Mission System Overview

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Mission System Overview

Mission Operations
• Monitor and operate ECOSTRESS during:
  – Integration and Test (EGSE/GDS delivered to I&T to “test as you fly”)
  – In-Orbit Checkout
  – Nominal operations
• Science observations will be planned and uplinked weekly
  – Time-based data collection planned based on ISS TOPO/Pointing Office data
  – Downlink planned based on schedule from ISS Data Management Coordinator

Ground Data System
• Command/Telemetry processing
• Sequence validation
• Manage HOSC software tools
• Data delivery to subsystems and SDS

Science Data System
• Create L0, L1, and L2 science products
• Catalog and store L0–L4 science products
• Data delivery to USGS LP DAAC
Science Planning Software

• Adaptation of CLASP demonstrated for basic ECOSTRESS observation scheduling
  – CLASP used for IPEX and many studies, in use for NISAR
  – Accounts for varying priority geographic target areas
    ▪ CONUS mapping, regional, global mapping
    ▪ Fluxnet Cal sites
    ▪ Targets of opportunity (volcanic activity, etc.)
  – Models data volume restrictions

Coverage display 7/10/2018 – 7/23/2018
Timeline Display

This document has been reviewed and determined not to contain export controlled technical data.
**Weekly ATS**

Generate Absolute Time Sequence and Uplink to Payload

**Daily ATS**

Generate Updated Absolute Time Sequence and Uplink to Payload

ATS = Absolute Time Sequence
**Weekly ATS Generation Process**

- On *Tuesday*, **process begins** (TOPO)
- On *Wednesday*, **uplink** and **enable** 14-day ATS
- On *Thursday*, **new** 14-day ATS begins
Daily ATS Process

- Regenerates science observation, or downlink window ATS sequences, primarily in response to ISS changes (e.g. attitude and orbit or downlink window).

- Give the flexibility for *opportunistic* science / disaster response (no formal requirements or plans).

- Same as the weekly process, though fewer ATS sequences will be generated, reviewed, and uplinked.

Daily ATS

Generate Updated Absolute Time Sequence and Uplink to Payload

HOSC Payload Planning Outline

- PRO-PLDMEM FILE-CMD
- ECOSTR-FILE-CMD
- ECOSTR-PD-CMD
- ECOSTR-RSRC-TRK
ECOSTRESS End-to-End Information System

Legend:
- Radiation / Photons
- Digital Data
- Analog / Other
- RF Signal
- NASA
- JPL

Water Stress Threatens Ecosystem Productivity

High Water Stress
Low Water Stress

Legend:
- Radiation / Photons
- Digital Data
- Analog / Other
- RF Signal
- NASA
- JPL

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L1 – L4 Product Generation

Slide 8
# ECOSTRESS Standard Science Data Products

<table>
<thead>
<tr>
<th>Product</th>
<th>Dimensions (cross x along x bands)</th>
<th>File Size (MB)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>L1B_RAD</td>
<td>5400 x 5632 x 6</td>
<td>939</td>
<td>Calibrated at-sensor radiances</td>
</tr>
<tr>
<td>L1B_GEO</td>
<td>5400 x 5632 x 1</td>
<td>1609</td>
<td>Geolocation tags, sun angles, and look angles, and calibrated, resampled at-sensor radiances</td>
</tr>
<tr>
<td>L1B_ATT</td>
<td>12 x 52 x 1</td>
<td>0.5</td>
<td>Corrected spacecraft ephemeris and attitude data</td>
</tr>
<tr>
<td>L2_LSTE</td>
<td>5,400 x 5,632 x 5+W</td>
<td>536</td>
<td>Land surface temperature and emissivity</td>
</tr>
<tr>
<td>L2_CLOUD</td>
<td>5,400 x 5,632 x 1</td>
<td>67</td>
<td>Cloud mask</td>
</tr>
<tr>
<td>L3_L4_QA</td>
<td>5,400 x 5,632 x 24</td>
<td>1609</td>
<td>24*16 bitmasks of L3/L4 ancillary data quality flags</td>
</tr>
<tr>
<td>L3_ET_PT-JPL</td>
<td>5,400 x 5,632</td>
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<td>Evapotranspiration retrieved from L2_LSTE using the PT-JPL Algorithm</td>
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<td>3,000 x 3,000</td>
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<td>Evapotranspiration generated by USDA using the ALEXI/DisALEXI Algorithm</td>
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Science Operations Scenarios And Data Availability

During IOC
- Autonomous 24/7 Forward Processing
- Perform Radiometric Calibration and Geolocation Validation
- On Demand Reprocessing as requested by the Instrument and Science Teams

During Science Operations
- Autonomous 24/7 Forward Processing
- On Demand Reprocessing as requested by the PI and Science Team

Science Operations + 6 months
- Autonomous 24/7 Forward Processing
- Bulk Reprocessing of first 6 months of data in parallel with Forward Processing
- On Demand Reprocessing as requested by the PI and Science Team

Standard Science Data Product Archival and Availability
- All standard science data products will be archived at the LP DAAC
- Science data products to be publicly available 6 months after IOC
- In addition, LP DAAC will provide early access (< IOC + 6 months) for external science team members and other research and applied science collaborators
Questions?

jordan.h.Padams@jpl.nasa.gov
## ECOSTRESS Science Data Products (1/2)

<table>
<thead>
<tr>
<th>PGE or &lt;Source&gt;</th>
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<tr>
<td>&lt;from GDS&gt;</td>
<td>L0A_FLEX</td>
<td>5,528 11,264 6</td>
<td>853</td>
<td>Level 0 “raw” spacecraft packets</td>
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<tr>
<td></td>
<td>L0A_HK</td>
<td>2560 54 1</td>
<td>0.25</td>
<td>Raw instrument housekeeping packets including attitude, ephemeris and BB temps</td>
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<tr>
<td>L0B</td>
<td>L0B</td>
<td>5528 11264 6</td>
<td>Up to 13G</td>
<td>Raw instrument FLEX, housekeeping, and other ancillary packets chronologically sorted and assembled into orbits.</td>
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<tr>
<td></td>
<td>L1A_ENG</td>
<td>1 54 7 .333</td>
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<td>Spacecraft and instrument engineering data, including blackbody gradient coefficients</td>
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<td>L1A_BB</td>
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<td>Instrument blackbody calibration pixels</td>
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<td>L1A_Raw_PIX</td>
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<td>766</td>
<td>Raw pixels separated by pixel frame</td>
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<tr>
<td></td>
<td>L1A_Raw_ATT</td>
<td>1 5400 1 0.5</td>
<td></td>
<td>Attitude from 1 Hz spacecraft BAD and housekeeping data</td>
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<tr>
<td>L1A Cal</td>
<td>L1A_PIX</td>
<td>5,400 11,264 6</td>
<td>805</td>
<td>Raw pixel data with appended calibration coefficients</td>
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<tr>
<td></td>
<td>L1A_RAD_GAIN</td>
<td>5,400 11,264 6</td>
<td>5237</td>
<td>Radiometric gains offsets and optionally calibrated radiances and temperatures (K)</td>
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