SISTER: Composite Release ID (CRID) Product Generation Files

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Documentation Revision Date: 2023-07-17

Dataset Version: 1

Summary

This dataset contains Composite Release ID (CRID) Product Generation and ancillary files that document the workflow components, versions, and links to source code for each version of data products generated by the Space-based Imaging Spectroscopy and Thermal pathfindER (SISTER) activity. SISTER supports the NASA Earth System Observatory's Surface Biology and Geology (SBG) mission. The objective of SISTER is to mature many of the workflows, algorithms, and data products envisioned for SBG, lay the groundwork to develop a robust cal/val network, and build a vigorous and expansive user community ahead of launch. This dataset contains JSON files that document the software employed in product generation steps. A schematic diagram illustrating the workflow is also included for each CRID.

Additional CRID files will be added to this dataset for SISTER Project collections archived at the ORNL DAAC.

This dataset includes five files: two files in JavaScript Object Notation (.json) format, two image files in Portable Network Graphics (.png) format and one file in text (.txt) format.

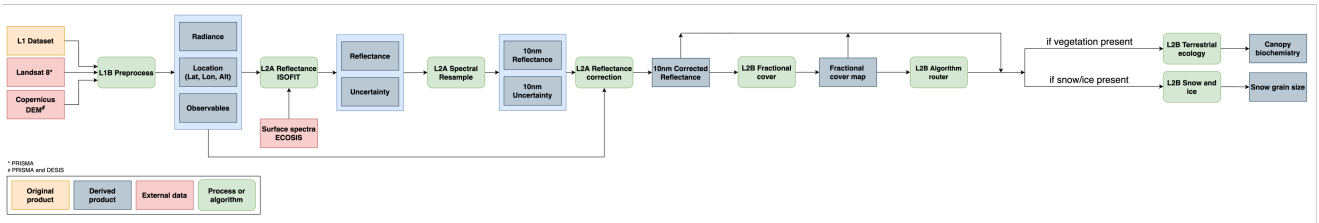

Figure 1. Workflow diagram for SISTER CRID 001 production run (Click on image to view full-resolution version.) Source: SISTER_CRID_001_workflow.png

Citation

Townsend, P., M.M. Gierach, P.G. Brodrick, A.M. Chlus, H. Hua, O. Kwoun, M.J. Lucas, N. Malarout, D.F. Moroni, S. Neely, W. Olson-Duvall, J.K. Pon, S. Shah, and D. Yu. 2023. SISTER: Composite Release ID (CRID) Product Generation Files. ORNL DAAC, Oak Ridge, Tennessee, USA. https://doi.org/10.3334/ORNLDAAC/2231

Table of Contents

1. Dataset Overview

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Project: SISTER

The Space-based Imaging Spectroscopy and Thermal pathfindER (SISTER) is a NASA project aimed at prototyping workflows and generating Surface

Biology and Geology (SBG)-like data products through efforts to build and sustain a community to increase prospects for major scientific discovery post launch of the SBG mission. SISTER utilizes existing airborne and spaceborne sources to generate prototype data products spanning terrestrial ecosystems, inland and coastal aquatic ecosystems, hydrology, and geology.

These data are associated with experimental products run by the SISTER Science Team as pre-launch modeling tools and data for algorithm development are investigated.

Related Datasets:

See SISTER datasets associated with these Composite Release ID (CRID) versions.
For example, products associated with SISTER_CRID_001.json can be found by filtering by "V001*".

2. Data Characteristics

These workflow files are associated with data products having the following spatiotemporal characteristics.

Spatial Coverage: Selected scenes/flight lines across the globe

Spatial Resolution: 30 m

Temporal Resolution: One time estimates

Temporal Coverage: 2011-05-13 to 2023-03-25

Site Boundaries: Latitude and longitude are given in decimal degrees.

Site	Westernmost Longitude	Easternmost Longitude	Northernmost Latitude	Southernmost Latitude
Selected sites across globe	-158.056	152.302	69.324	-38.860

Data File Information

This dataset includes five files: two files in JavaScript Object Notation (.json) format, two image files in Portable Network Graphics (.png) format and one file in text (.txt) format.

The ***SISTER_CRID_00<#>.json*** files provide information pertaining to the software used in workflow processes (Table 1). The files list the CRID number, name of software version, version number, and a URL to GitHub site that provide additional details.

The ***SISTER_CRID_00<#>_workflow.png*** files are images that illustrate the sequence and interconnected steps of the respective workflows.

The file names include version number (e.g., "001", "002") which link these CRID files to the products listed on the SISTER Project page.

The ***SISTER_log.txt*** file provides ancillary information which lists and explains file/scene addition or removal between version releases.

Table 1. Key SISTER workflow components, versions, and links to source code used for V001 production found in the SISTER_CRID_001.json file.

software	version	url
maap-api-nasa	2.0	https://gitlab.com/geospec/maap-api-nasa/-/tags/2.0
sister-preprocess	2.0.0	https://github.com/EnSpec/sister-preprocess/releases/tag/2.0.0
sister-isofit	2.0.0	https://gitlab.com/geospec/sister-isofit/-/releases/2.0.0
sister-resample	2.0.1	https://github.com/EnSpec/sister-resample/releases/tag/2.0.1
sister-reflect_correct	2.0.0	https://github.com/EnSpec/sister-reflect_correct/releases/tag/2.0.0
sister-fractional-cover	1.0.0	https://gitlab.com/geospec/sister-fractional-cover/-/releases/1.0.0
sister-algorithm_router	1.0.0	https://github.com/EnSpec/sister-algorithm_router/releases/tag/1.0.0
sister-trait_estimate	1.0.0	https://github.com/EnSpec/sister-trait_estimate/releases/tag/1.0.0
sister-grainsize	1.0.0	https://github.com/EnSpec/sister-grainsize/releases/tag/1.0.0

3. Application and Derivation

These files are useful for exploring the details of production techniques employed by the SISTER team.

4. Quality Assessment

Not applicable.

5. Data Acquisition, Materials, and Methods

The SISTER team documents their workflow processes employed at each step of this research project. Each version of products has an associated CRID document that lists the software packages used. URLs within the CRID JSON files lead to GitHub sites with additional details. The overall workflow process is illustrated in the associated PNG images (Figures. 1-2).

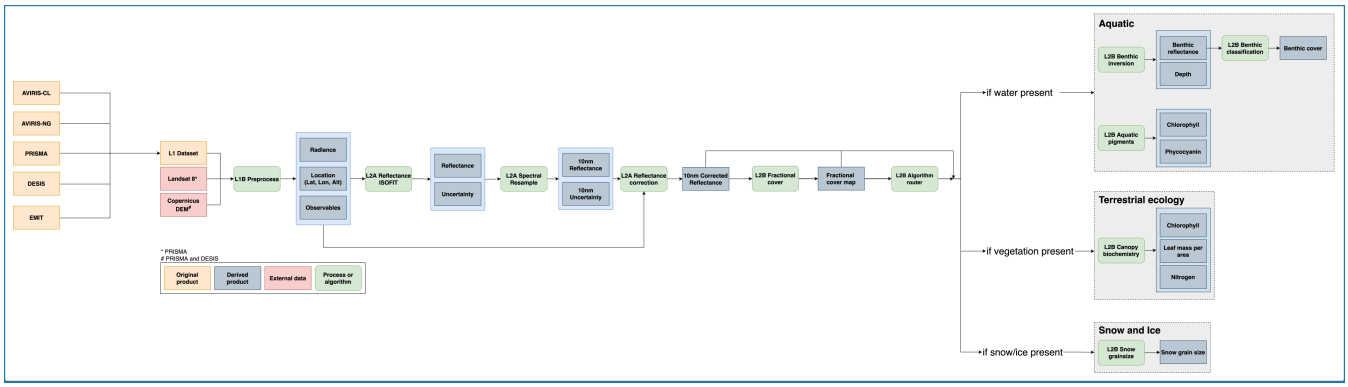

Figure 2. Workflow diagram of the SISTER CRID 002 production run (Click on image to view full-resolution version). Source: SISTER_CRID_002_workflow.png

The general workflow involved spatially resampling remotely sensed imagery to 30-meter resolution and processed to surface reflectance using an optimal estimation atmospheric correction algorithm, ISOFIT (Thompson et al., 2018) with an open-source neural-network-based emulator for modeling radiative transfer (Brodrick et al., 2021). Next, spectral resampling to a 10-nm sampling interval was performed in a two-step calculation. Bands were first aggregated and averaged to the closest resolution to the target interval then a piecewise cubic interpolator was used to interpolate the spectra to the target wavelength spacing.

Table 2. Summary of SISTER Sensors, Products, and Coding for outputs available as separate datasets.

Sensor	Product	Sensor_Level_Product
AVIRIS Classic	Resampled Surface Reflectance and Uncertainty	AVCL_L2A_RSRFL
	Corrected Surface Reflectance	AVCL_L2A_CORFL
	Fractional Cover	AVCL_L2B_FRCOV
	Vegetative Biochemical Traits	AVCL_L2B_VEGBIOCHEM
	Snow Grain Size	AVCL_L2B_SNOWGRAIN
	Benthic Reflectance and Depth	AVCL_L2B_BENTHRFL
	Benthic Cover	AVCL_L2B_BENTHCOV
AVIRIS Next Gen	Resampled Surface Reflectance and Uncertainty	AVNG_L2A_RSRFL
	Corrected Surface Reflectance	AVNG_L2A_CORFL
	Fractional Cover	AVNG_L2B_FRCOV
	Vegetative Biochemical Traits	AVNG_L2B_VEGBIOCHEM
	Snow Grain Size	AVNG_L2B_SNOWGRAIN
	Benthic Reflectance and Depth	AVNG_L2B_BENTHRFL
	Benthic Cover	AVNG_L2B_BENTHCOV
DESIS	Resampled Surface Reflectance and Uncertainty	DESIS_L2A_RSRFL
	Corrected Surface Reflectance	DESIS_L2A_CORFL
	Fractional Cover	DESIS_L2B_FRCOV
	Vegetative Biochemical Traits	DESIS_L2B_VEGBIOCHEM
	Benthic Reflectance and Depth	DESIS_L2B_BENTHRFL
	Benthic Cover	DESIS_L2B_BENTHCOV
PRISMA	Resampled Surface Reflectance and Uncertainty	PRISMA_L2A_RSRFL
	Corrected Surface Reflectance	PRISMA_L2A_CORFL
	Fractional Cover	PRISMA_L2B_FRCOV
	Vegetative Biochemical Traits	PRISMA_L2B_VEGBIOCHEM
	Snow Grain Size	PRISMA_L2B_SNOWGRAIN
	Benthic Reflectance and Depth	PRISMA_L2B_BENTHRFL
	Benthic Cover	PRISMA_L2B_BENTHCOV
	Resampled Surface Reflectance and Uncertainty	EMIT_L2A_RSRFL
	Corrected Surface Reflectance	EMIT_L2A_CORFL
	Fractional Cover	EMIT_L2B_FRCOV

EMIT	Vegetative Biochemical Traits	EMIT_L2B_VEGBIOCHEM
	Snow Grain Size	EMIT_L2B_SNOWGRAIN
	Benthic Reflectance and Depth	EMIT_L2B_BENTHRFL
	Benthic Cover	EMIT_L2B_BENTHCOV

Table 3. SISTER Project Instruments.

Instrument	Instrument fullname
AVCL	AVIRIS Classic
AVNG	AVIRIS Next Generation
DESIS	DLR Earth Sensing Imaging Spectrometer
PRISMA	PRecursore IperSpettrale della Missione Applicativa
EMIT	Earth Surface Mineral Dust Source Investigation

6. Data Access

These data are available through the Oak Ridge National Laboratory (ORNL) Distributed Active Archive Center (DAAC).

SISTER: Composite Release ID (CRID) Product Generation Files

Contact for Data Center Access Information:

- E-mail: uso@daac.ornl.gov
- Telephone: +1 (865) 241-3952

7. References

Brodrick, P.G., D.R. Thompson, J.E. Fahlen, M.L. Eastwood, C.M. Sarture, S.R. Lundeen, W. Olson-Duvall, N. Carmon, and R.O. Green. 2021. Generalized radiative transfer emulation for imaging spectroscopy reflectance retrievals, Remote Sensing of Environment 261:112476. https://doi.org/10.1016/j.rse.2021.112476

Thompson, D.R., V. Natraj, R.O. Green, M.C. Helmlinger, B.C. Gao, and M.L. Eastwood. 2018. Optimal estimation for imaging spectrometer atmospheric correction. Remote Sensing of Environment 216:355-373. https://doi.org/10.1016/j.rse.2018.07.003