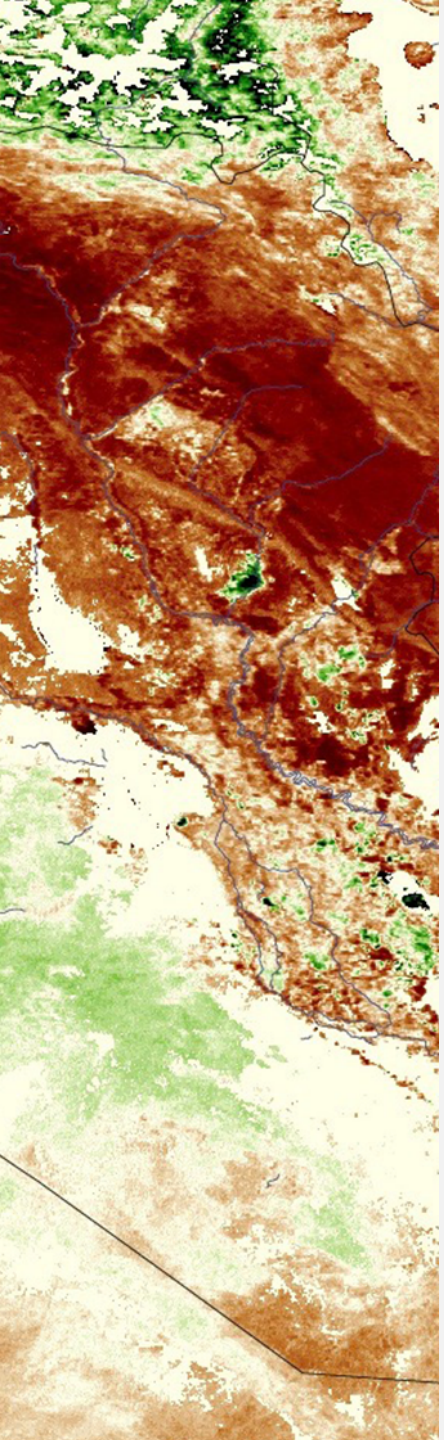


National Aeronautics and
Space Administration

ARSET

Applied Remote Sensing Training

http://arset.gsfc.nasa.gov

@NASAARSET

Remote Sensing of Drought

July 19, 2017

Week 2

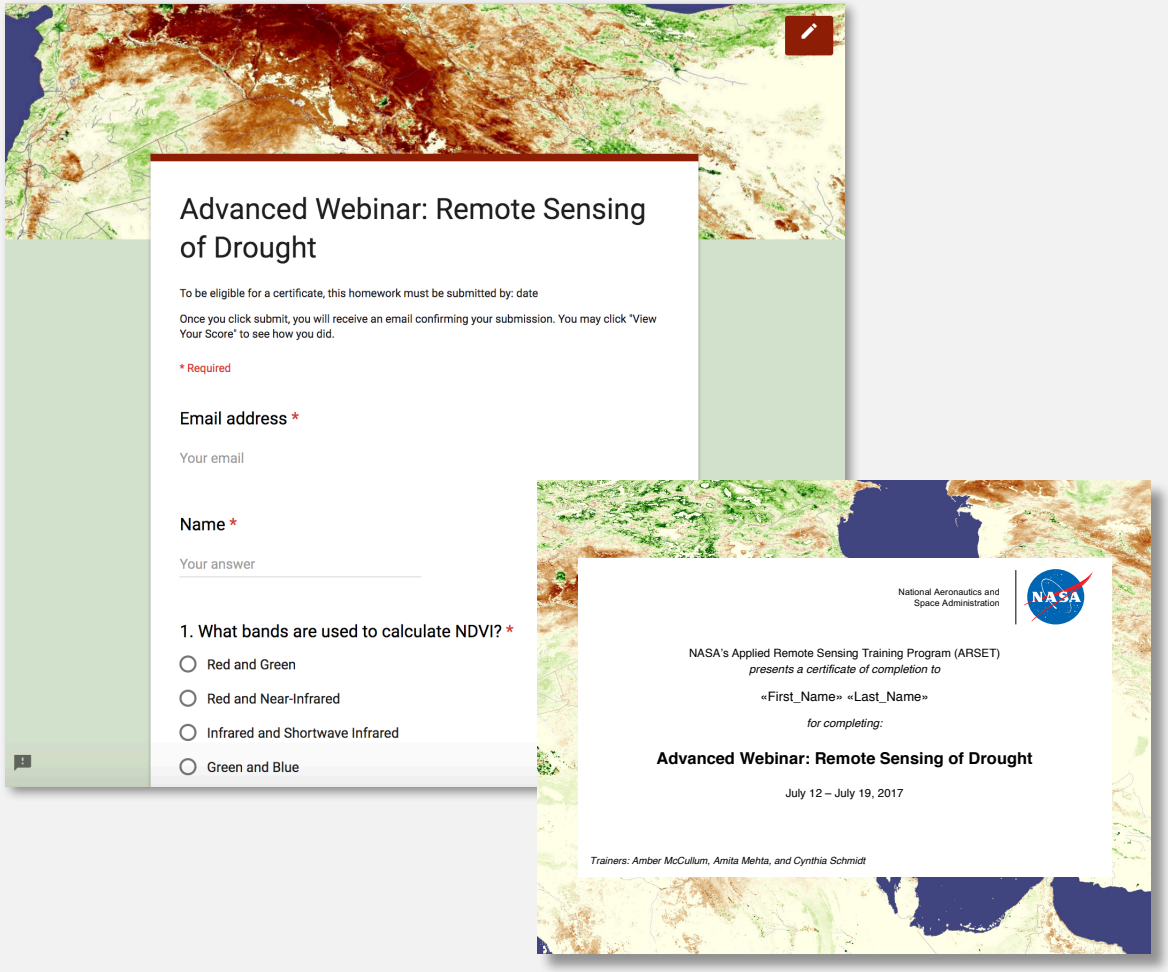
Speakers: Amber McCullum amberjean.mccullum@nasa.gov

Amita Mehta amita.v.mehta@nasa.gov

Cynthia Schmidt cynthia.l.schmidt@nasa.gov

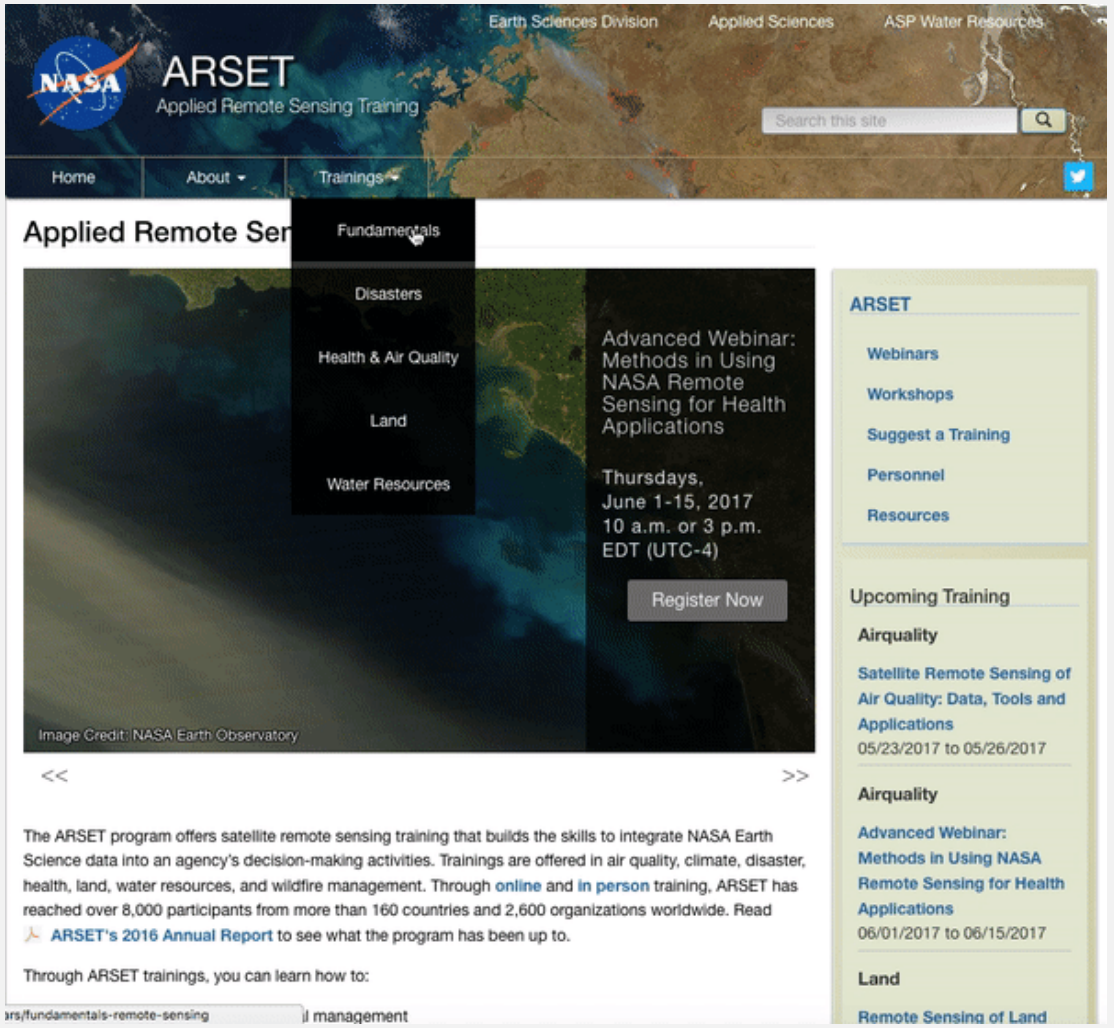
Homework and Certificates

- Homework
  - Answers must be submitted via Google Form
- Certificate of Completion:
  - Attend both webinars
  - Complete the homework assignment by the deadline (access from ARSET website)
    - HW Deadline: August 2nd
  - You will receive certificates approx. two months after the completion of the course from: marines.martins@ssaihq.com



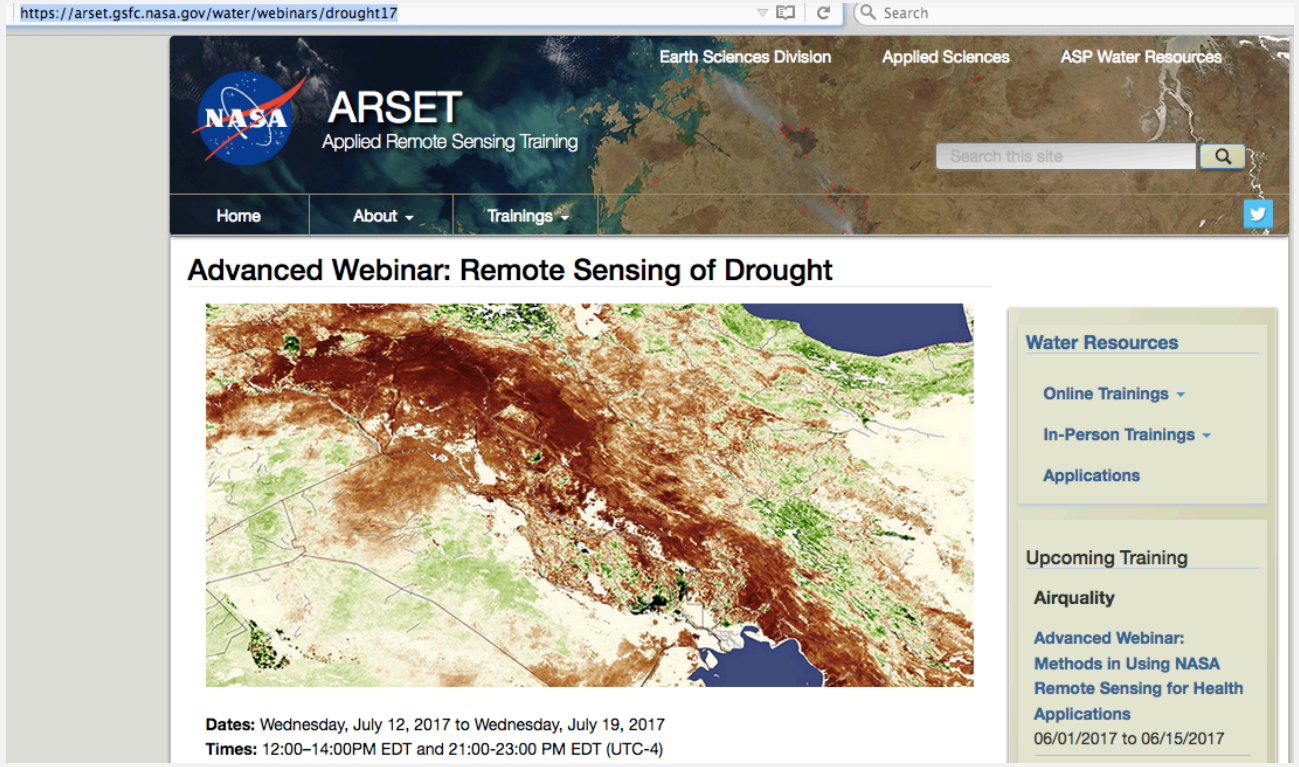
Prerequisites

- Fundamentals of Remote Sensing
  - Sessions 1, 2A, and 2B
  - On demand webinar, available anytime
  - http://arset.gsfc.nasa.gov/webinars/fundamentals-remote-sensing
- Download and install QGIS
  - https://www.qgis.org/en/site/forusers/download.html
  - Open software to ensure it is working properly



Course Material

Webinar recordings, presentations, in class exercises, and homework are available at: http://arset.gsfc.nasa.gov/water/webinars/drought17/



Course Agenda:

Agenda.pdf

Remote Sensing-Based Drought Monitoring

July 12, 2017

This session will include an overview of drought classification, an introduction to web-based drought monitoring tools, a demonstration of drought data visualization tools, and end with an exercise for attendees to practice downloading data.

- View the Recording »
- Presentation Slides (English) »

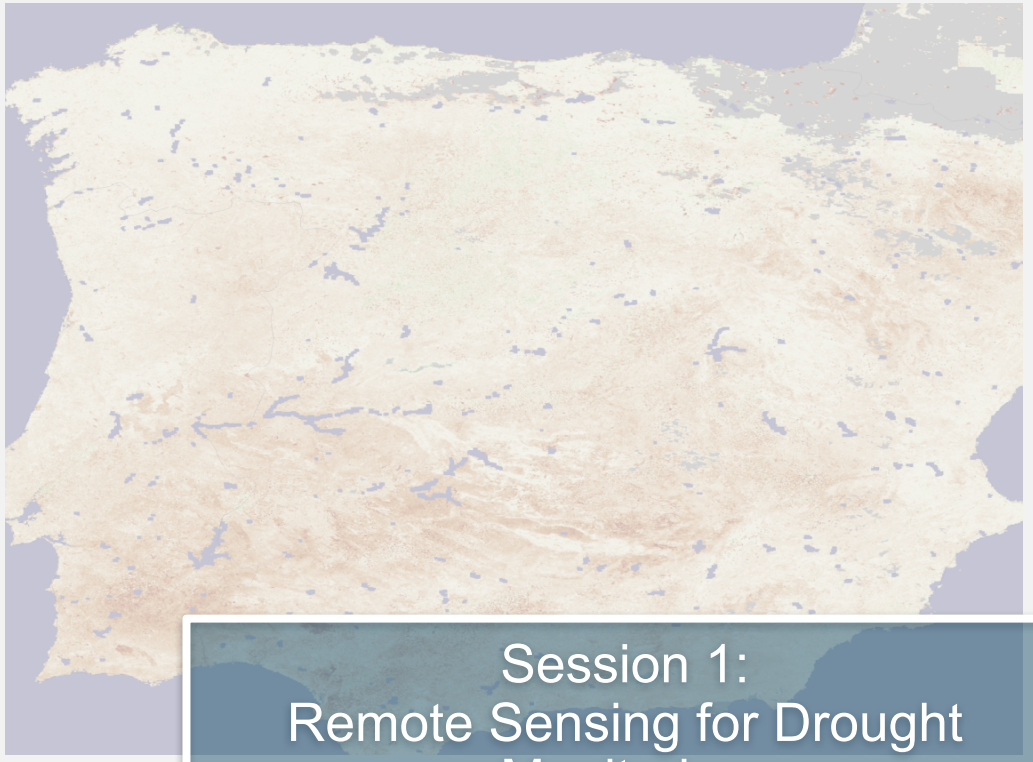
Drought Monitoring Analysis and Application

July 19, 2017

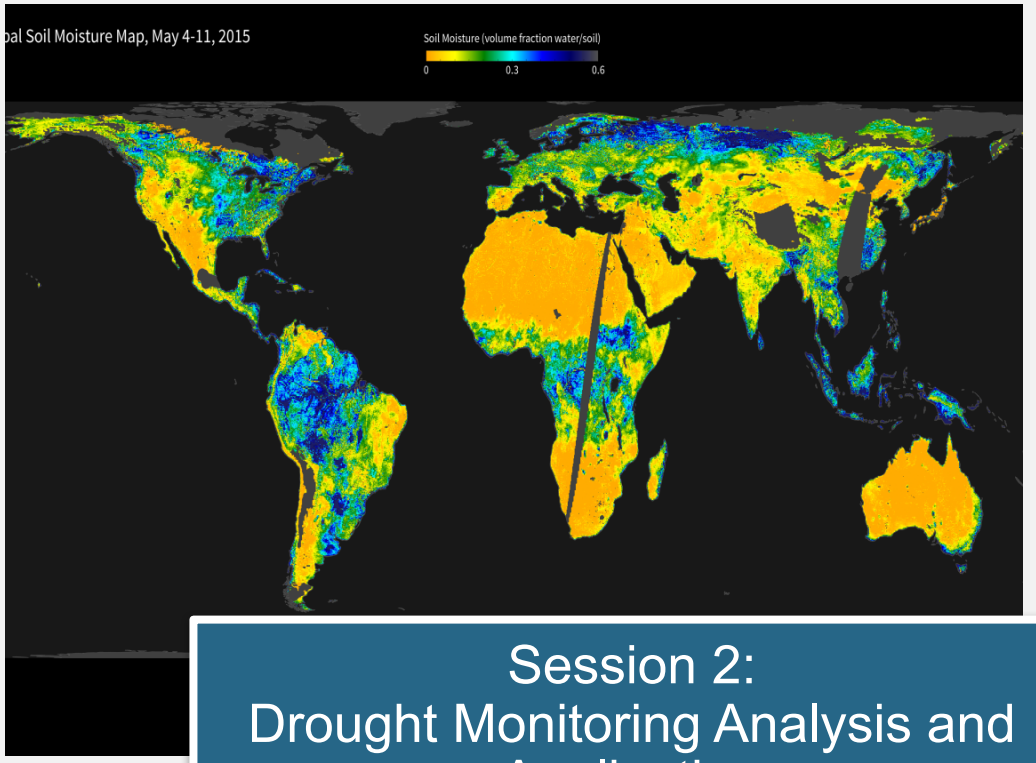
This session will include a demonstration of soil moisture, groundwater, NDVI, and evapotranspiration (ET) data access and visualization, and will use a case study (California) exercise to demonstrate how participants can analyze drought conditions. Background will also be provided for a case study (northern Africa) to be used by participants to independently conduct their own analysis.

- View the Recording »
- Presentation Slides (English) »
- Homework Assignment »

Course Outline



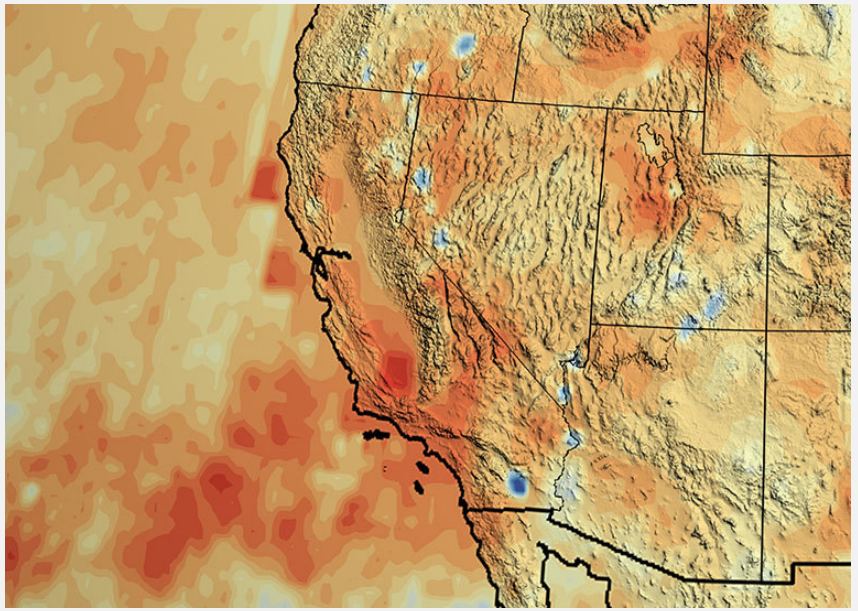
Session 1:
Remote Sensing for Drought Monitoring



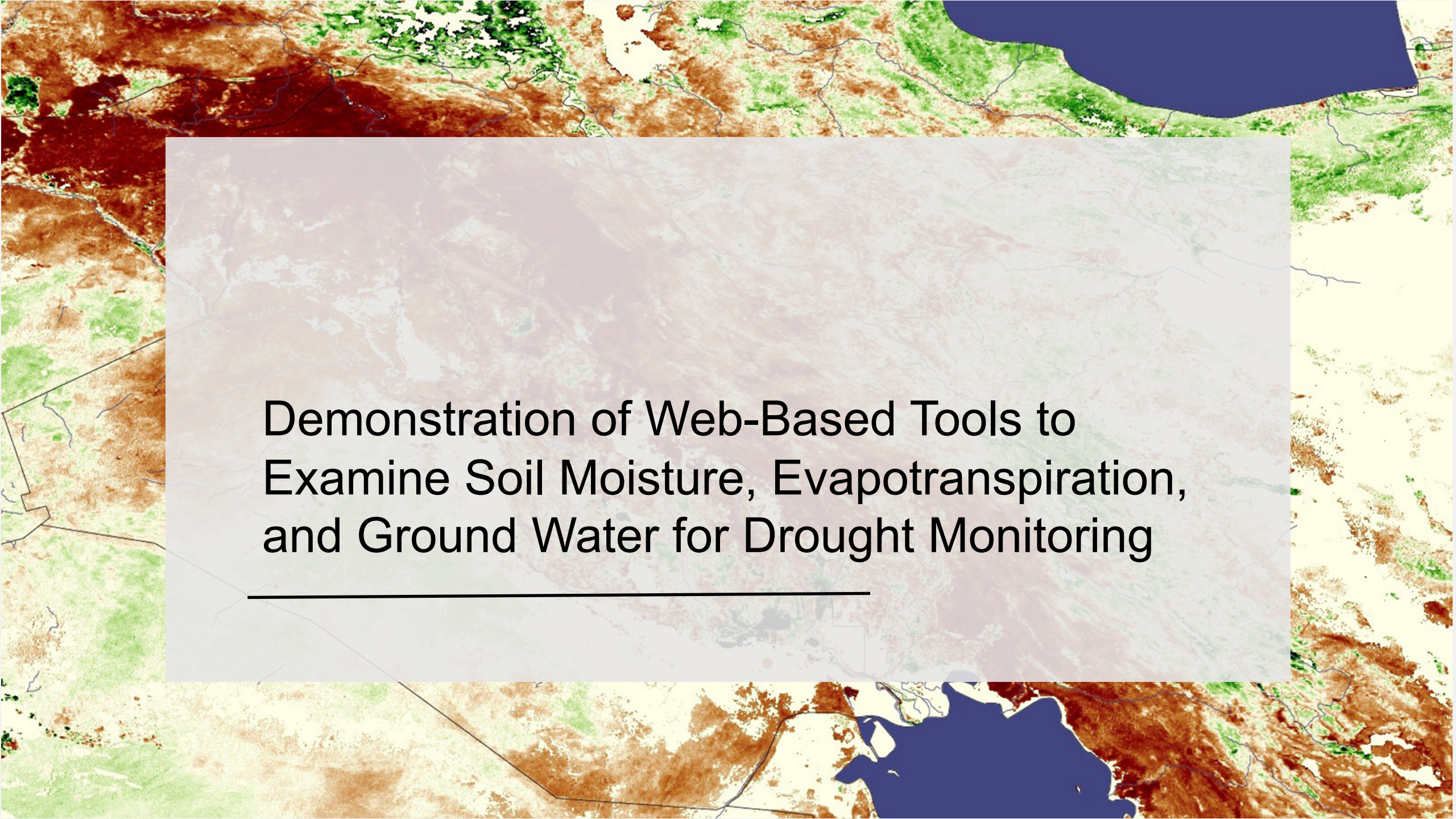
Session 2:
Drought Monitoring Analysis and Application

Session 2 Agenda

- Demonstration of Web-Based Tools to Monitor Soil Moisture, Evapotranspiration, and Ground Water Storage for Drought Monitoring
- Exercise: Analysis of Precipitation and NDVI Anomalies for Drought Monitoring
- Summary
- Q and A



California's precipitation deficit from 2012-2014 via TRMM (NASA Global Climate Change)

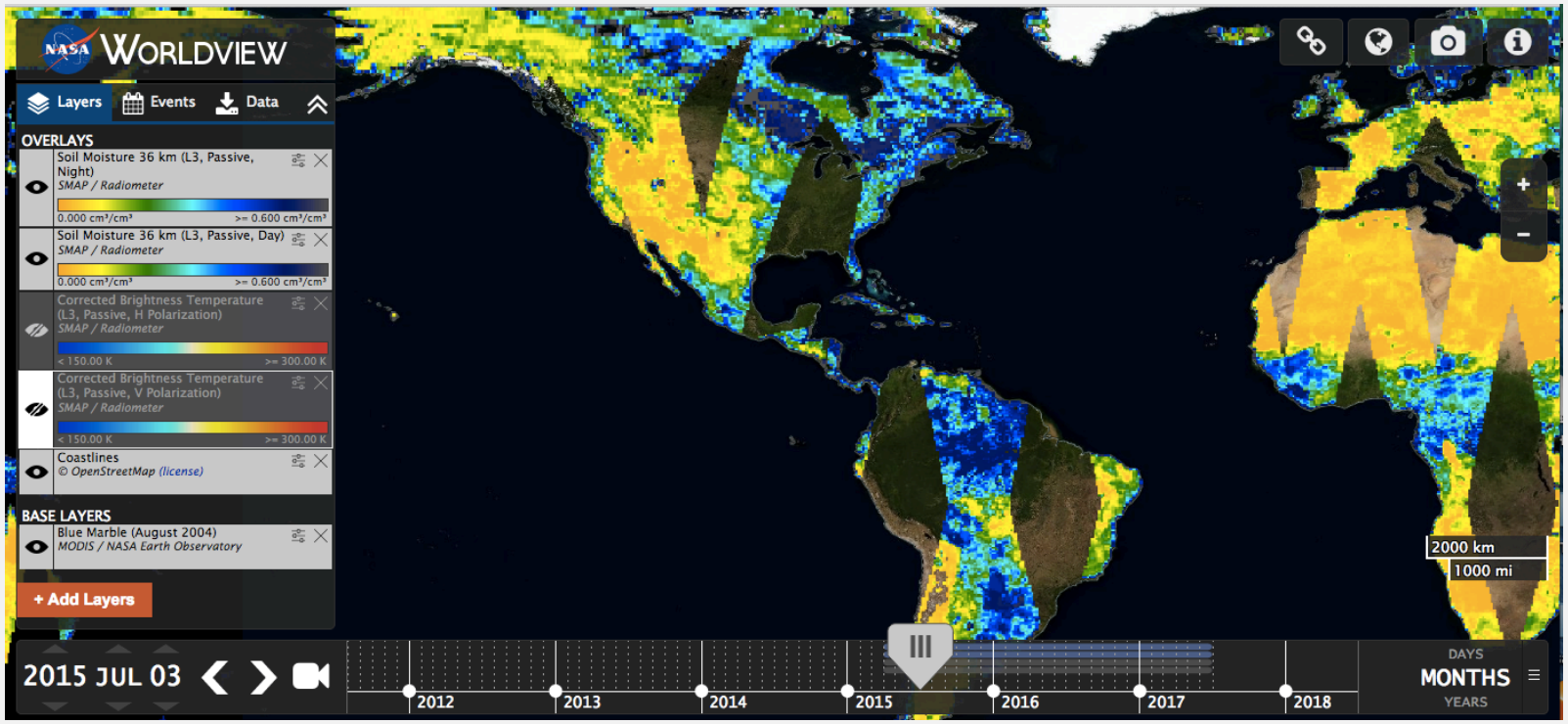


Demonstration of Web-Based Tools to Examine Soil Moisture, Evapotranspiration, and Ground Water for Drought Monitoring

Monitoring Soil Moisture

https://worldview.earthdata.nasa.gov/

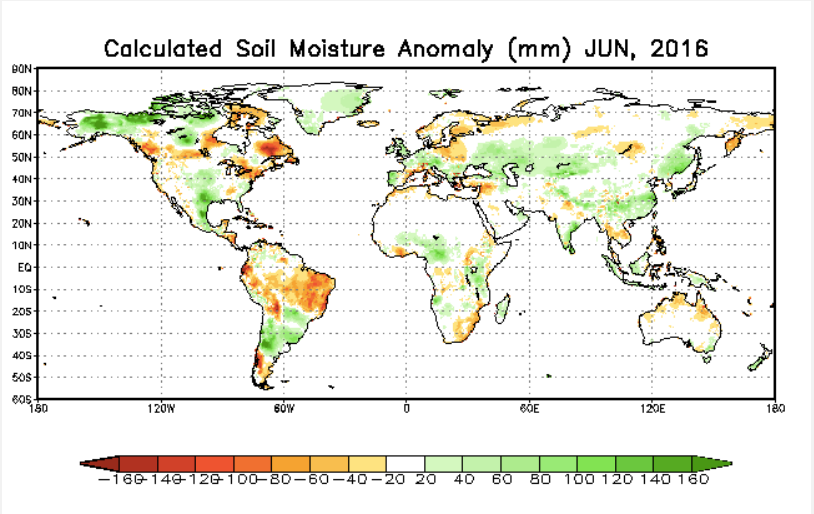
- Since early 2015, the SMAP mission provides global soil moisture observations that can be used to monitor soil moisture variability from day-to-day and month-to-month
- Daily and monthly soil moisture data can be visualized using NASA Worldview

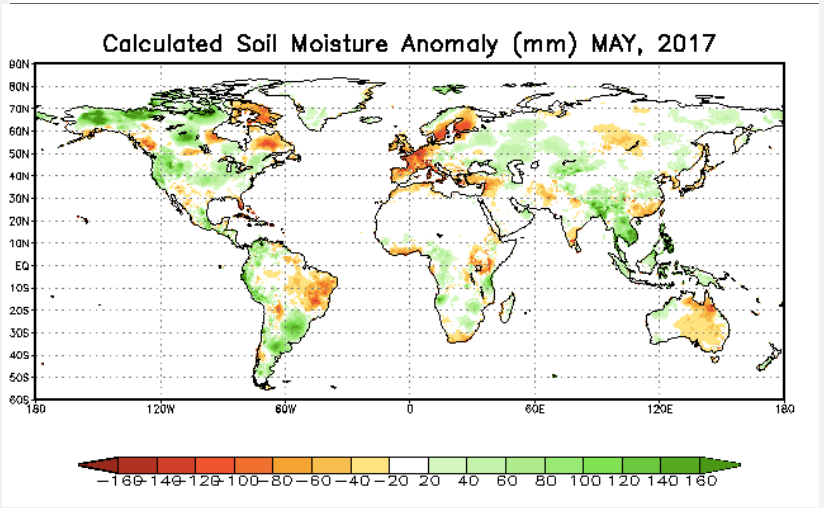


Soil Moisture Anomalies for Drought Monitoring

http://www.cpc.ncep.noaa.gov/products/Soilmst_Monitoring/gl_Soil-Moisture-Monthly.php

- NOAA Climate Prediction Center provides calculated monthly soil moisture climatology (19701-2000) and anomalies for present-day and the past 12 months
- These maps visually provide indications of soil moisture deficit and drought conditions



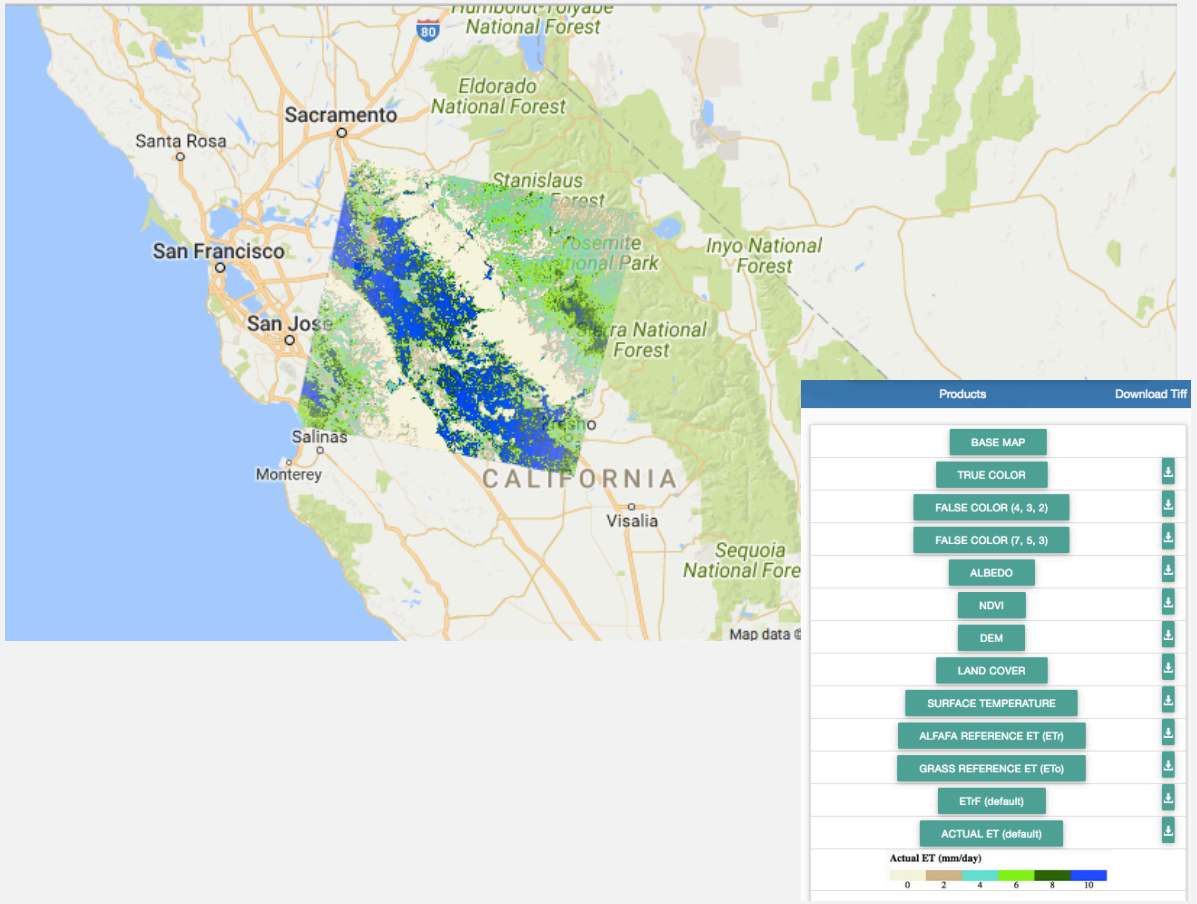


ET for Drought Monitoring

http://eeflux-level1.appspot.com/

- Landsat-based evapotranspiration images are available online at 30m resolution (see https://arset.gsfc.nasa.gov/sites/default/files/water/ET-SMAP/week4.pdf for details)
- These maps provide information about changing ET, indicative of agricultural and hydrological drought conditions

Landsat-Based ET for July 17, 2015



Reference: https://c3.nasa.gov/water/static/media/other/Day1_S1-3_Allen.pdf

GRACE-Based Water Storage Anomalies for Drought Monitoring

http://geoid.colorado.edu/grace/dataportal.html

Time Selection

YYYY:DY

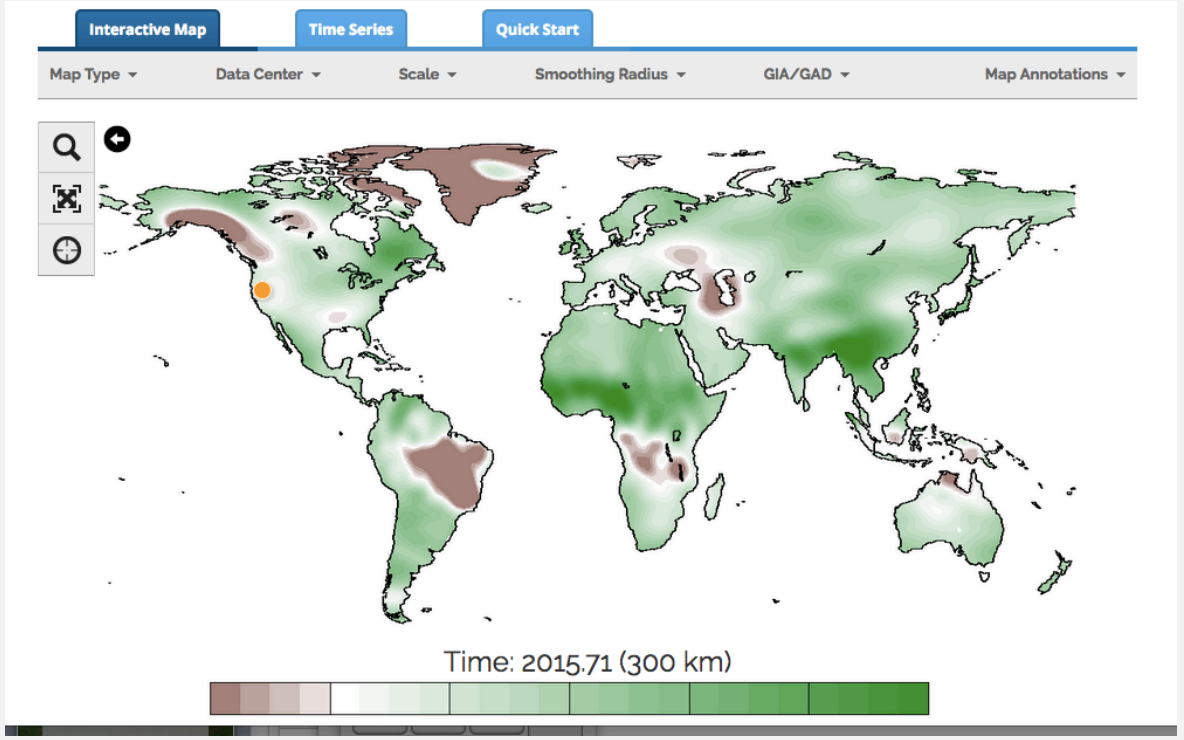
DY=Decimal Year

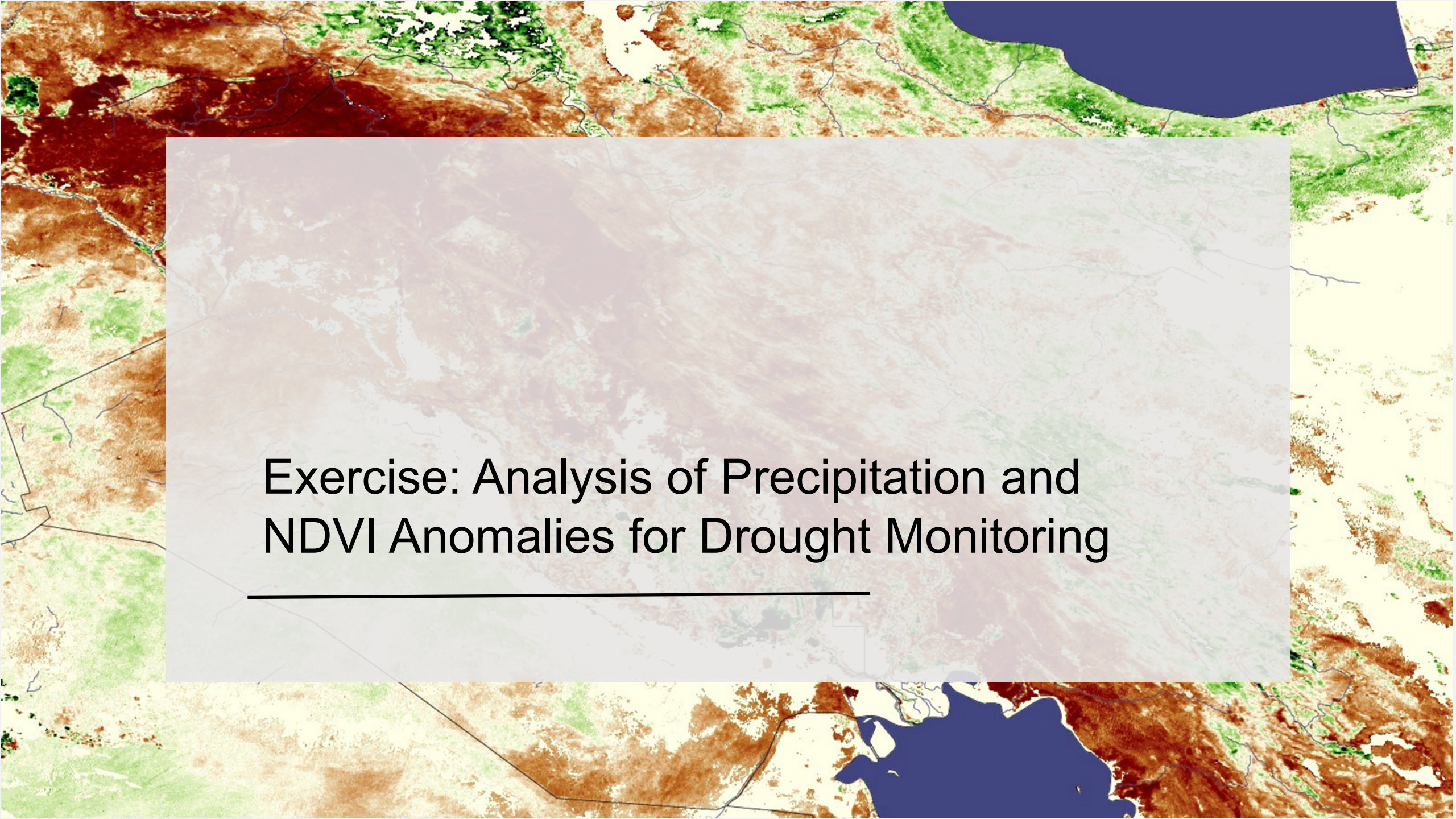
Day of Year/365

DY=0.79

Represents 0.71*365=259th Day of the Year = 15 September

2015.71 selects data for September 2015





Exercise: Analysis of Precipitation and NDVI Anomalies for Drought Monitoring

Summary

- Multiple historical and near real-time remote sensing-based data provide consistent and large-scale coverage to assess past and monitor current meteorological, hydrological, and agricultural droughts
  – Data Include: precipitation, NDVI, soil moisture, ET, & ground water estimates
- These data
  – have different spatial and temporal resolutions and coverage
  – require appropriate analysis and synthesis for drought monitoring
- Precipitation anomalies, their magnitudes, spatial extent, and duration provide indications of short to long term drought conditions, and the potential for agricultural and hydrological droughts
- NDVI can be used to assess vegetation health
- Negative NDVI anomalies may indicate drought conditions and/or fallowed land

Thank you!

- The Homework Assignment is Due August 2, 2017
  – Available at: http://arset.gsfc.nasa.gov/water/webinars/drought17

- To keep up-to-date on available ARSET training, join the ARSET listserv:
  – https://lists.nasa.gov/mailman/listinfo/arset