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EXPANDING THE FRONTIERS OF SPACE ASTRONOMY

Nancy Grace Roman Space Telescope Data Management and Data Analysis

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Science Operations and the Data Management System

STScI Roman Science Operation Center responsibilities include:

- Planning & scheduling all observations
- Calibration and support of the Wide Field imaging
- The archive (MAST) for all mission data
  - Most Roman science will be archival due to the survey nature of the mission

NASA Astrophysics *Big Data*:

- Data accumulated per day likely to be >100x *Hubble*
- Both catalogs and pixel-level data sets provide unique science opportunities
- Downloading and processing exceeds resources typically available

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Data products from multiple mission partners

- Calibrated and mosaiced images, extracted spectra, catalogs, etc.
- Staged in the cloud and co-located with significant computational resources
- Open source, modular imaging pipeline facilitates custom reprocessing

WFI Data Management Environment

- Cloud-based science platform for high-level data processing
- Bring software to the data
- Jupyter Lab environments and notebooks to ease access, sharing and repeatability

AWS

jupyter

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Roman Data Management

Downlinked science data

STScI
Science Operations Center
Data Management System

WFI Exposure-level processing

WFI High-level processing

Archive

Data Analysis

Low-level processed data

IPAC
Science Support Center

WFI high-level processing
Microlensing & spectroscopy

CGI data analysis environment

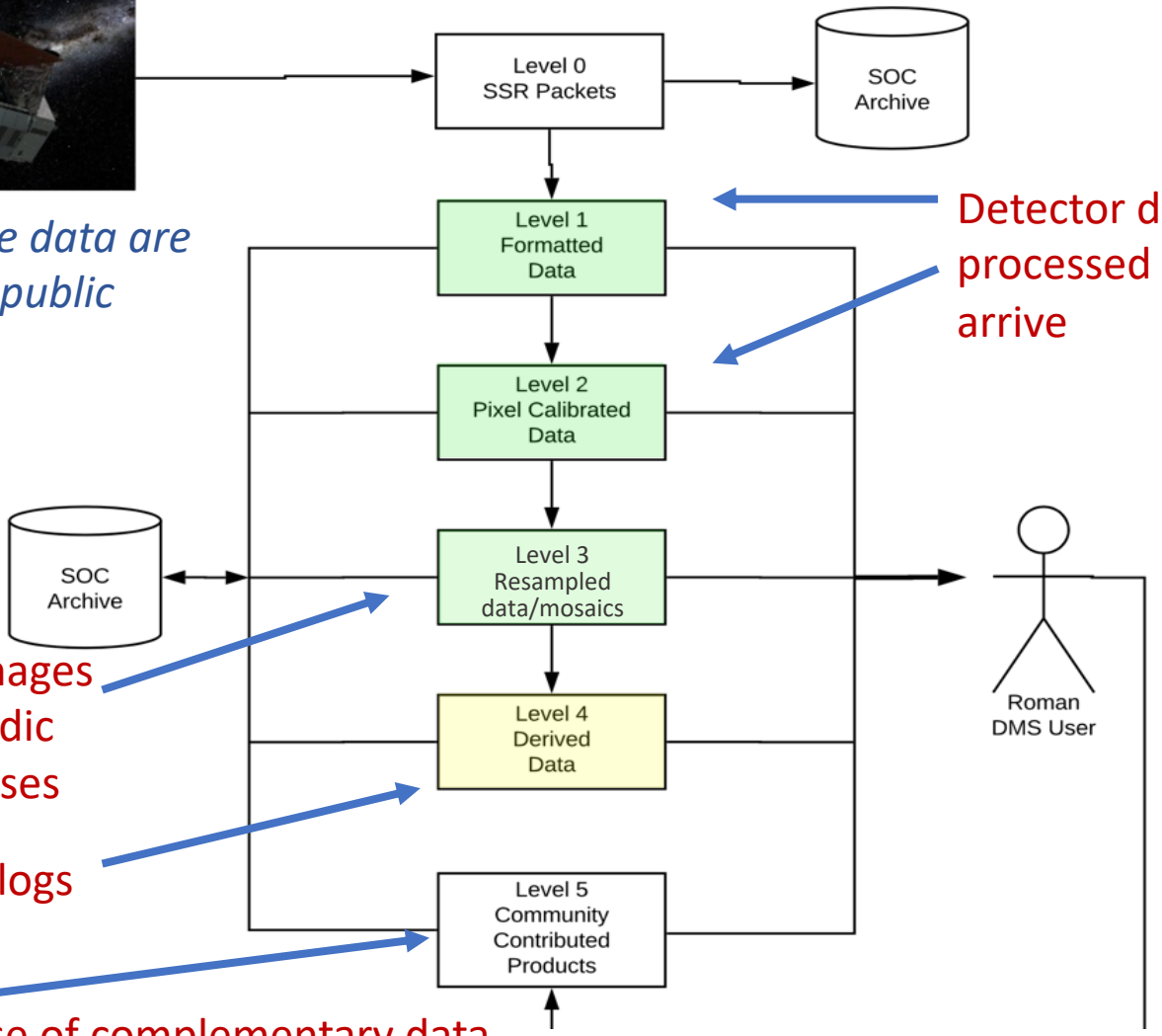
Science ready data

Data and software

Science community

Data product levels

All Roman science data are immediately public



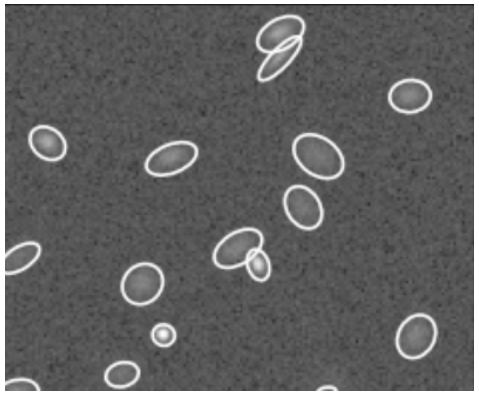
Available as associated images are processed; with periodic consolidated survey releases

Catalogs

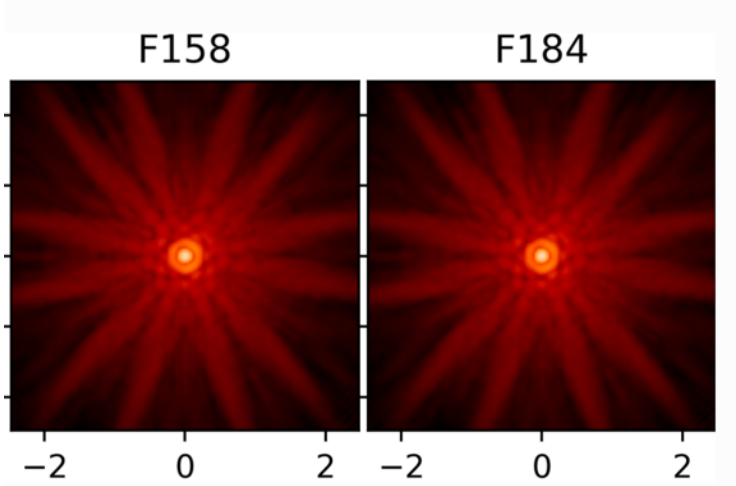
E.g. catalogs that make use of complementary data from other facilities & survey-level calibrations

WFI Imaging
High-Level Pipeline Components

Catalogs



Point spread functions

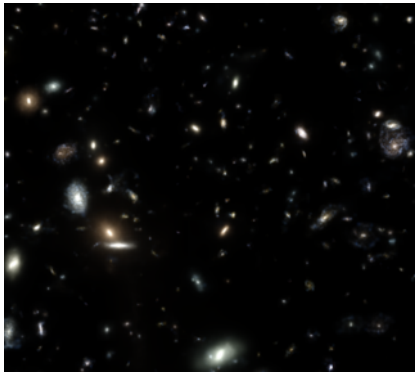


High-level science products:

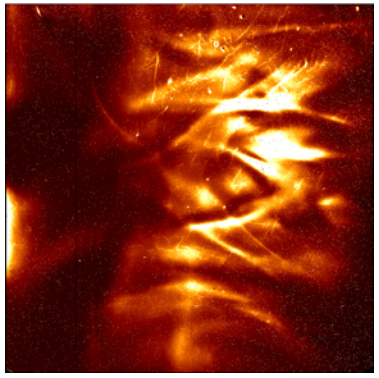
- Catalogs of static & variable sources
- Spectroscopic extractions & redshifts (SSC)
- Photometric redshifts (based only on Roman data)

Simulations

Astronomical Sources



Instrument signatures



→ Completeness/Systematics

Community input

- Moving from concept to design
  - Helpful to have use cases and “user stories” to help guide development
- Types of questions
  - What measurements would you like to see in the catalog(s)?
  - Do you anticipate needing to reprocess image data? Why?
  - Do you anticipate needing to download large amounts of data, instead of working in the cloud? Why?
  - How can we best configure the science platform (e.g. with what hardware or software) to meet your needs?

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