OpenUniverse 2024 Roman & Rubin Simulated Images: Preview

Data Products

03 June 2024

Roman

Input truth files

Relative directory path:

- openuniverse2024/roman/preview/roman_rubin_cats_v1.1.2_faint/

There are 7 files in this directory. In each filename listed below, "10307" refers to the nside 32 healpixel the file corresponds to.

1. **galaxy_10307.parquet** - Table of galaxy properties in Parquet format

2. **galaxy_flux_10307.parquet** - Table of galaxy fluxes in relevant bandpasses, in Parquet format
3. **galaxy_sed_10307.hdf5** - Low-resolution galaxy spectral energy distributions (SEDs) in HDF5 format. The wavelength grid is contained under the 'meta' group. The 'galaxy' group contains a tree of object IDs split into subgroups of 10k objects, each containing the SED for each component of the object (bulge, disk, and star-forming knots). Original SED resolution can be obtained via https://github.com/LSSTDESC/lsstdesc-diffsky/.
4. **pointsource_10307.parquet** - Table of star properties in Parquet format
5. **pointsource_flux_10307.parquet** - Table of star fluxes in Parquet format
6. **snana_10307.hdf5** - Table of transient fluxes in HDF5 format
7. **snana_10307.parquet** - Table of transient properties in Parquet format

Roman Wide-Area Survey: Truth files

Relative directory path:

- openuniverse2024/roman/preview/RomanWAS/truth

Roman Wide-Area Survey: Simulated ‘True’ images

Relative directory path:

- openuniverse2024/roman/preview/RomanWAS/images/truth

Truth images that include the appropriate bandpass and PSF, but otherwise no sources of noise except for object poisson noise, backgrounds, or other non-idealities of the detectors. The subdirectory structure splits files into bandpass, then pointing id, then individual SCA files. Each final file also contains this information in its name.

Roman Wide-Area Survey: Simulated ‘Calibrated’ images

Relative directory path:

- openuniverse2024/roman/preview/RomanWAS/images/simple_model

Simulated “Calibrated images” that include relevant backgrounds and major sources of detector non-idealities that would prevent treating the images as final calibrated products. The subdirectory structure splits files into bandpass, then Pointing ID, then individual SCA files. Each final file also contains this information in its name.

Roman Wide-Area Survey: Simulated Coadds

Relative directory path:

- openuniverse2024/roman/preview/RomanWAS/images/coadds

IMCOM coadd images. The subdirectory structure corresponds to sub-images (blocks) as described in Fig 4a of Hirata et al. (2024).

Roman Wide-Area Survey: Simulation metadata

Relative directory path:

- openuniverse2024/roman/preview/RomanTDS

There are 3 files in this directory:

- **was.yaml** - Driver configuration file for the WAS image simulation
- **Roman_WAS_obseq_11_1_23.fits** - Contains information for each pointing in the simulated WAS.
- **Roman_WAS_obseq_11_1_23_radec.fits** - Contains tables of RA and Dec of each Sensor Chip Assembly (SCA) center for each pointing.

Roman High-Latitude Time Domain Survey: Truth files

Relative directory path:

- openuniverse2024/roman/preview/RomanTDS/truth

Truth files for each SCA, containing basic info on any object simulated in them (e.g., position, total object flux, etc) - Subdirectory structure splits files into bandpass, then pointing id, then individual SCA files. Each final file also contains this information in its name.

Roman High-Latitude Time Domain Survey: Simulated “True” images

Relative directory path:

- openuniverse2024/roman/preview/RomanTDS/images/truth

'True' images that include the appropriate bandpass and PSF, but otherwise no sources of noise except for object poisson noise, backgrounds, or other non-idealities of the detectors. The subdirectory structure splits files into bandpass, then pointing id, then individual SCA files. Each final file also contains this information in its name.

Roman High-Latitude Time Domain Survey”: Simulated “Calibrated” images

Relative directory path:

- openuniverse2024/roman/preview/RomanTDS/images/simple_model

Simulated 'Calibrated' images that include relevant backgrounds and major sources of noise, including some that are correlated, but no detector non-idealities that would prevent treating the images as ~final calibrated products. The subdirectory structure splits files into bandpass, then pointing id, then individual SCA files. Each final file also contains this information in its name.

Rubin

There are 8 kinds of simulated data products in this distribution. Aside from the simulated input images, i.e., the raw data files, these simulated data products are all produced by the Rubin Science Pipelines code. For more detailed descriptions of the Rubin code and their outputs, see:

- Bosch, J., AlSayyad, Y., Armstrong, R., et al. 2019, in ASP Conf. Ser. 523, Astronomical Data Analysis Software and Systems XXVII, ed. P. J. Teuben et al. (San Francisco, CA: ASP), 521
- Bosch, J., Armstrong, R., Bickerton, S., et al. 2018, PASJ, 70, S5
- https://pipelines.lsst.io/index.html

LSSTCam raw exposures

Relative directory path:

- LSSTCam/raw/all/raw

These are the raw, pixel data, one file per exposure per CCD, simulated as if produced by LSSTCam observations.

Spatial partitioning for coadded images

Relative directory path:

- skymaps/skyMap

This is the partitioning of the sky that's used for generating coadded images.

Reference catalog stars

Relative directory path:

- refcats/roman-desc-sims/uw_stars_aug_2021_tp

These are the files containing the reference catalog stars that are used for calibrating the LSSTCam images.

Calibrated exposures

Relative directory path:

- u/descdm/preview_data_step1_w_2024_12/*/calexp

Calibrated exposure data including detrended, background-subtracted image, and mask and variance plane data, the PSF model for that image, WCS, and zero-point information.

Detected sources in calibrated exposures

Relative directory path:

- u/descdm/preview_data_step1_w_2024_12/*/src

Catalog of detected sources in each calexp and their measured properties.

Calibrated coadds

Relative directory path:

- u/descdm/preview_data_step3_2877_19_w_2024_12/20240403T150003Z/deepCoadd_calexp

Calibrated coadded image dataset with the same info as the per-exposure calexps.

Number of exposures in coadds

Relative directory path:

- u/descdm/preview_data_step3_2877_19_w_2024_12/20240403T150003Z/deepCoadd_nImage

FITS image containing the number of exposures contributing to each pixel in the coadd.

Forced photometry on coadds

Relative directory path:

- u/descdm/preview_data_step3_2877_19_w_2024_12/20240403T150003Z/deepCoadd_forced_src

Catalog of forced photometry measurements for the objects identified in the multiband coadds.