ECOSTRESS Applications and Early Adopters

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Water stress is quantified by the Evaporative Stress Index, which relies on evapotranspiration measurements.

ECOSTRESS is used to study plant health and water stress from the ISS, which has direct benefit for drought monitoring and agricultural applications.

We have set up the ECOSTRESS Early Adopters program to explore the vast potential our mission has to support other science and applications efforts.
Goals of ECOSTRESS applications and Early Adopters

• Maximize NASA / taxpayer investments by increasing access, utility, and capacity to work with data earlier in the mission life cycle

• Understand how ECOSTRESS and ECOSTRESS-like data could be applied in both science and applications

• Use Early Adopter feedback to improve ECOSTRESS mission science and applications outcomes, such as through improving data quality and providing input / supporting development of custom tools, services, and short courses
## ECOSTRESS Science Data Products

<table>
<thead>
<tr>
<th>PGE or &lt;Source&gt;</th>
<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>ECO1BRAD</td>
<td>5400 5632 6</td>
<td>939</td>
<td>Calibrated at-sensor radiances</td>
</tr>
<tr>
<td>L1B Geo</td>
<td>ECO1BGEO</td>
<td>5400 5632 1</td>
<td>1609</td>
<td>Geolocation tags, sun angles, and look angles, and calibrated, resampled at-sensor radiances</td>
</tr>
<tr>
<td></td>
<td>ECO1BATT</td>
<td>12 52 1</td>
<td>0.5</td>
<td>Corrected spacecraft ephemeris and attitude data</td>
</tr>
<tr>
<td></td>
<td>ECO1BMAPRAD</td>
<td>7636 7964 6</td>
<td>4224</td>
<td>Map projected calibrated at-sensor radiances and geolocation parameters of each pixel</td>
</tr>
<tr>
<td>L2</td>
<td>ECO2LSTE</td>
<td>5,400 5,632 5+W</td>
<td>536</td>
<td>Land surface temperature and emissivity</td>
</tr>
<tr>
<td></td>
<td>ECO2CLD</td>
<td>5,400 5,632 1</td>
<td>67</td>
<td>Cloud mask</td>
</tr>
<tr>
<td>L3/4 Preprocessor</td>
<td>ECO3ANCQA</td>
<td>5,400 5,632 24</td>
<td>1609</td>
<td>24*16 bitmasks of L3/L4 ancillary data quality flags</td>
</tr>
<tr>
<td>L3/4 PT-JPL</td>
<td>ECO3ETPTJPL</td>
<td>5,400 5,632</td>
<td>671</td>
<td>Evapotranspiration retrieved from L2_LSTE using the PT-JPL Algorithm</td>
</tr>
<tr>
<td></td>
<td>ECO4ESIPTJPL</td>
<td>5,400 5,632</td>
<td>268</td>
<td>Evaporative stress index generated with PT-JPL</td>
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<tr>
<td></td>
<td>ECO4WUE</td>
<td>5,400 5,632</td>
<td>134</td>
<td>Water use efficiency</td>
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<tr>
<td>&lt;from USDA&gt;</td>
<td>ECO3ETALEXI</td>
<td>3,000 3,000</td>
<td>99</td>
<td>Evapotranspiration generated by USDA using the ALEXI/DisALEXI Algorithm</td>
</tr>
<tr>
<td></td>
<td>ECO4ESIALEXI</td>
<td>3,000 3,000</td>
<td>119</td>
<td>Evaporative Stress Index generated by USDA with ALEXI/DisALEXI</td>
</tr>
</tbody>
</table>
Footprint of data acquired

Footprint of products delivered and currently available
Early Adopters: implementation – the first EV to have an EA program

Get access (by submitting a form and acknowledging Charter)

Search and download data through NASA Earthdata

Community exchange and feedback through Slack, plus data guides and other references posted
Early Adopters Stats

- Received our 202\textsuperscript{nd} submission to Early Adopters as of Mar 20 2019 morning
- 80 of the submissions were self-classified as “Applied Sciences” likely lower limit
Mapping urban heat stress in Los Angeles County

Team: JPL, UC Santa Barbara, Los Angeles County Sustainability Office, Los Angeles County Department of Public Health

Objective: Integrating ECOSTRESS data into an on-going project to develop a high spatial and temporal resolution tool for assessing urban heat maps in urban areas.
Evapotranspiration products for state water planning in New Mexico

Team: JPL, WWAO, NMOSE (New Mexico Office of the State Engineer)

Integrating ECOSTRESS data into an on-going project to develop an operational evapotranspiration pipeline for the NM Office of the State Engineering for several decision-making and planning activities, including state water use planning.

Pecan orchard and NMSU ground sites in Las Cruces, NM
Monitoring water quality in California water supplies and smelt access to food-rich waters

Team: JPL, UCMerced, 34N, USGS, CDWR

Objective: Apply ECOSTRESS data to help map water temperature in Suisun Marsh and adjacent areas to monitor control gate actions in the SF Bay Delta, California.
Observations from Early Adopters

- Uses of ECOSTRESS data extend considerably beyond agricultural and drought vulnerability applications and over 50% of early adopters want to apply data in regions outside of CONUS.

- Considerable interest in early version of ECOSTRESS data, with nearly 200 unique individuals who currently have access (EAs have downloaded over 49,000 scenes as of early March 2019, 38 TB of data).

- Feedback from Early Adopters have helped the ECOSTRESS team better understand performance and quality of data products in different regions.

- Partnership with LP DAAC was essential to support EA program.

- Look forward to working with you, and possibility of integrating into future NASA Earth science efforts, such as the Surface Biology and Geology Designated Observable identified in the Decadal Survey.
THANK YOU, EARLY ADOPTERS!