



STScI | SPACE TELESCOPE
SCIENCE INSTITUTE

EXPANDING THE FRONTIERS OF SPACE
ASTRONOMY

The Roman Software Working Group

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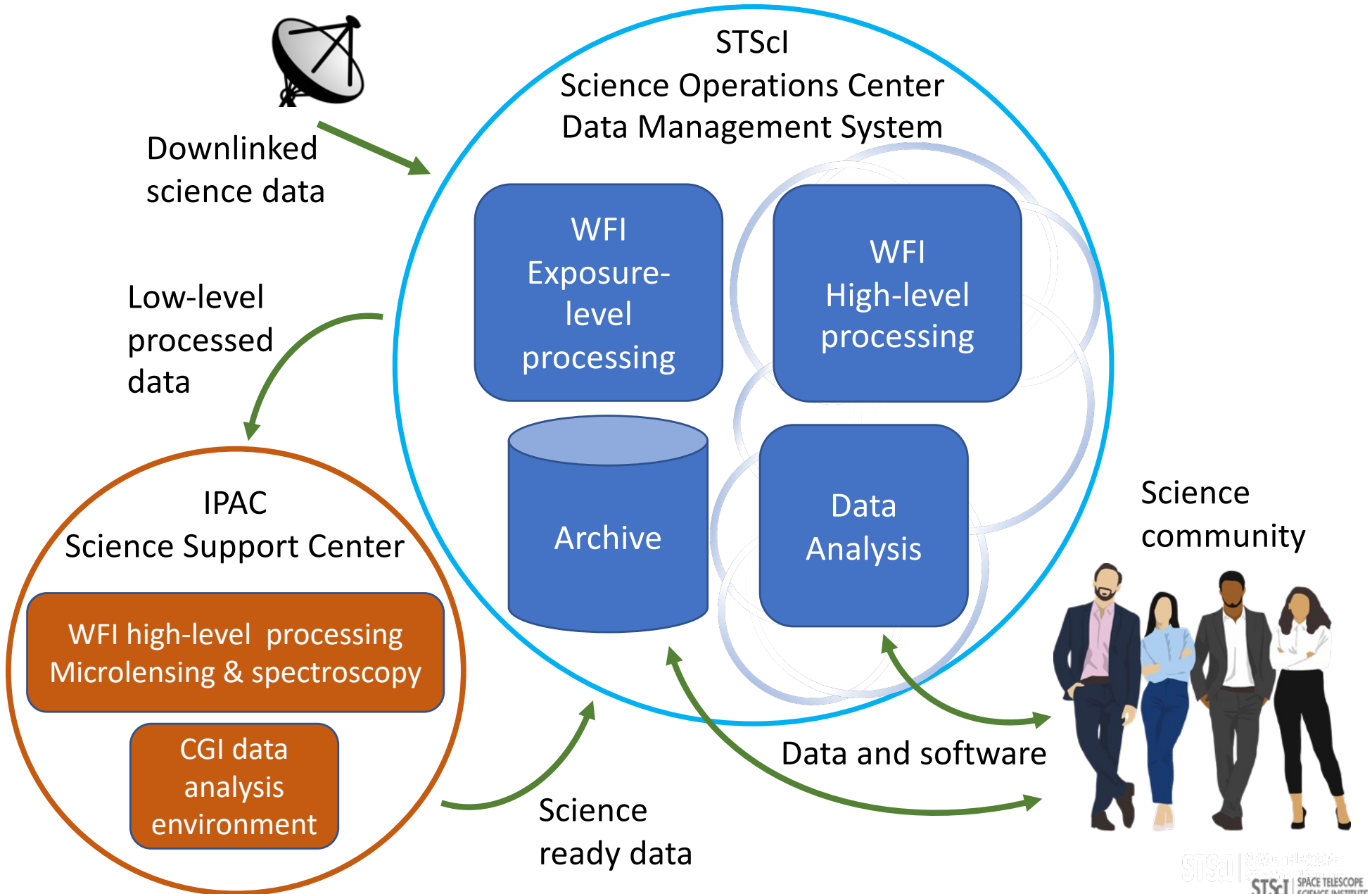


Community interaction on technical aspects of Roman Software and Data products

Interactions are essential to ensure:

- That the data products will broadly serve the science needs of the community
- That the science platform will broadly serve the data-analysis needs of the community
- That software and documentation are broadly meeting the needs
- That code and algorithms can be effectively shared

Roman Data Management





Scope of the working group

Current concept:

- Limited to WFI
- Includes, imaging, spectroscopy & time-domain
- Includes topics of relevance to both SSC and SOC
- All aspects of data processing, including topics where PITs and WFS are leading
- Includes discussions of the Roman Science Platform
- Topics related to accessing and using the data

This is not a decision-making body but is nonetheless crucial for making sensible decisions about software and data processing.



Previous iteration

- SOC-SIT Software & Data Functionality Working Group
- SOC-SIT Software & Data Standards Working Group

Reports and reference material

Discussion Material Meetings Reports Reference material User Stories

Title	Creator	Modified
WFI Level 2 data products	Harry Ferguson	Mar 04, 2022
Reconstituting the Roman Software & Data Functionality ...	Harry Ferguson	Dec 08, 2021
Roman WFI Level-3 Sky Tessellation	Harry Ferguson	Dec 07, 2021
Aperture Photometry Variability Catalog	Harry Ferguson	Dec 01, 2021
Systematic uncertainties and completeness in static catal...	Harry Ferguson	Oct 18, 2021
WFI Catalog Shape Information including Ellipticities	Harry Ferguson	Sep 20, 2021
Basic Statistical Uncertainties on Catalog Parameters	Harry Ferguson	Sep 17, 2021
Photometric Redshifts	Harry Ferguson	Sep 16, 2021
Point Spread Functions	Harry Ferguson	Apr 28, 2021
HLIS Catalogs	Harry Ferguson	Nov 06, 2020
Roman Catalogs	Harry Ferguson	Nov 06, 2020
HLPP SIT Resource Estimates	Harry Ferguson	Nov 02, 2020
Discussion of Data-Format Trade Study	Russell Ryan	Jun 04, 2020
WFIRST data associations	Harry Ferguson	May 18, 2020
Software and Algorithm Demonstrations	Russell Ryan	Apr 20, 2020

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/ SOC-SIT Software & Data Functionality Working Group 727 views

Anticipated Data Processing and Algorithm Descriptions for SIT-Contributed Software

Created by Russell Ryan, last modified

Basic Statistical Uncertainties on Catalog Parameters

Created by Harry Ferguson on Sep 17, 2021

R. E. Ryan¹, S. Crawford¹, R. J. Hargis¹, R. Hounsell^{4,5,6}, J. K. Rizzo⁶, A. Rest¹, B. Rose¹, L. Williams¹⁰, R. Windhorst¹²

Introduction

While many of the measurements planned are very valuable to have estimates of the size of the pixel of the detector. The object catalog is meaningful. The associated science requirements are:

HLIS 2.1.5: The WFIRST shall be capable of producing a catalog containing information for each detected source in the HLIS field, including positions, classifications, photometry (e.g. aperture photometry, model fits, adaptive moment photometry), and limited time domain information for variable sources. (GND+SIT)

Affiliations

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Revision History

1. Initial draft prepared
2. Second draft completed
3. Third draft completed

Table of Contents

- 1 Executive Summary
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- 2 Introduction and Motivation
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 - 3 Operational Concepts and Requirements
 - 4 JWST Data Processing Pipeline
 - 4.1 Additional Helpful References

Subtitles:

Propagation of errors is not an entirely trivial task. What is best. Take the simplest example: uncertainty include:

1. Poisson fluctuations in the number of counts
2. Uncertainties in centering the aperture
3. The Poisson uncertainty in the sky background
4. The uncertainty in the estimate of the background
5. The Gaussian(?) uncertainty in the background
6. The uncertainty in the detector dark current
7. The non-Gaussian uncertainty in the background
8. Counting statistics in the flat fields
9. All of the terms above for point sources

To the extent that the sky apertures are independent. However, sky-estimation is not independent. Even all the sources in the image. So range of uncertainty is larger.

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 - 3.1. Hubble Catalog of Variables
 - 3.1.1.1. Thoughts for Roman
 - 3.1.2. Zwicky Transient Factory
 - 3.1.2.1.1. Thoughts for Roman
 - 3.1.3. The Rubin Observatory Legacy Survey of Space and Time (LSST)
 - 3.1.3.1.1. Thoughts for Roman
- 4. Possible Approaches for Roman
 - 4.1. To force or not to force the photometry?
 - 4.2. Flow-Diagrams of Possible Concepts

2. Introduction

This purpose of this page is further elaboration and discussion regarding the WFI pipeline extension **Basic Variability Catalog for HLIS and SNS survey areas**. The brief description of that feature is the following:

Create separate photometric catalogs from different epochs of data from the two major surveys, similar to the Hubble Catalog of Variables. This will be good for point-sources, but not for sources embedded in complex backgrounds. This item also does not include rapid release or transient alerts.

This traces back to requirement HLIS2.1.3:

HLIS 2.1.3: WFIRST shall be capable of producing a catalog containing information for each detected source in the HLIS field, including positions, classifications, photometry (e.g. aperture photometry, model fits, adaptive moment photometry), and limited time domain information for variable sources. (GND+SIT)



Possible Agenda topics FY 23 (suggestions welcome!)

Major topics for FY23

- Mosaics, Associations & sky tessellation
- Data Releases
- Photometric redshifts
- Basic photometry (including PSF matching)
- Synthetic photometry (for simulations)
- Simulations (idealized & instrument signatures)
- Difference imaging
- Image co-addition
- Spectroscopic data processing



Possible Agenda topics FY24 & Beyond

- Background estimation
- PSFs & Astrometry
- PSF photometry & PSF Library
- Photometric precision (in crowded & uncrowded fields)
- Galaxy shapes, star/galaxy classifiers, etc.
- Source injection & completeness
- Level 5 products
- Archive User tools, API, data availability notification, performance
- Platform Resources & Performance
- Topics that flow from the Calibration WG & community