NIRISS Calibration Reference Files

This page provides information on the reference files used by the JWST pipeline to process NIRISS data. The information is sorted by pipeline stages. Detailed information on the pipeline steps and files format is provided in the specified links.

Introduction

The JWST NIRISS instrument offers 4 science observing modes that are automatically processed by the JWST pipeline: wide field slitless spectroscopy, single object slitless spectroscopy, aperture masking interferometry, and imaging. The following sections provide information on the NIRISS-specific reference files used by the pipeline, organised according to the different pipeline stages.

CALWEBB_DETECTOR1

This pipeline stage process the LVL1 up-the-ramp raw files and returns the level 2a files in units of (counts/sec). All NIRISS data goes though the entire set of pipeline steps applied in CALDETECTOR1. To achieve that several the diverse steps in the correspondent NIR pipeline flow use the following reference files:

Table 1. NIRISS reference files used by the JWST pipeline module calwebb_detector1.

Pipeline step	Reference files used	Usability notes
Data Quality Initialisation	jwst_niriss_mask_xxxx.fits	
Saturation check	jwst_niriss_saturations_xxxx.fits	
Interpixel Capacitance Correction	jwst_niriss_ipc_xxxx.fits	Step included in the pipeline, but disabled by default.
Superbias Subtraction	jwst_niriss_superbias_xxxx.fits One reference file per readout mode/subarray.	
Reference Pixels Correction	N/A. The correction uses reference pixels information stored in each exposure	
Linearity Correction	jwst_niriss_linearity_xxxx.fits	
Persistence Correction	Persat: jwst_niriss_persat_xxxx.fits Trap density: jwst_niriss_trapdensity_xxxx.fits Trap pars: jwst_niriss_trappars_xxxx.fits	
Dark Subtraction	jwst_niriss_dark_xxxx.fits One reference file per readout mode/subarray.	
Jump Detection	Gain: jwst_niriss_gain_xxxx.fits Read noise: jwst_niriss_readnoise_xxxx.fits	
Ramp fit	Gain: jwst_niriss_gain_xxxx.fits Read noise: jwst_niriss_readnoise_xxxx.fits	

CALWEBB_Dark

This pipeline branch is intended for use with dark exposures. It applies all of the same detector-level correction steps as CALWEBB_Slopes and uses the same reference files, but stops just before the application of the dark subtraction step.

CALWEBB_IMAGE2 reference files

In this pipeline stage individual exposures from the imaging modes are processed from counts/sec to absolute flux units. Details on the pipeline steps flow are given here.

Table 2. NIRISS reference files used by the JWST pipeline module calwebb_image2.

Pipeline step	Reference files used	Usability notes
Assign WCS Information	Distortion file: jwst_niriss_distortion_xxxx.asdf	
Background Subtraction	Step does not use any reference file.	Step applies to science data if the user requests a dedicated background image. Not applied to Target Acquisition images.
Flat Field Correction	Flat field: jwst_niriss_flat_xxxx.fits	
Flux Calibration	Photom: jwst_niriss_photom_xxxx.fits Area: jwst_niriss_area_xxxx.fits	Not applied to Target Acquisition images.
Rectify 2D image	Step does not use any reference file.	

CALWEBB_SPEC2 reference files

This pipeline stage process Individual exposures from the spectroscopic modes from counts/sec to absolute flux and wavelength units. Nominally, this stage works on individual exposures obtained for the NIRISS wide field slitless grism observations, but the steps are not yet implemented.

Table 3. NIRISS reference files used by the JWST pipeline module calwebb_spec2.

Pipeline step	Reference files used	Usability notes
Assign WCS Information	Distortion file: jwst_niriss_distortion_xxxx.asdf	
Background Subtraction	WFSS uses a reference file (To be defined). SOSS uses a reference file (master background).	
Subwindow extraction	Step does not use any reference file.	
extract_2d	jwst_niriss_wavecorr_xxxx.asdf	Step applied in NIRISS WFSS only
Flat Field	Flat file: jwst_niriss_flat_xxxx.fits	
Point vs Extended Decision	Step does not require any reference file	
Photometric Correction	Photom file: jwst_niriss_photom_xxxx.fits Area: jwst_niriss_area_xxxx.fits	
Rectified 2D 3D product		
Spectral Extraction 1d	jwst_niriss_extract1d_xxxx.json	

CALWEBB_IMAGE3 reference files

Multiple exposures from the direct imaging modes (e.g., dither pattern or mosaic) are combined into a single rectified (distortion corrected) image. Details on the pipeline steps flow are given in this page.

Table 4. NIRISS reference files used by the JWST pipeline module calwebb_image3.

Pipeline step	Reference files used	Usability notes
Tweakreg Catalog	Step does not use any reference file.	
Tweakreg	Step does not use any reference file.	
Skymatch	Step does not use any reference file.	
Outlier_detection	Step does not use any reference file.	
Resample	Step does not use any reference file.	
Source_catalog	Step does not use any reference file.	

CALWEBB_SPEC3

Multiple individual exposures for the spectroscopic modes (i.e. dither patters or mosaics) are combined into a single rectified cube and/or extracted spectrum.

Table 5. NIRISS reference files used by the JWST pipeline module calwebb_spec3.

Pipeline step	Reference files used	Usability notes
Outlier Detection	Step does not require any extra reference file.	
Create Exp Level Products		
Cube Creation	Step does not use any reference file.	
Spectral Extraction 1D	jwst_niriss_extract1d_xxxx.json	

CALWEBB_AMI3

The Level-3 Aperture Mask Interferometry pipeline is intended to be applied to associations of individual calibrated NIRISS AMI exposures and is used to compute fringe parameters and correct science target fringe parameters using observations of reference targets. Details on the individual pipeline steps can be found here.

Table 6. NIRISS reference files used by the JWST pipeline module calwebb_ami3.

Pipeline step	Reference files used	Usability notes
Analize	jwst_niriss_throughput_xxxx.fits	
Average	Step does not use any reference file.	
Normalize	Step does not use any reference file.	