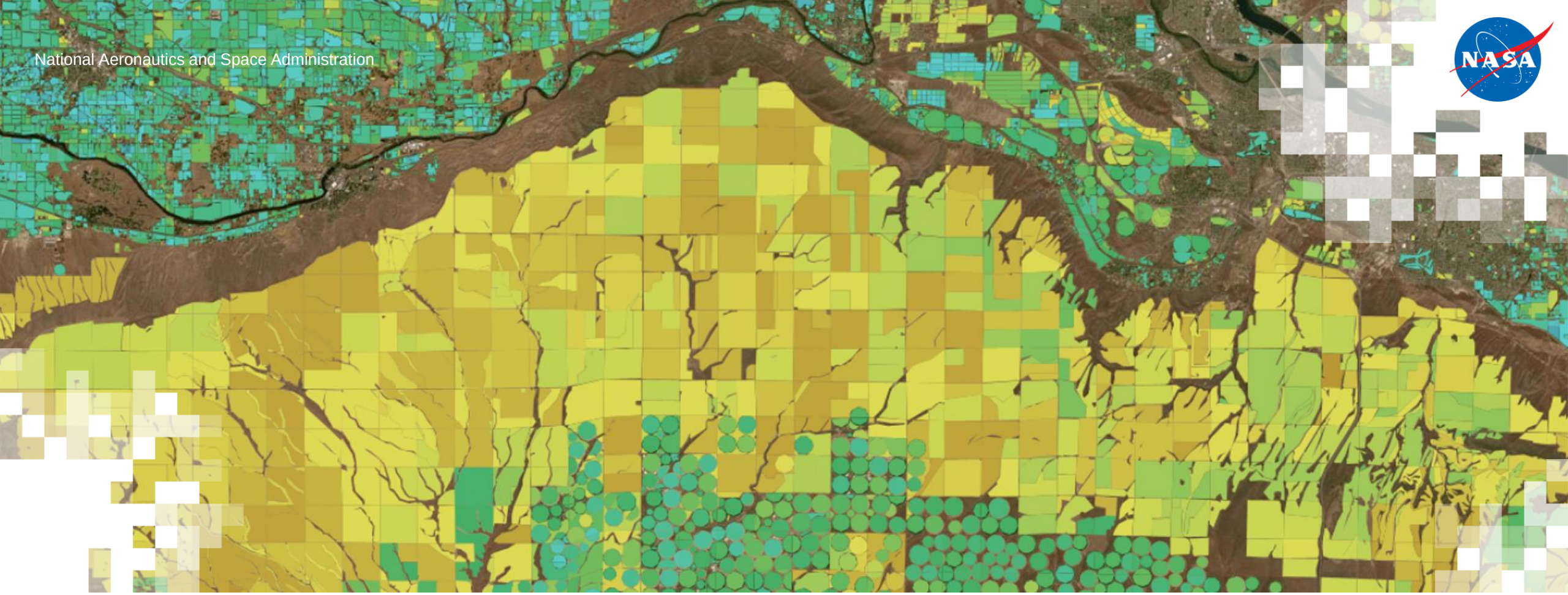


Applications of Remote Sensing-Based Evapotranspiration Data Products for Agricultural and Water Resources Management

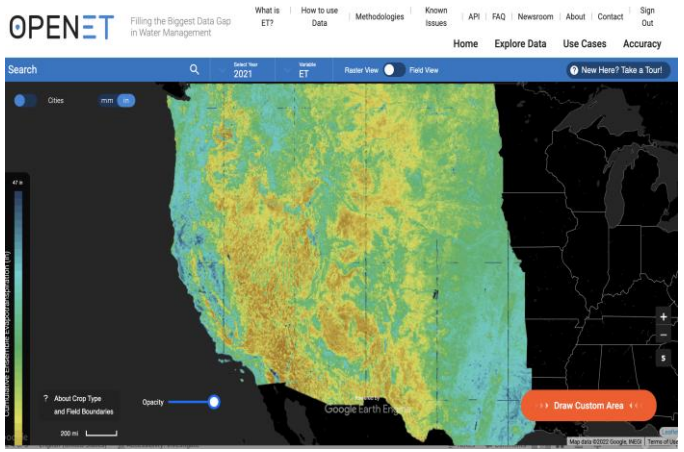
Amita Mehta

June 15, 2022

Training Outline

Three 1.5-hour sessions offered in English with materials available in Spanish

Part 1: June 1, 2022



https://explore.etdata.org/#5/39.665/-110.396

OpenET

Speaker: Forrest Melton
NASA Ames Research Center

Part 2: June 8, 2022

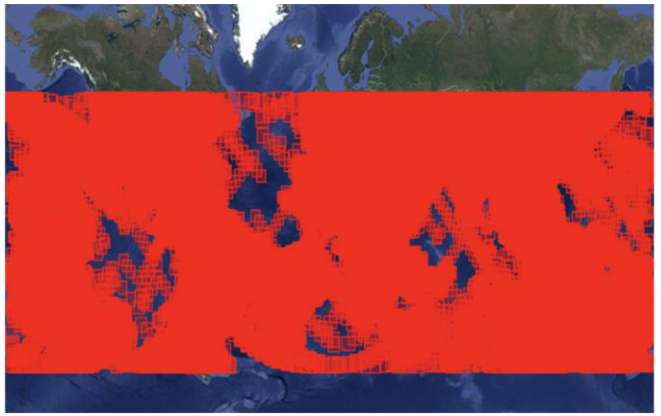


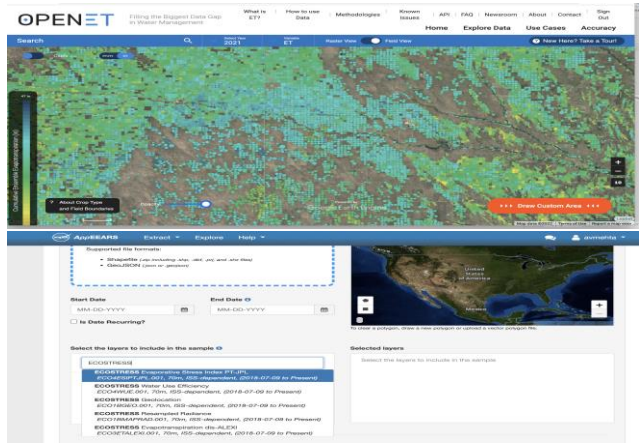
Figure 2 . Represent the actual coverage area acquisition as of 19 March 2020.

https://ecostress.jpl.nasa.gov/science

ECOSTRESS ET

Speaker: Gregory Halverson
NASA JPL

Part 3: June 15, 2022



Exercises: Access and Analysis of OpenET and ECOSTRESS ET Data

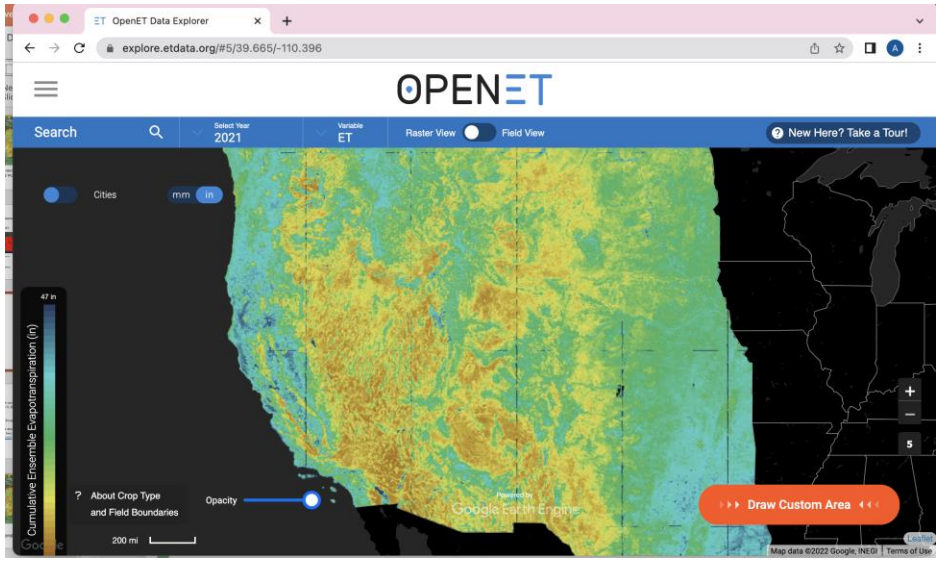
Homework and Certificate

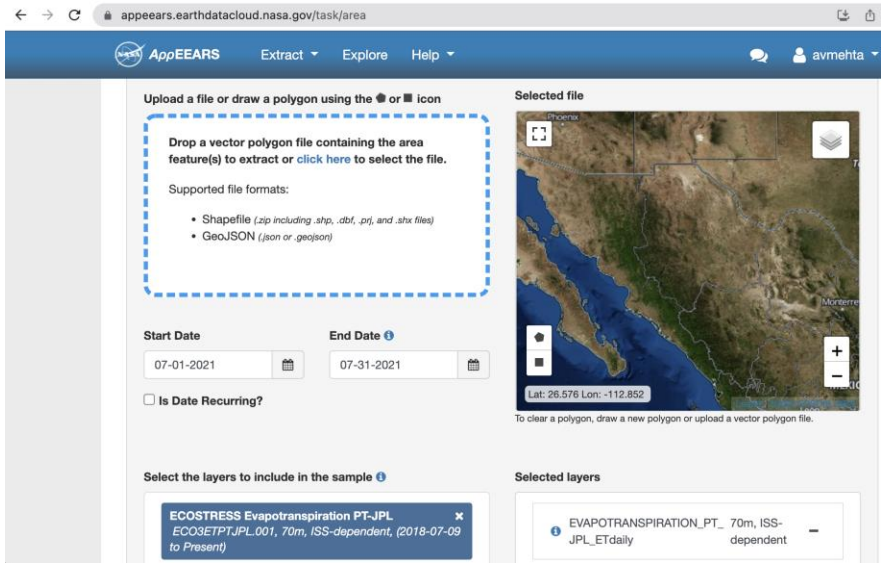
- One homework assignment:
  - **Homework is posted** on the ARSET website
  - Answers must be submitted via Google Form
  - Due date for homework: June 29, 2022.

- A certificate of completion will be awarded to those who:
  - Attend all live webinars
  - Complete the homework assignment by the deadline
  - You will receive a certificate approximately two months after the completion of the course from: marines.martins@ssaihq.com

Outline

- Summary
- OpenET and ECOSTRESS ET data:
  - Unit conversion of ECOSTRESS ET
  - Demonstration of ET data access, OpenET, and ECOSTRESS ET (AppEEARS) data.
- Lab time: Exercises





Summary

- Overview and access of OpenET evapotranspiration data: https://openetdata.org/
  - Calculated using remote sensing data and six different models.
  - Ensemble mean and individual model ET, available for the western US at 30 m resolution.
  - Currently monthly data and annual cumulative data are available, daily data will be available in near future.
  - OpenET will be extended to cover entire US in near future, efforts are underway to expand internationally.
  - Potential ET and gridded precipitation data included along with ET data

Summary

- Overview, access, and analysis of ECOSTRESS ET:
  - [1]Calculated using ECOSTRESS surface temperature and saturation vapor pressure data in Priestley-Taylor Jet Propulsion Laboratory (PT-JPL) algorithm (Fisher et al., 2008).
  - PT-JPL ET data are global, and available at 70 m resolution.
  - Daily ET estimates and evaporative stress data are available from https://appeears.earthdatacloud.nasa.gov/
- Both OpenET and ECOSTRESS ET are validated by using the eddy covariance technique at FLUXNET sites (Baldocchi, 2001)

Baldocchi, et al., 2001, FLUXNET: A new tool to study the temporal and spatial variability of ecosystem-scale carbon dioxide, water vapor, and energy flux densities, Bulletin of the American Meteorological Society, 82(11), 2415-2434.

Fisher rt al., 2008, Global estimates of the land-atmosphere water flux based on monthly AVHRR and ISLSCP-II data, validated at 16 FLUXNET sites, Remote Sensing of Environment, 112(3), 901-919.

[1]https://ecostress.jpl.nasa.gov/downloads/atbd/ECOSTRESS_L3_ET_PT-JPL_ATBD_20180509.pdf

Convert Watts/m^2 to mm/day

- PT-JPL ECOSTRESS ET is the units of energy (Watts/m^2) that is used for evapotranspiration of water

  Note:

  1 day = 86,400 seconds

  1 Watt = 1 Joule/second → 1 Watt/m^2 = 1 Joules/(second.m^2)

  = 86,400 Joules/(day.m^2)

  Density of water = 1000 kg/m^3

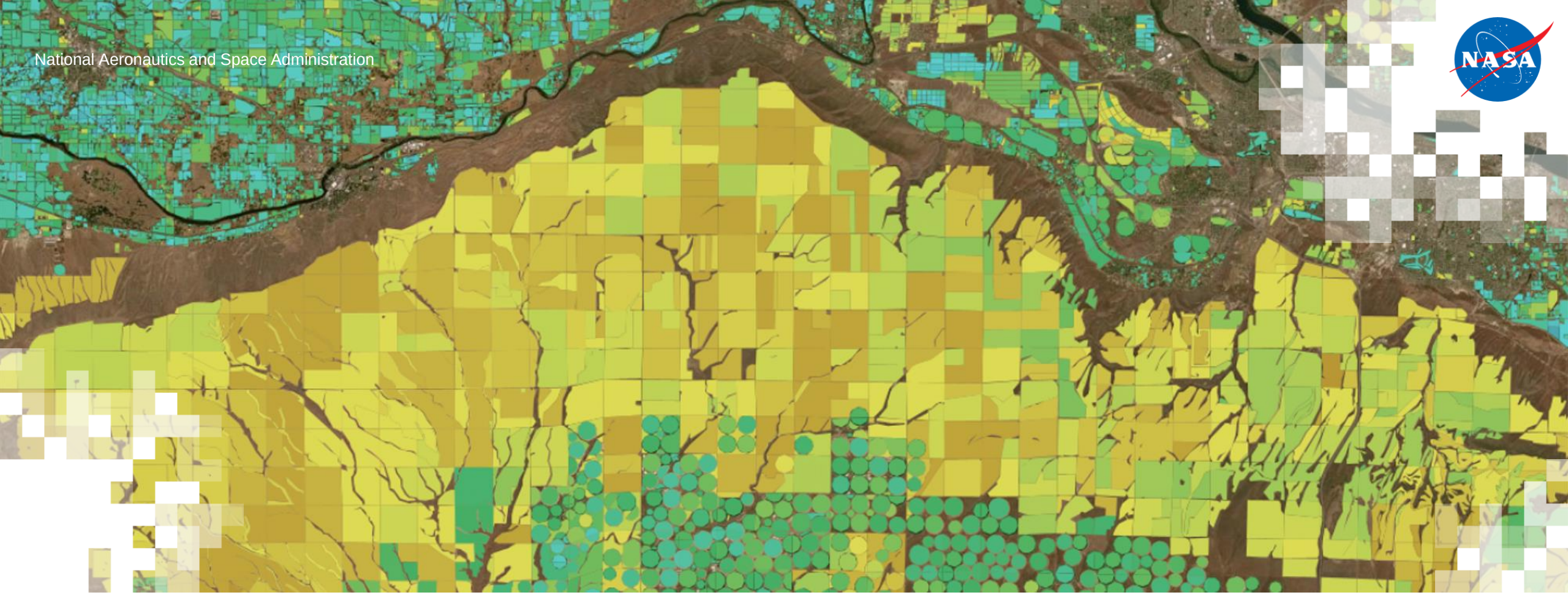
  Laten heat energy of evaporation = 2.45 x 10^6 Joules/kg

  = energy needed to evaporate 1 kg or 0.001m^3 or 1 mm of water

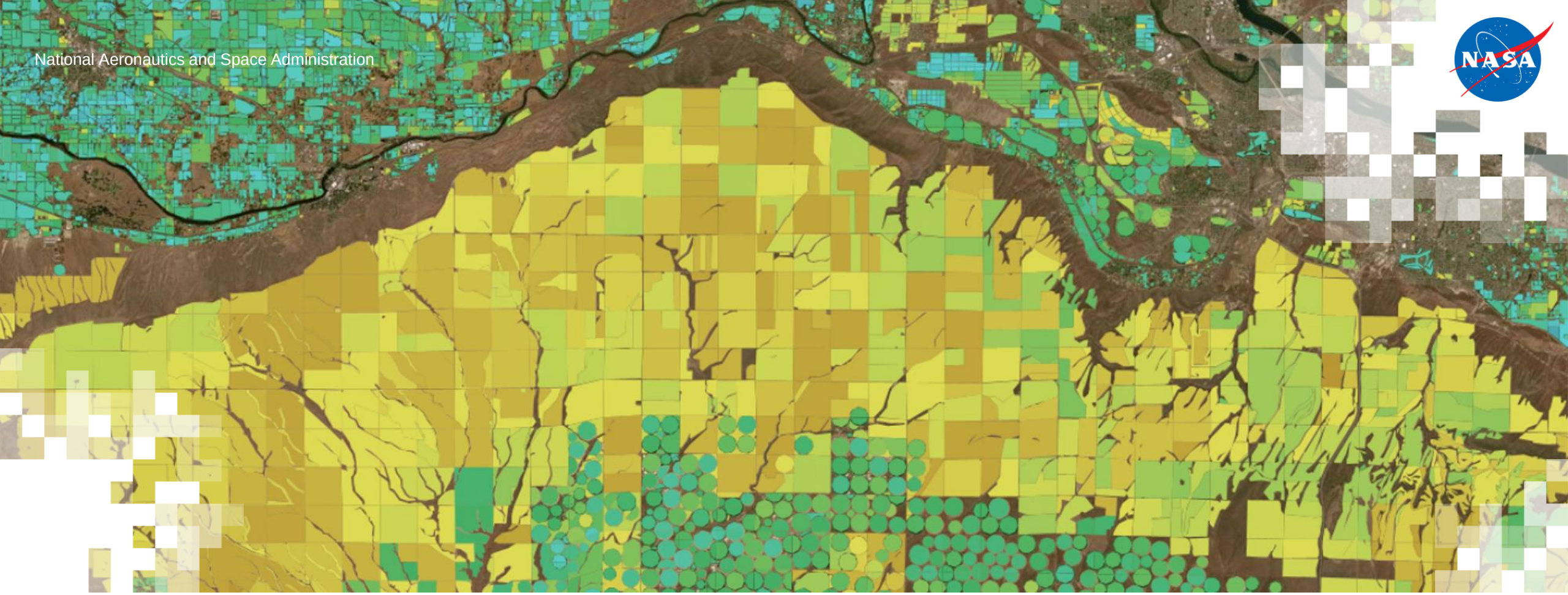
  → 2.45 x 10^6 Joules energy is required to evaporate 1 mm of water

  In mm/day per m^2 = (ET * 86400Joules)/ 2.45 x 10^6 Joules

[1]https://academic.uprm.edu/abe/backup2/tomas/fao%2056.pdf



Data Access Demonstration



Lab Time: Exercise

Questions?

- Please enter your questions in the Q&A box. We will answer them in the order they were received.
- We will post the Q&A to the training website following the conclusion of the webinar.

https://earthobservatory.nasa.gov/features/WaterWatchers/page1.php

Contacts

- Trainer:
  - Amita Mehta: amita.v.mehta@nasa.gov
- Training Webpage:
  - https://appliedsciences.nasa.gov/join-mission/training/english/arset-applications-remote-sensing-based-evapotranspiration-data
- ARSET Website:
  - https://appliedsciences.nasa.gov/arset
- Twitter: @NASAARSET

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TRAIN - EMPOWER - ADVANCE

Thank You!