National Aeronautics and Space Administration

Introduction to Thermal Remote Sensing and Applications in Urban Heat Island Mapping

May 27 & June 2, 2026

11:00-12:30 or 14:00-15:30 EST (UTC-5)

Extreme heat is a prolonged period of excessively high temperatures for multiple consecutive days. According to the World Health Organization (WHO), heat stress is the leading cause of weather-related deaths and can exacerbate underlying illnesses, accidents and transmission of some infectious diseases. This intermediate-level training equips participants with the foundational theory and practical skills necessary to leverage thermal infrared (TIR) remote sensing to quantify these risks.

The course begins by establishing the physical principles of TIR—including emissivity and blackbody radiation. While these fundamentals are broadly applicable to numerous applications including ecosystem stewardship and agriculture, this training specifically focuses on using NASA's Ecosystem Spaceborne Thermal Radiometer Experiment on Space Station (ECOSTRESS) mission to identify heat-vulnerable communities and quantify urban heat island (UHI) effects.

In the hands-on component, participants will process ECOSTRESS Land Surface Temperature (LST) data in R – including quality filtering and time-of-day subsetting – and apply the interactive ECOSTRESS LST Downscaling Tool in Google Earth Engine. This tool uses a Random Forest model to enhance spatial resolution from 70 m to 10 m, translating satellite observations into street-scale thermal maps suitable for urban planning, strategic greenspace placement, and extreme heat early warning systems. No prior programming experience is required.

Part 1: Foundational Concepts

ARSET Instructor: Savannah Cooley (BAERI/ARC)

- Introduction
- Thermal Infrared Fundamentals
- Emissivity
- Current and Future Thermal Missions and Applications
- Summary
- Q&A

Part 2: Applications in Urban Heat Island Mapping

ARSET Instructor: Savannah Cooley (BAERI/ARC)

Guest Instructor: Glynn Hulley (NASA JPL)

- Urban Heat Island Theory
- Land Surface Temperature Data Overview
- Hands-on Exercise 1: Land Surface Temperature in Los Angeles County
- Hands-on Exercise 2: Ecostress LST Downscaling Tool
- Summary
- Q&A

ARSET empowers the global community through remote sensing training.

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