

A.33 ECOSTRESS SCIENCE AND APPLICATIONS TEAM

NOTICE: Corrected February 18, 2022. The previously omitted phone number for Keith Gaddis has been added. New text is in bold.

1. Scope of Program

NASA launched the ECOSystem Spaceborne Thermal Radiometer Experiment on Space Station (ECOSTRESS) instrument to the International Space Station (ISS) on June 29, 2018. In 2019, NASA selected the initial members of the ECOSTRESS Science and Applications Team to develop research and applications products with ECOSTRESS data (please see [this link](#) for a list of the 15 initial Team members selected by NASA in 2019 and their proposal abstracts).

This program element solicits proposals for membership in the second round of the ECOSTRESS Science and Applications Team. This team continues to support basic research and analysis activities as well as applications activities associated with the production, validation, and utilization of ECOSTRESS data products.

NASA selected the ECOSTRESS instrument through the Earth Venture Instrument-2 solicitation in July 2014. ECOSTRESS is a multispectral thermal radiometer acquiring coincident thermal infrared (TIR) emission measurements of the Earth's surface in five separate spectral bands, covering the 8-to-12.5 micron (μm) wavelength range. Since May 15th, 2019, ECOSTRESS data were acquired for just three of these bands (8.78 μm , 10.49 μm , and 12.09 μm). ECOSTRESS measures the brightness temperature of the Earth's surface with an accuracy of 1 Kelvin (K) and a precision of 0.3 K at 300 K. The mission acquires brightness temperatures at a ground sampling distance of approximately 40 m by 70 m over a continuous ground swath width of 360 km, from the 385 to 415 km ISS altitude range. The ISS precessing orbit (orbital inclination of 51.5 degrees) does not allow observations over high-latitude regions but does have the advantage of enabling measurements at different times of the diurnal cycle, with coverage every few days depending on latitude. The planned ECOSTRESS end of mission is September 2023. Data collection plans originally included the entire CONUS, twelve 1,000x1,000 km areas in key climate zones, and multiple Fluxnet sites. In March 2020, this coverage was extended to include all of the ECOSTRESS imagery captured by the sensor across the globe within the orbital limits of the ISS.

The ECOSTRESS website at <https://ecostress.jpl.nasa.gov> provides additional information about the mission, including a map of ECOSTRESS data currently available through <https://ecostress.jpl.nasa.gov/gmap/>.

A key ECOSTRESS measurement is evapotranspiration (ET), derived from the TIR brightness temperatures of plants. ET is a key climate and ecosystem variable, as it integrates life with the water, carbon, and energy cycles—incorporating elements of the sun, atmosphere, hydrosphere, and biosphere. ECOSTRESS's diurnal sampling captures the shape of the daily ET cycling as plants open and close their stomata over the course of a day.

ECOSTRESS addresses scientific and management-oriented questions about plant-water dynamics and how ecosystems respond to climate variability and change. The ECOSTRESS science objectives are to:

1. Identify critical thresholds of water use and water stress in key climate-sensitive biomes;
2. Detect the timing, location, and predictive factors leading to plant-water uptake decline and/or cessation over the diurnal cycle; and,
3. Measure agricultural water consumptive use over CONUS at spatiotemporal scales applicable to improve drought estimation accuracy.

ECOSTRESS data products include:

Level 0	Raw Collected Telemetry
Level 1	Calibrated Geolocated Radiances
Level 2	Surface Temperature and Emissivity
Level 3	Evapotranspiration
Level 4	Water Use Efficiency and Evaporative Stress Index

All products are now publicly available through: [LP.DAAC](#) and [EarthData](#). Median latency for processing is 12 hours.

2. Science and Applications Team for the ECOSTRESS Mission

This program element seeks proposals for membership on the ECOSTRESS Science and Applications Team under the leadership of the ECOSTRESS Principal Investigator. Proposals should focus on utilization of ECOSTRESS Level 2 (Surface Temperature and Emissivity), Level 3 (Evapotranspiration), and/or Level 4 (Water Use Efficiency and Evaporative Stress Index) data products for basic research of importance to Earth system science and applications relevant to management activities. The program element is also open to production of new higher-level (Levels 3 and 4) data products.

NASA particularly encourages proposals in the following areas:

- Efforts that advance the three ECOSTRESS science objectives;
- Evaluation and improvement of existing ECOSTRESS data products;
- New research and innovative analyses using ECOSTRESS data products alone or in combination with data products from other sensors (e.g., those from NASA, other U.S. entities, or international providers) that advance the understanding of the climate system, the water cycle, the carbon cycle, ecosystems and their biodiversity, and/or extreme weather events;
- Applications of ECOSTRESS products alone or in combination with data products from other sensors (e.g., those from NASA, other U.S. entities, or international providers) for agriculture, water management, disaster response and mitigation, public health, managing ecosystems for conservation and more sustainable resource use, and the forecasting of weather and extreme events; and
- Enhanced validation strategies, techniques, and data products.

Please note that any proposers responding to this program element who are already funded by ECOSTRESS must explain in their new proposal how the new proposed work goes beyond and is distinct from the work for which they are already funded.

3. Science and Applications Team Meeting

All proposers should budget for one two-day annual Science and Applications Team Meeting to be held on the West Coast of the U.S. each year (for costing purposes, assume the meeting will take place in the Los Angeles, CA area). In consultation with the Headquarters program scientist for ECOSTRESS, the ECOSTRESS Principal Investigator will be responsible for calling and organizing science team meetings and related activities.

4. Summary of Key Information

Expected annual program budget for each year of new awards	\$1 M per year
Number of awards	~5-10
Maximum duration of awards	3 years
Due date for Notice of Intent	See Tables 2 and 3 of this ROSES NRA.
Due date for proposals	See Tables 2 and 3 of this ROSES NRA.
Planning date for start of investigation	Assume 6 months after receipt of proposals.
Page limit for the central Science-Technical-Management section of proposal	15 pages; see also Table 1 of ROSES and NASA Guidebook for Proposers .
Relevance	This program is relevant to the Earth science questions and goals in the NASA Science Plan. Proposals relevant to this program are, by definition, relevant to NASA.
General information and overview of this solicitation	See the <i>ROSES Summary of Solicitation</i> .
General requirements for content of proposals	See A.1 the Earth Science Research Program Overview, and Section IV and Table 1 of the <i>ROSES Summary of Solicitation</i> .
Detailed instructions for the submission of proposals	See the NSPIRES Online Help page, Sections 3.22-4.4 of the NASA Guidebook for Proposers and Section IV(b) of the <i>ROSES Summary of Solicitation</i> .
Submission medium	Electronic proposal submission is required; no hard copy is permitted.
Web site for submission of proposal via NSPIRES	http://nspires.nasaprs.com/ (help desk available at nspires-help@nasaprs.com or (202) 479-9376).
Web site for submission of proposal via Grants.gov	http://grants.gov/ (help desk available at support@grants.gov or (800) 518-4726).
Funding opportunity number for downloading an application package from Grants.gov	NNH22ZDA001N-ESAT

Point of contact for this program [Corrected February 18, 2022]	Keith Gaddis Earth Science Division Science Mission Directorate NASA Headquarters Washington, DC 20546-0001 Telephone: (202) 358- 4651 Email: keith.gaddis@nasa.gov
---	---
