or list of raw files), pipeline version, operating system