



Jet Propulsion Laboratory
California Institute of Technology



ECOSTRESS

*ECOsysteM Spaceborne Thermal Radiometer
Experiment on Space Station*

Data Overview, Processing and Products
February 2020

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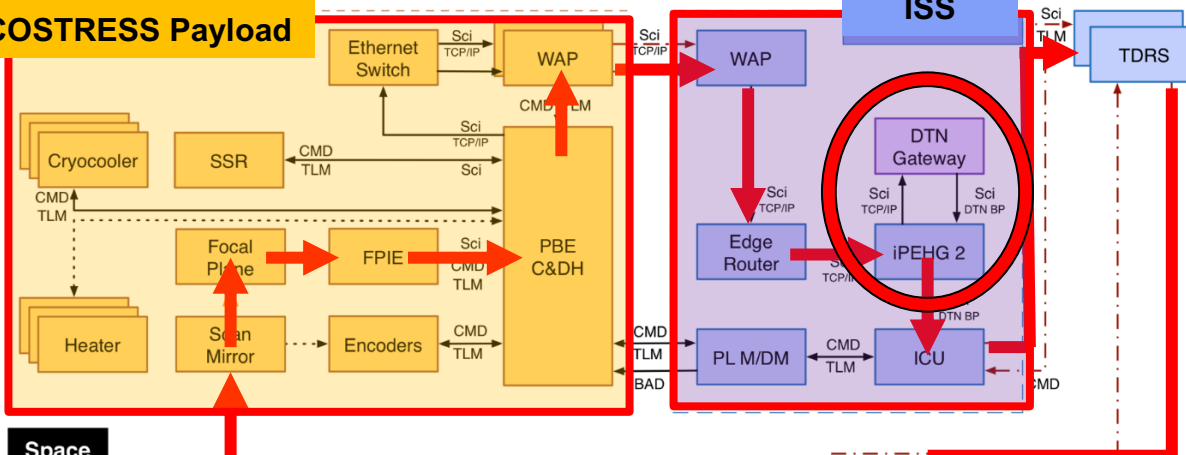


Data Acquisition



End-to-End Information System

ECOSTRESS Payload



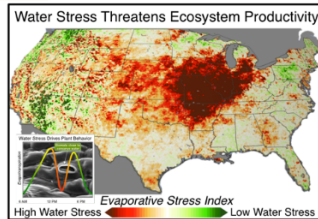
Acronyms

ASTER	Advanced Spaceborne Thermal Emission and Reflection Radiometer
BAD	Broadcast Ancillary Data
BP	Bundle Protocol
C&DH	Command and Data Handling
CMD	Command
Co-Is	Co-Investigators
DAAC	Distributed Active Archive Center
DTN	Delay-Tolerant Networking
FPIE	Focal Plane Interface Electronics
GDS	Ground Data System
HOSC	Huntsville Operations Support Center
ICU	Integrated Communications Unit
L0	Level 0 data (raw packets)
L1	Level 1 data (geolocated radiances)
L2	Level 2 data (land surface temperature and emissivity)
L3	Level 3 data (evapotranspiration)
L4	Level 4 data (water use efficiency and evapotranspiration index)
LP DAAC	Land Process Distributed Active Archive Center
MCC-H	Mission Control Center - Houston
MERRA	Modern-Era Retrospective Analysis for Research and Applications
MOS	Mission Operations System
PBE	Payload Bus Electronics
PEHG	Payload Ethernet Hub Gateway
PL M/D	Payload Multiplexer/Demultiplexer
POIC/F	Payload Operations Integration Center/Function
Sci	Science Data
SDS	Science Data System
SSR	Solid State Recorder
TCP/IP	Transmission Control Protocol / Internet Protocol
TDRS	Tracking and Data Relay Satellite
TLM	Telemetry
TOPO	Trajectory Operations Officer
WAP	Wireless Access Point

Space

Ground

Observables

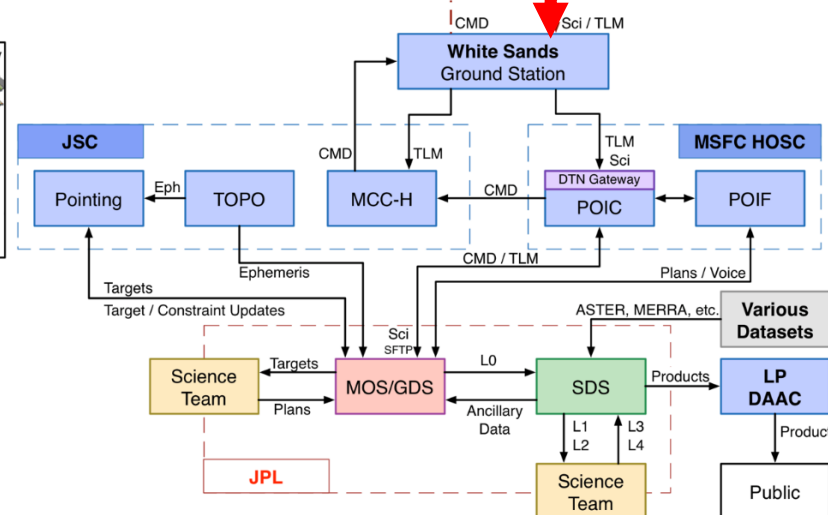


Legend

- ➡ Radiation / Photons
- Digital Data
- ... Analog / Other
- RF Signal

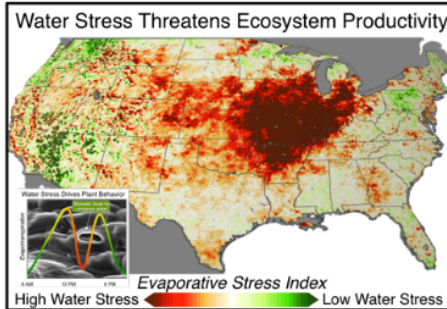


Updated: July 1, 2015 at 11:00 PDT



Ground

Observables

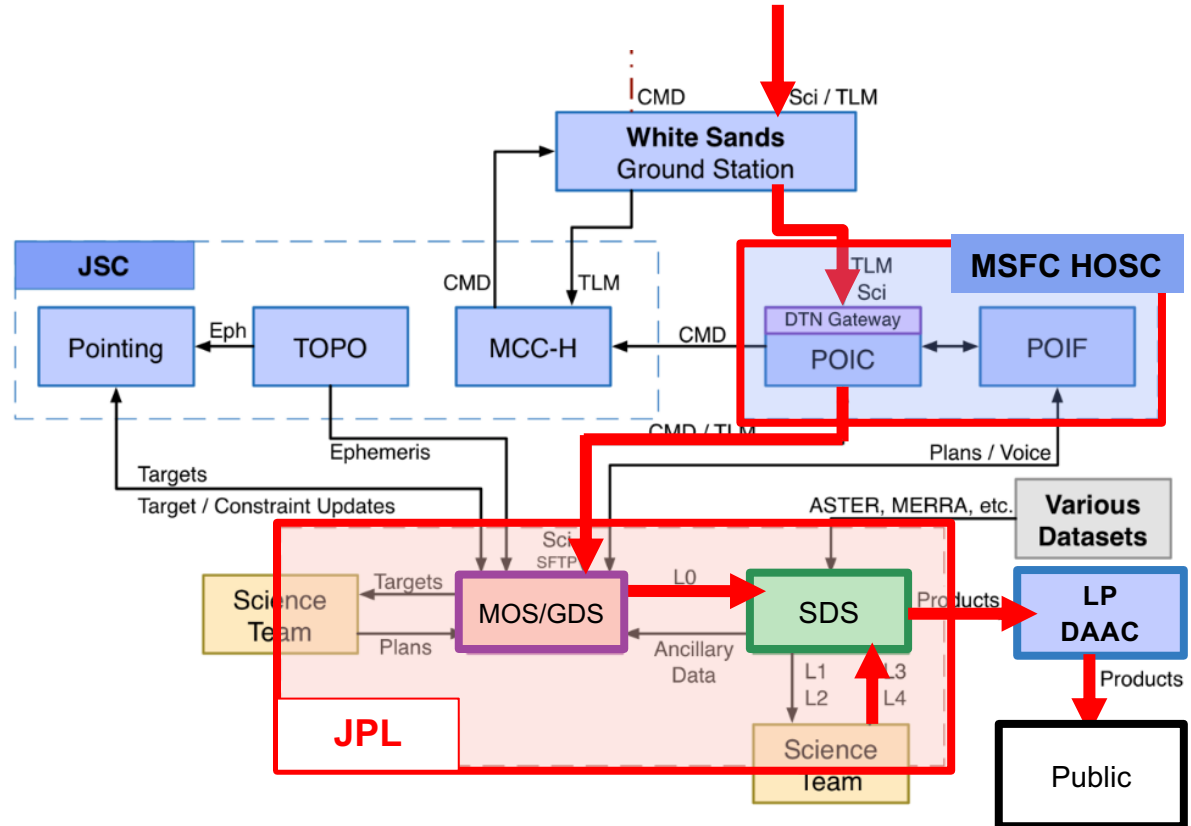


Legend

- ➡ Radiation / Photons
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Updated: July 1, 2015 at 11:00 PDT

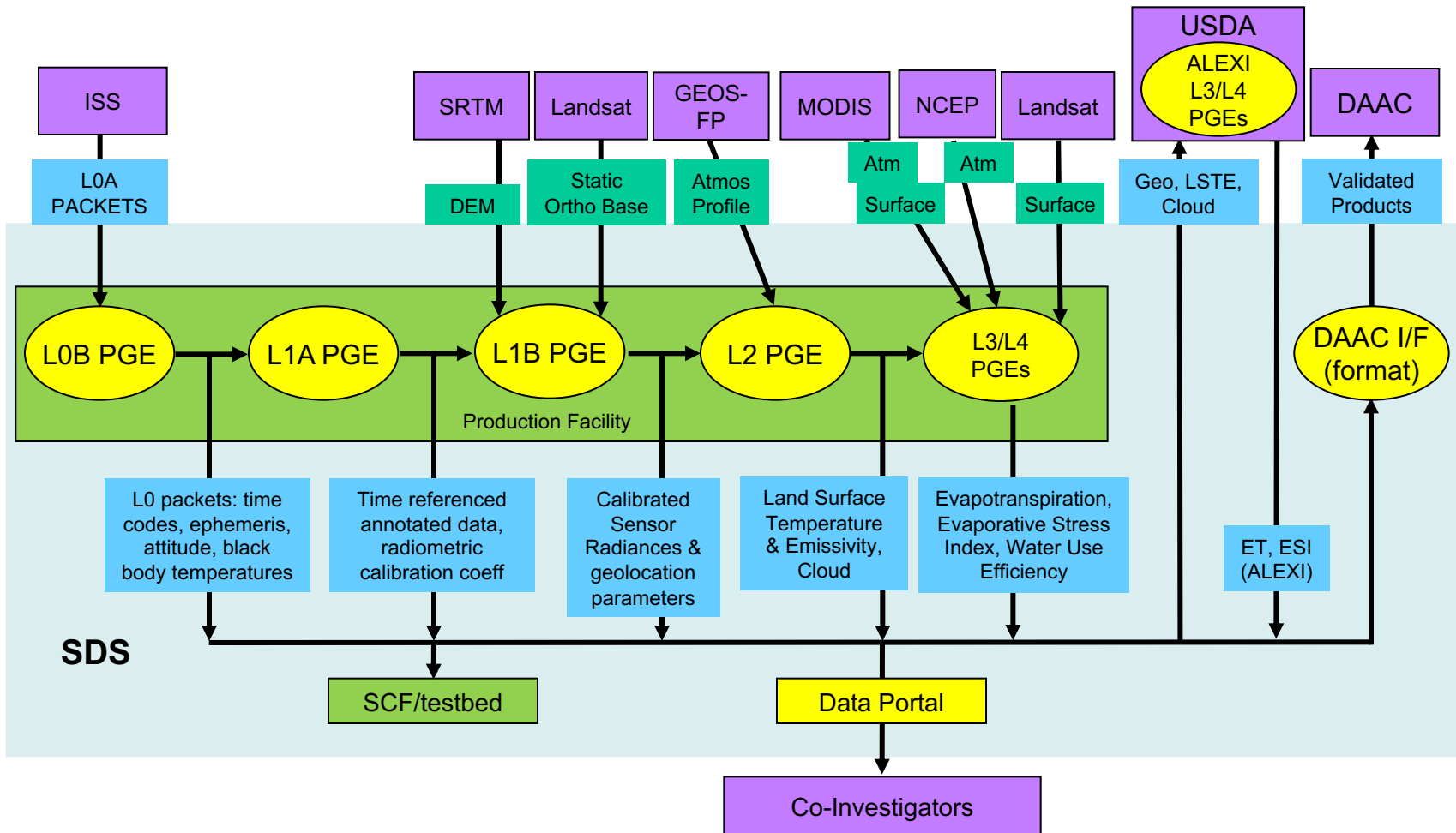




Data Product Generation

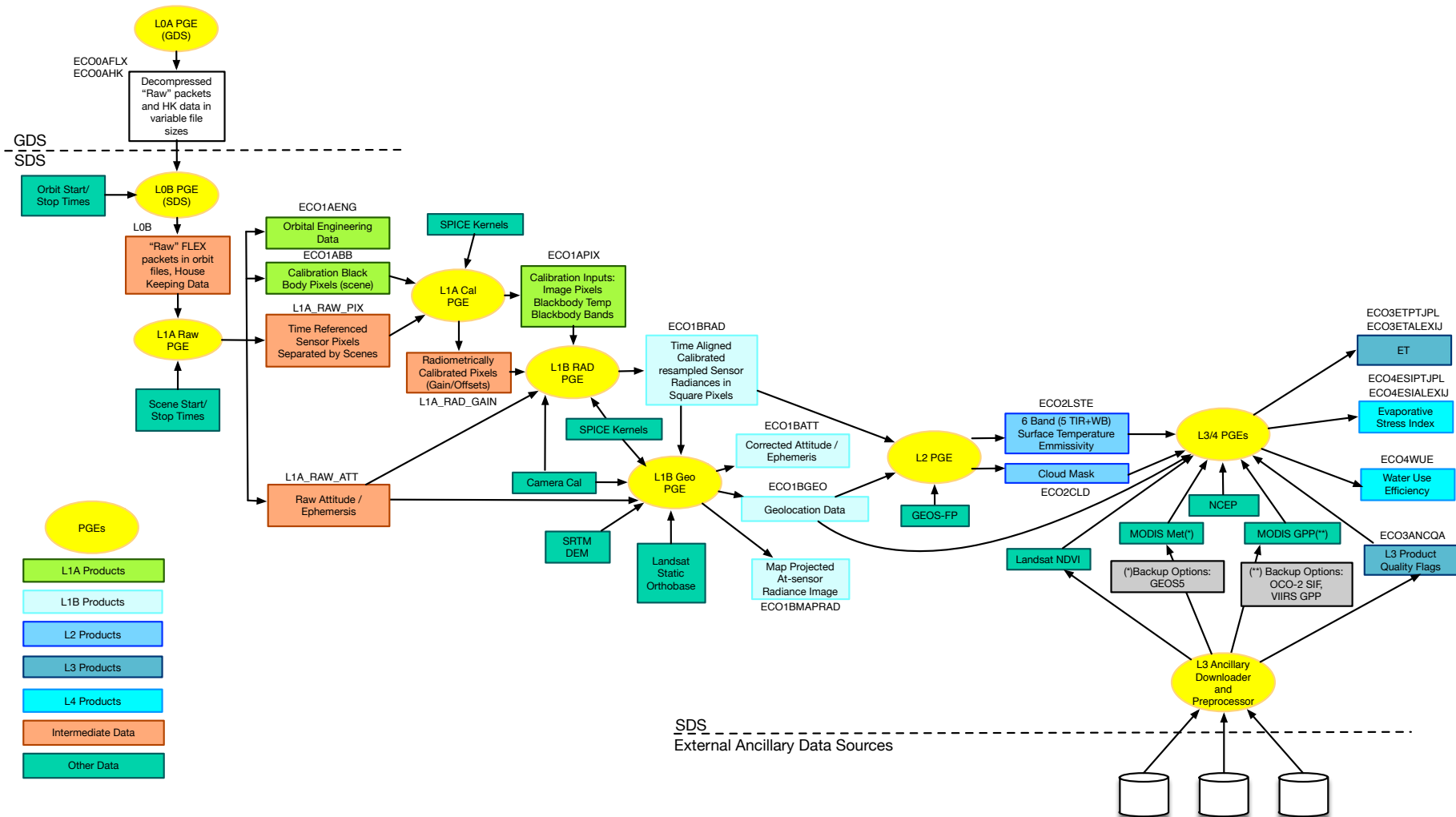


SDS High Level Processing Data Flow





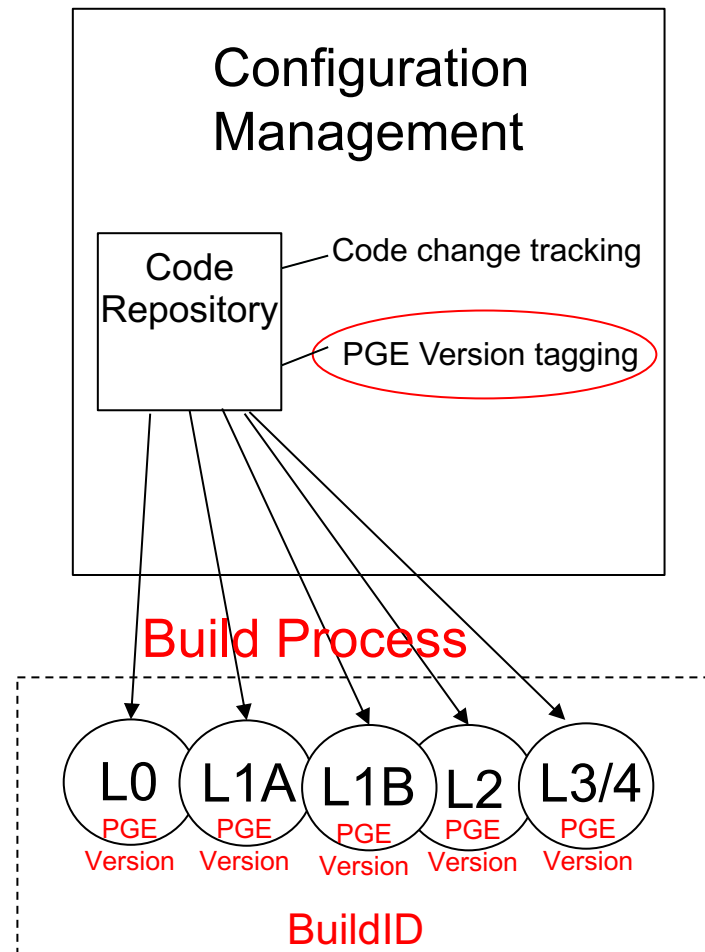
SDS L1 – L4 Product Generation





Product Generation Code Configuration Management

- All Product Generation Executable (PGE) source code and relevant configuration files are kept in the JPL GIT hub, which tracks all changes as part of the configuration management process.
- Each individual PGE carries its own version ID.
 - Any changes in the PGE impacting the output data product format or content receives a new PGE version ID.
 - The Version ID for the PGE that generated the product is specified in the product's metadata as "PGEVersion".
- All PGEs delivered to the SDS will be assigned an overall SDS build ID, or release number.
 - Each time any PGE is updated and delivered with a new version ID, the SDS production pipeline will also be updated with a new release number
 - The Build ID for the PGE that generated the product is specified in the product's metadata as "BuildID".





Data Products



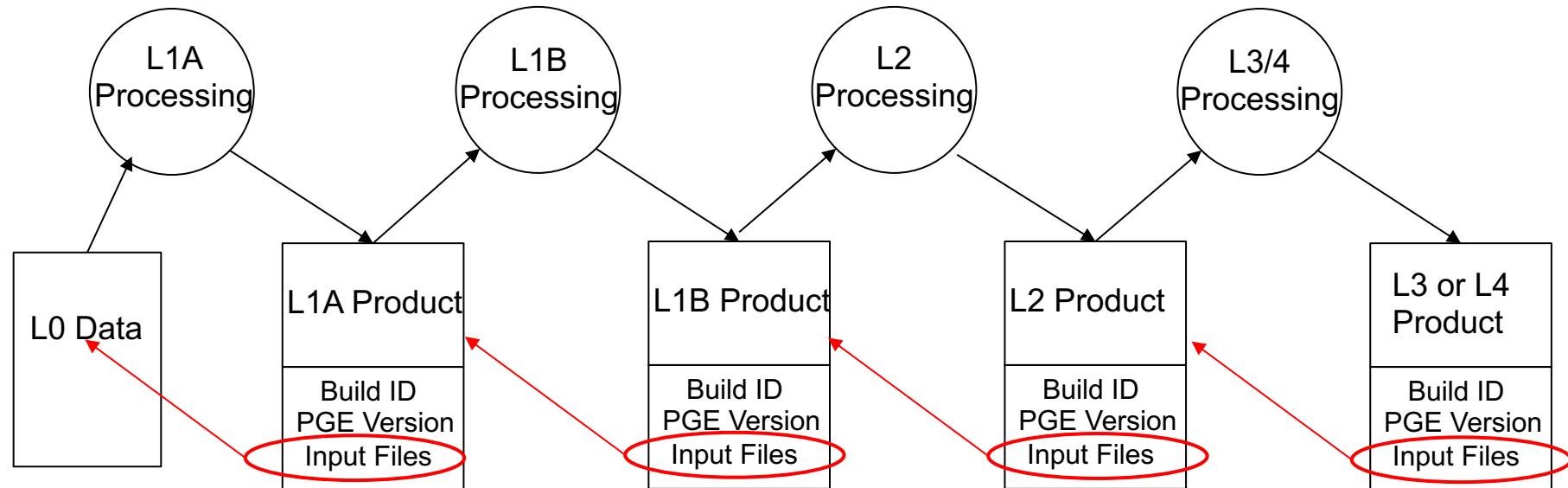
ECOSTRESS Science Data Products



PGE or <Source>	Product	Dimensions (cross / along / bands)			File Size (MB)	Description
L1B Rad	ECO1BRAD	5400	5632	6	939	Calibrated at-sensor radiances
L1B Geo	ECO1BGEO	5400	5632	1	1609	Geolocation tags, sun angles, and look angles, and calibrated, resampled at-sensor radiances
	ECO1BATT	12	52	1	0.5	Corrected spacecraft ephemeris and attitude data
	ECO1BMAPRAD	7636	7964	6	4224	Map projected calibrated at-sensor radiances and geolocation parameters of each pixel
L2	ECO2LSTE	5,400	5,632	5+W	536	Land surface temperature and emissivity
	ECO2CLD	5,400	5,632	1	67	Cloud mask
L3/4 Preprocessor	ECO3ANCQA	5,400	5,632	11	395	forwarded L3/L4 ancillary data quality flags
L3/4 PT-JPL	ECO3ETPTJPL	5,400	5,632		671	Evapotranspiration retrieved from L2_LSTE using the PT-JPL Algorithm
	ECO4ESIPTJPL	5,400	5,632		268	Evaporative stress index generated with PT-JPL
	ECO4WUE	5,400	5,632		134	Water use efficiency
L3/L4 dis-ALEXI from JPL	ECO3ETALEXIJ	5,400	5,632		304	ET generated by JPL using the ALEXI/DisALEXI Algorithm
	ECO4ESIALEXIJ	5,400	5,632		243	ESI generated by JPL with ALEXI/DisALEXI
L3/L4 dis-ALEXI from USDA	ECO3ETALEXIU	3,000	3,000		99	ET generated by USDA using the ALEXI/DisALEXI Algorithm
	ECO4ESIALEXIU	3,000	3,000		119	ESI generated by USDA with ALEXI/DisALEXI

Product Provenance

- Product provenance can be traced through product metadata.
- InputPointer – Name of ECOSTRESS data product as input to the product generation

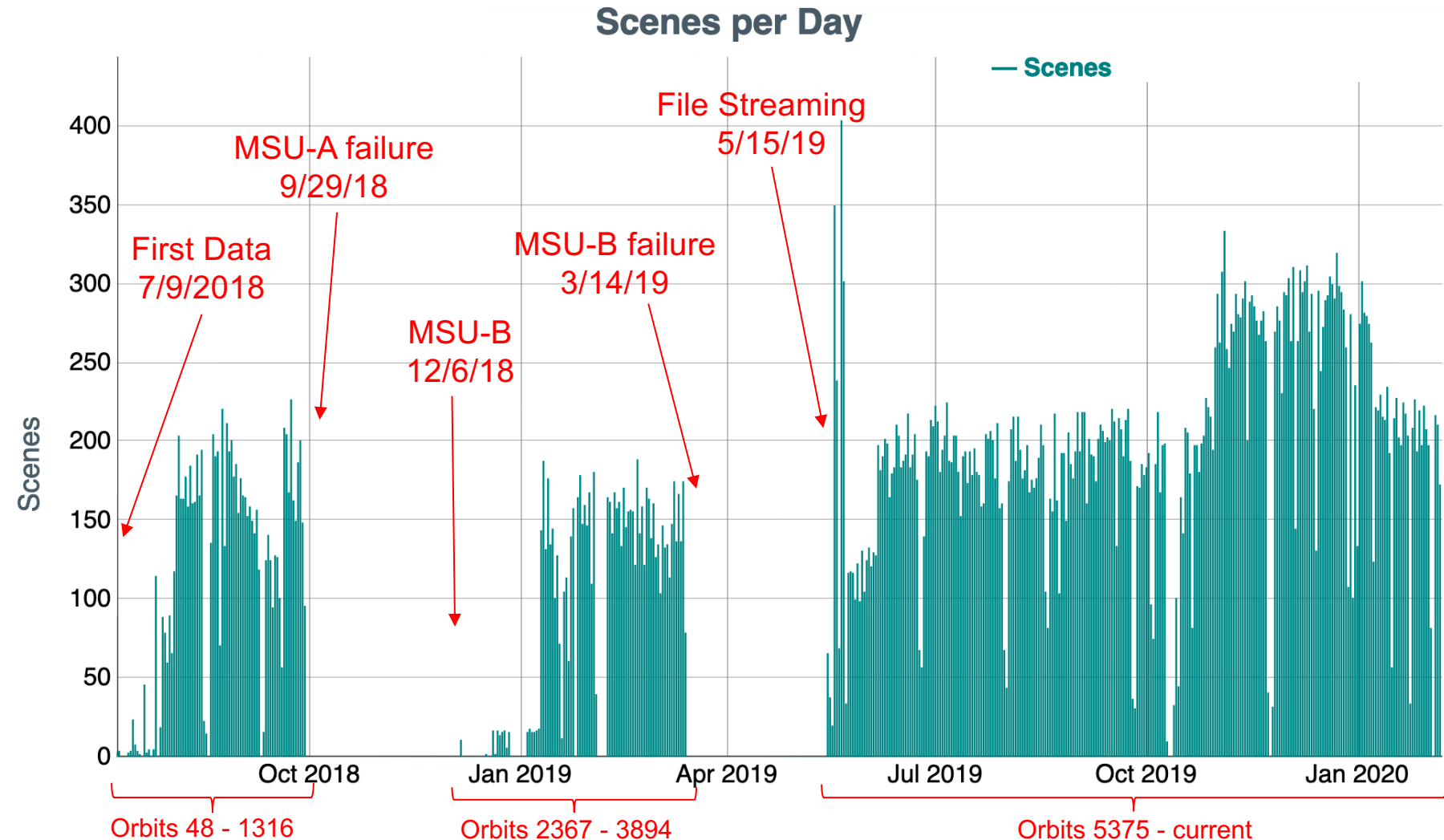




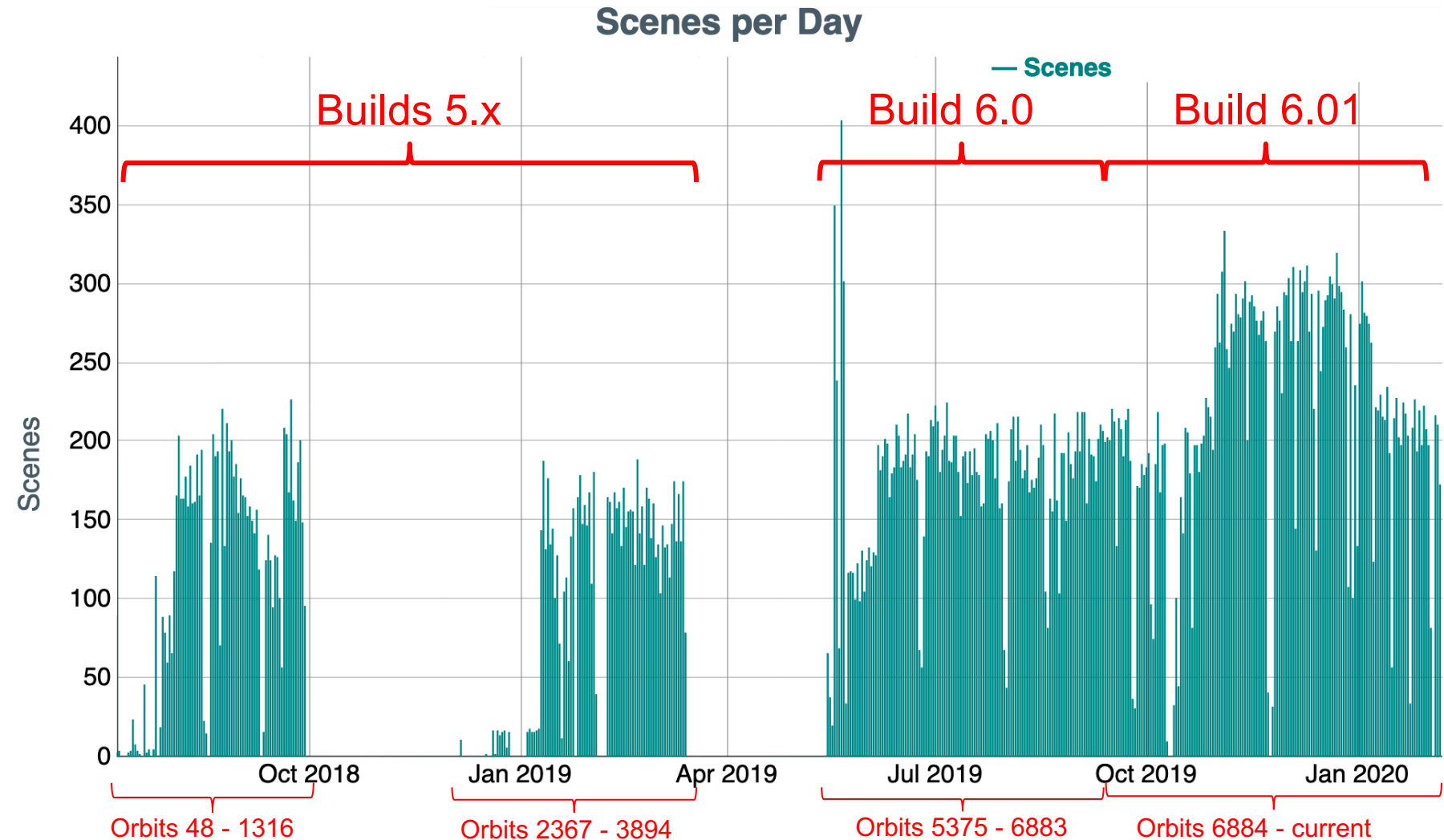
Data Coverage and Availability



Temporal Coverage



Temporal Coverage by Build ID





Product Compatibility / Usability between Builds (1 of 2)

- Build 5x
 - Level 1 – Level 4 products
 - No change to algorithm or product format in Build 5.01, 5.02 and 5.03.
 - Level 3 and Level 4 products
 - Revised L3/L4 QA product with uncompressed size reduced to 395 mb and original bitmasks from Landsat and MODIS preserved in build 5.03.
 - Only the QA products from build 5.03 and above should be used.
- Build 6.0
 - Level 1 products
 - No change to algorithm or product format
 - Level 2 products
 - When Temperature > 380, set Mandatory QA to "nominal quality" and Data Quality to "bad/missing L1B data."
 - When Mandatory QA is set to "not produced", LST and Emis values are forced to fill values.
 - If LST contains a fill value, Mandatory QA is forced to "not produced."

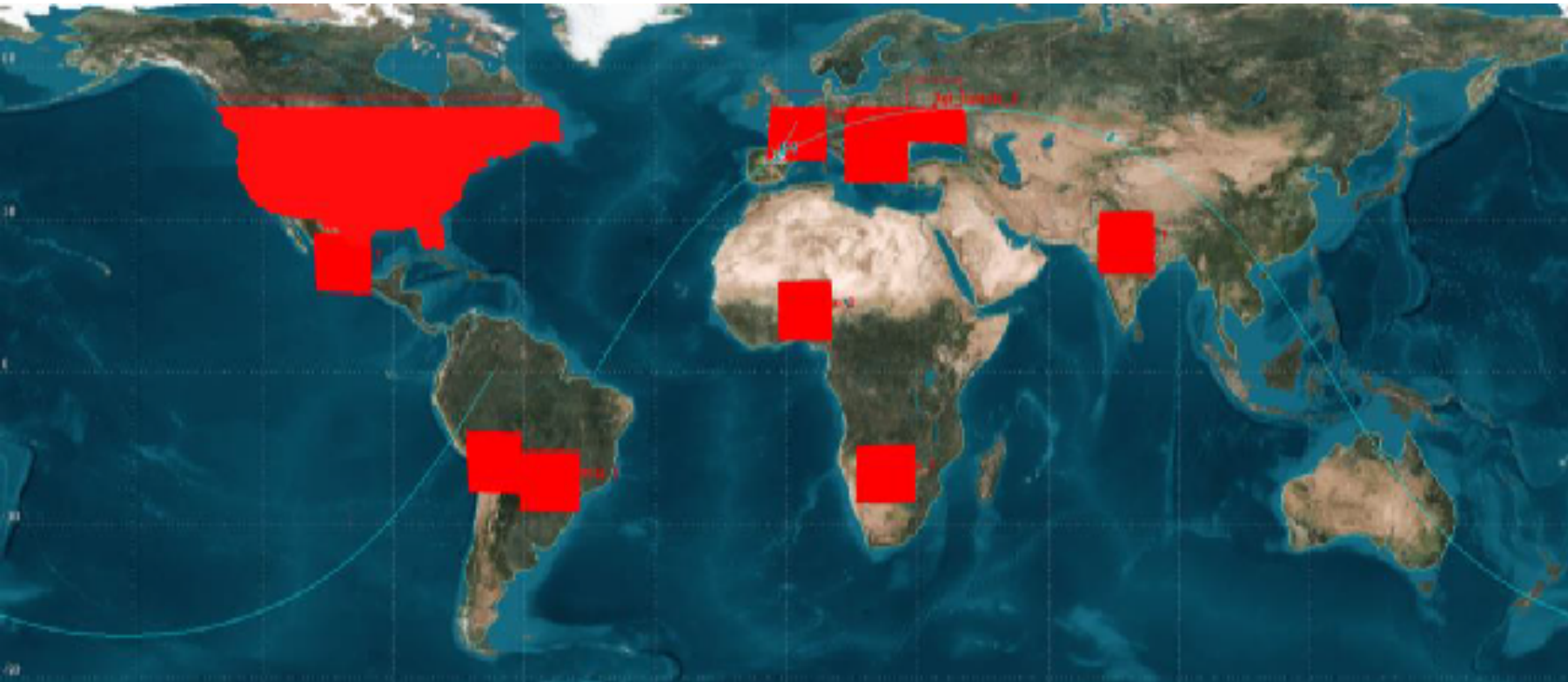


Product Compatibility / Usability between Builds (2 of 2)

- Build 6.01
 - Level 1 – Level 2 products
 - No change to algorithm or product format
 - Level 3 and Level 4 products
 - Replaced Surface Energy Balance System (SEBS) algorithm processing with the Two Source Energy Balance (TSEB) model.
 - Only the level 3 uncertainty products from build 6.1 and above should be used.

Proposed Targets

ECOSTRESS has priority regions over CONUS and key biomes



(Image does not include fluxnet sites)



Total Data Acquired to Date



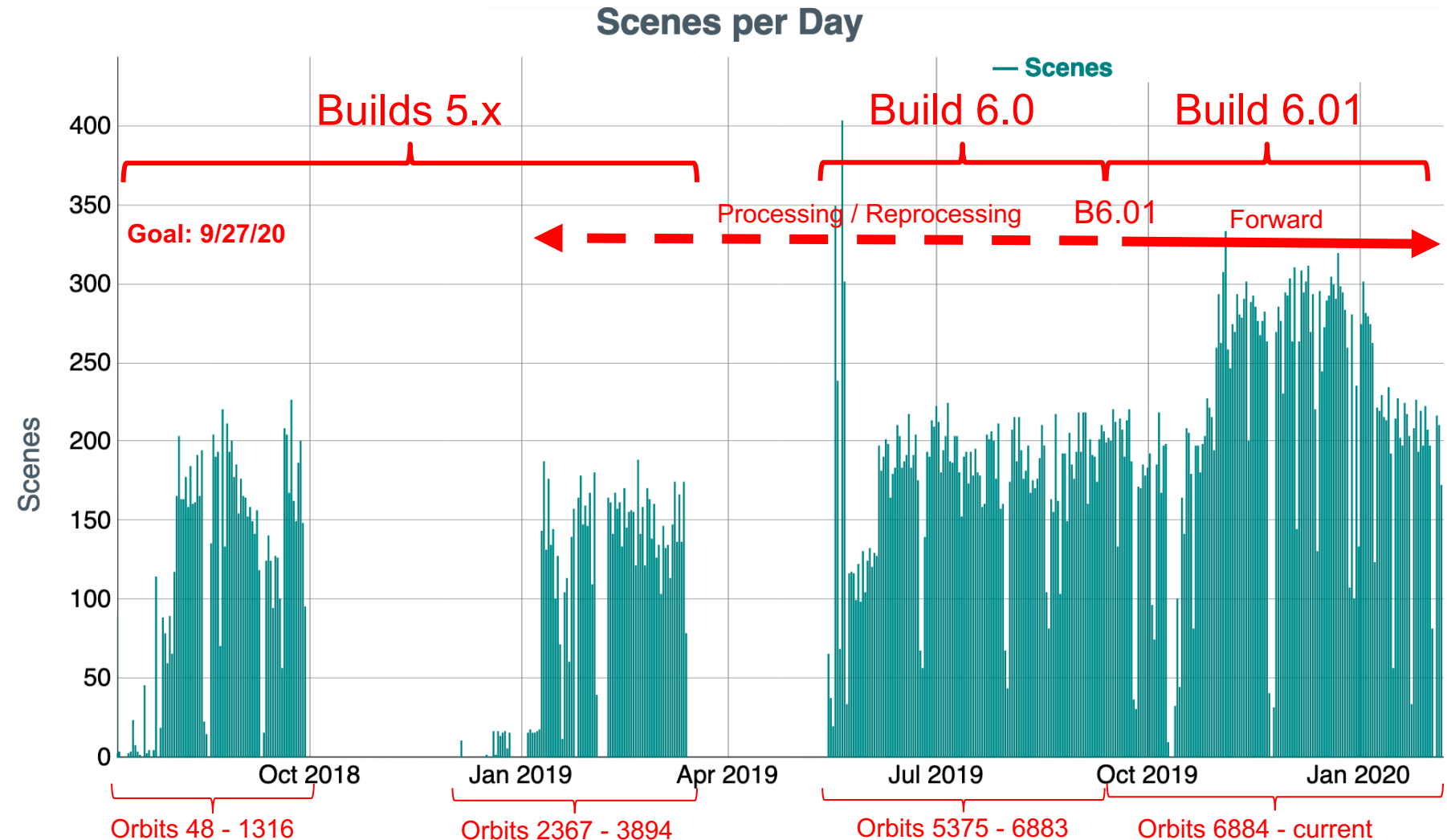
- Due to better downlink rate than anticipated (even in Prime Mission), ECOSTRESS has acquired much more data than proposed.
- However, not all data acquired in Prime Mission was delivered to LP DAAC due to system sizing constraints.

ECOSTRESS has acquired over 70,000 scenes (400 km x 400 km); this is the equivalent of covering the land surface of the Earth 20 times!

- All data acquired will be processed during Extended Mission.

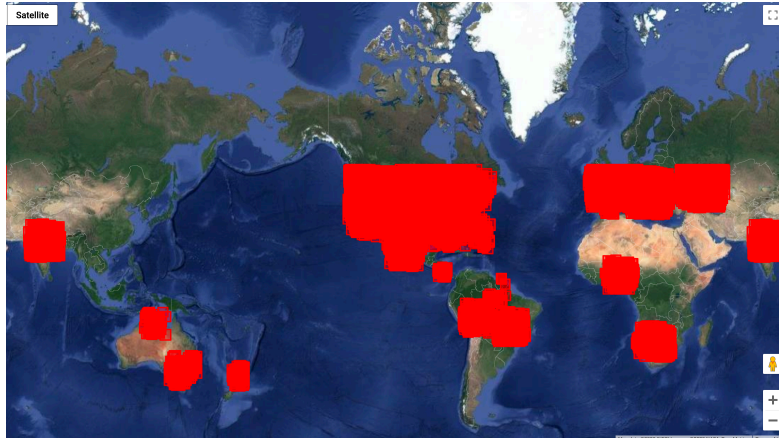


B6.01 Processing / Reprocessing Status



Product Availability at LP DAAC

Prime Mission : Products delivered to LP DAAC for Builds 5x and 6.0

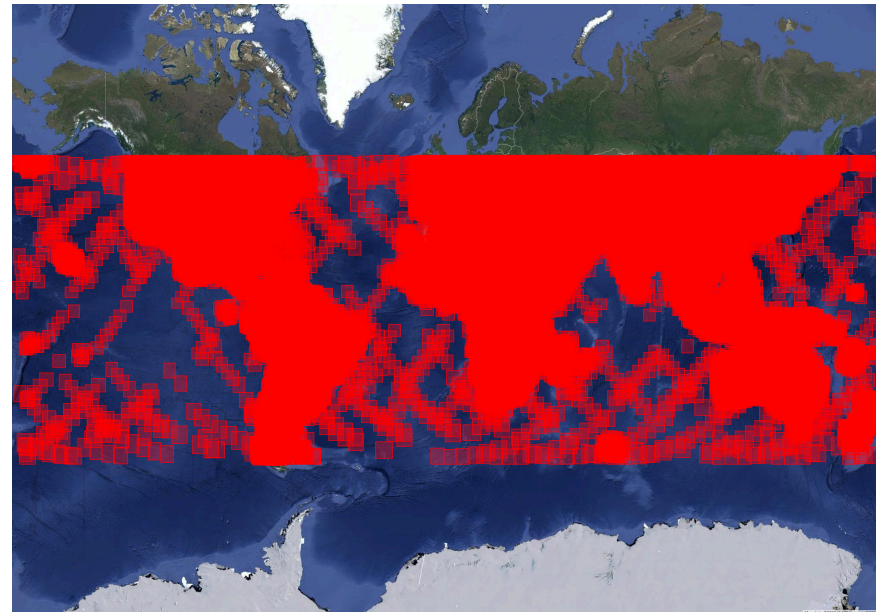


Extended Mission : Products delivered to LP DAAC for Builds 6.01



Extended Mission:
All acquired data from Prime Mission will be processed / reprocessed and delivered to LP DAAC

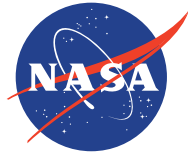
All Prime Mission data to be processed / reprocessed with B6.01 and delivered to LP DAAC





Final Summary

- Data is available in three temporal blocks:
 - 7/29/2018 – 9/29/2018
 - 1/10/2019 – 3/14/2019
 - 5/15/2019 – Present
- LP DAAC provides the latest version of each product
- All data acquired will be processed / reprocessed to Build 6.01 by 27 September 2020
 - This includes data acquired during Prime Mission but not processed/delivered (data outside proposed targets)



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