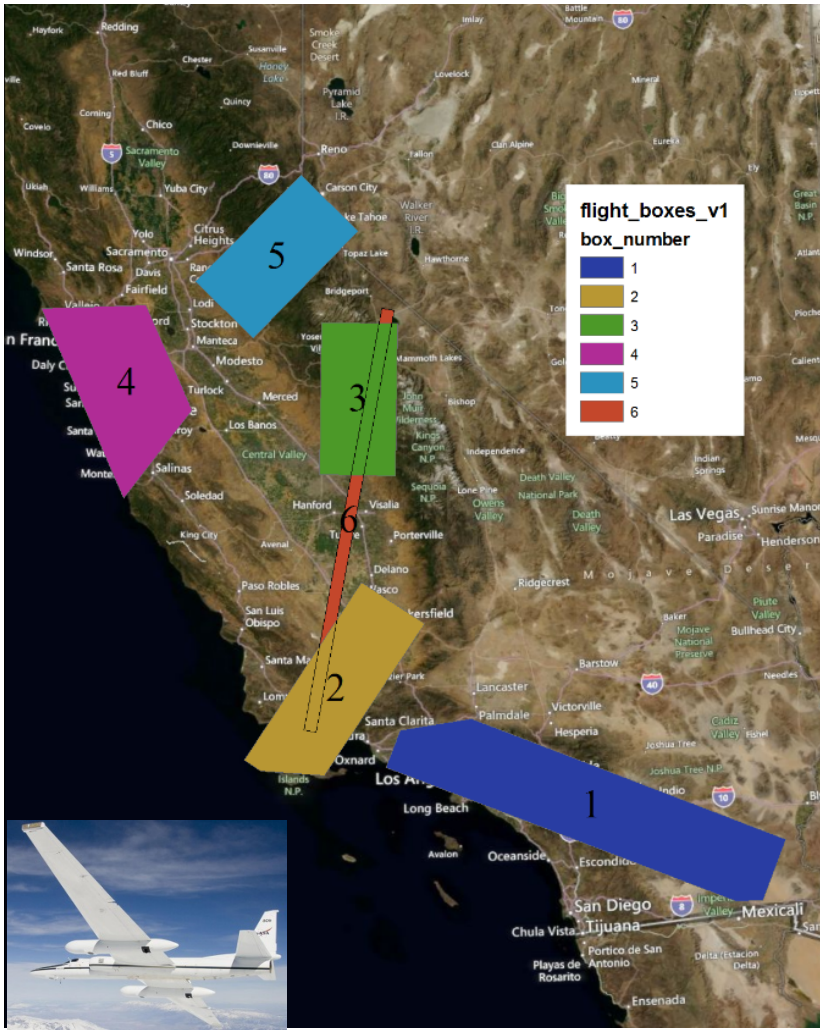
HyspIRI Aircraft campaign: science goals, project overviews & data sharing

[*Rob Green & Simon Hook*]

HyspIRI Preparatory Airborne Science (Ecosystems, Seasonal, Climate, Coastal, Urban, Resources)



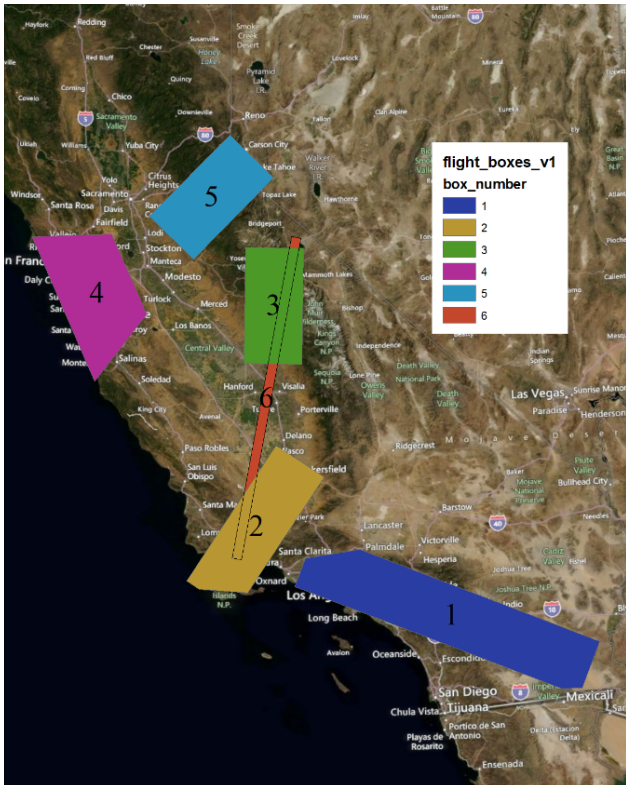
- 6 zones, 3 seasons, 2 years
- Objective: Advance HyspIRI Mission Science Readiness
  - Ecosystem composition, function, biochemistry, seasonality, structure, and modeling
  - Coastal ocean phytoplankton functional types, habitat
  - Urban land cover, temperature, transpiration
  - Surface energy balance
  - Atmospheric characterization and local methane sources
  - Surface geology, resources, soils, hazards

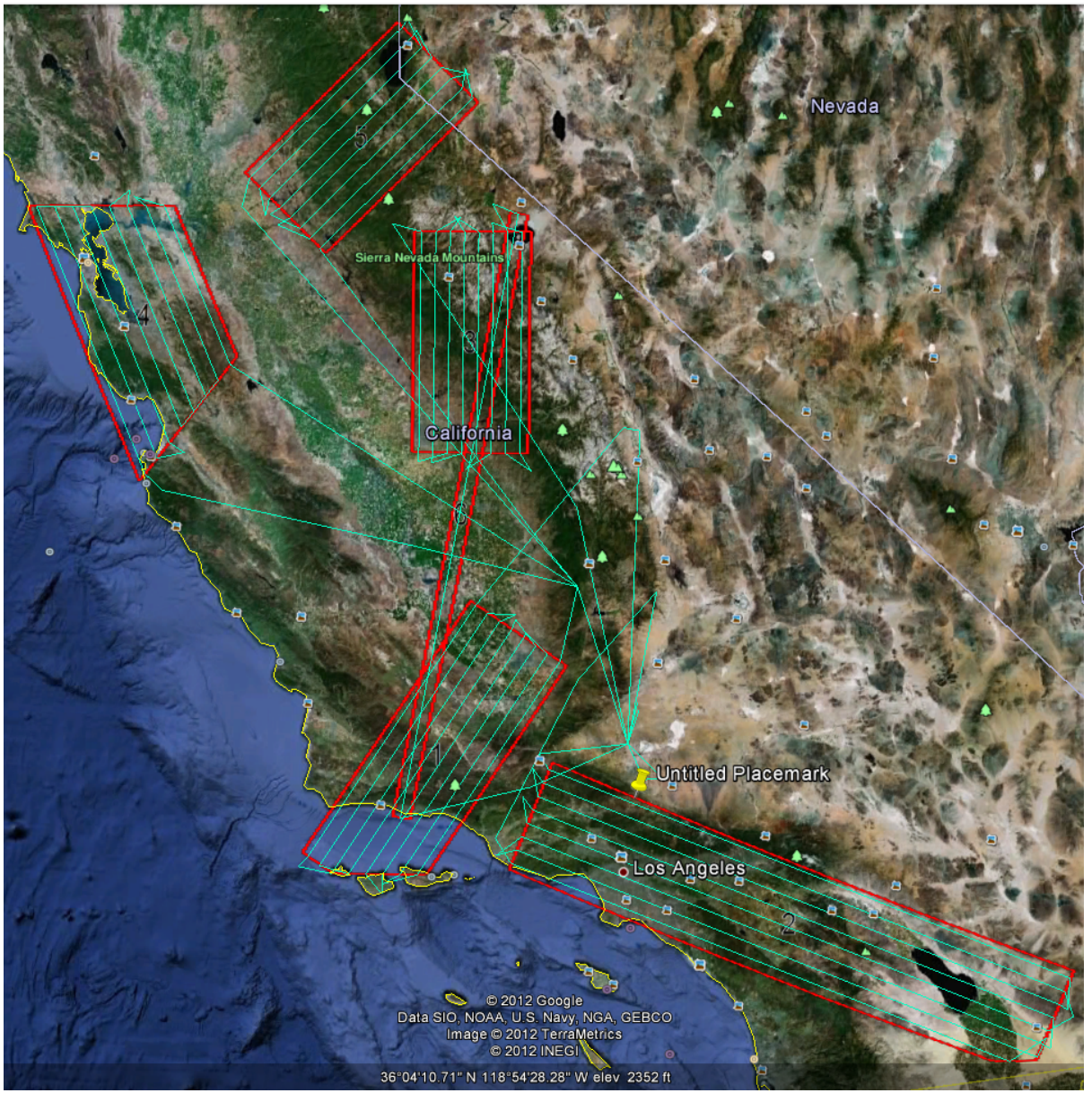
AVIRIS and MASTER on ER-2

HyspIRI Preparatory Airborne Activities Projects

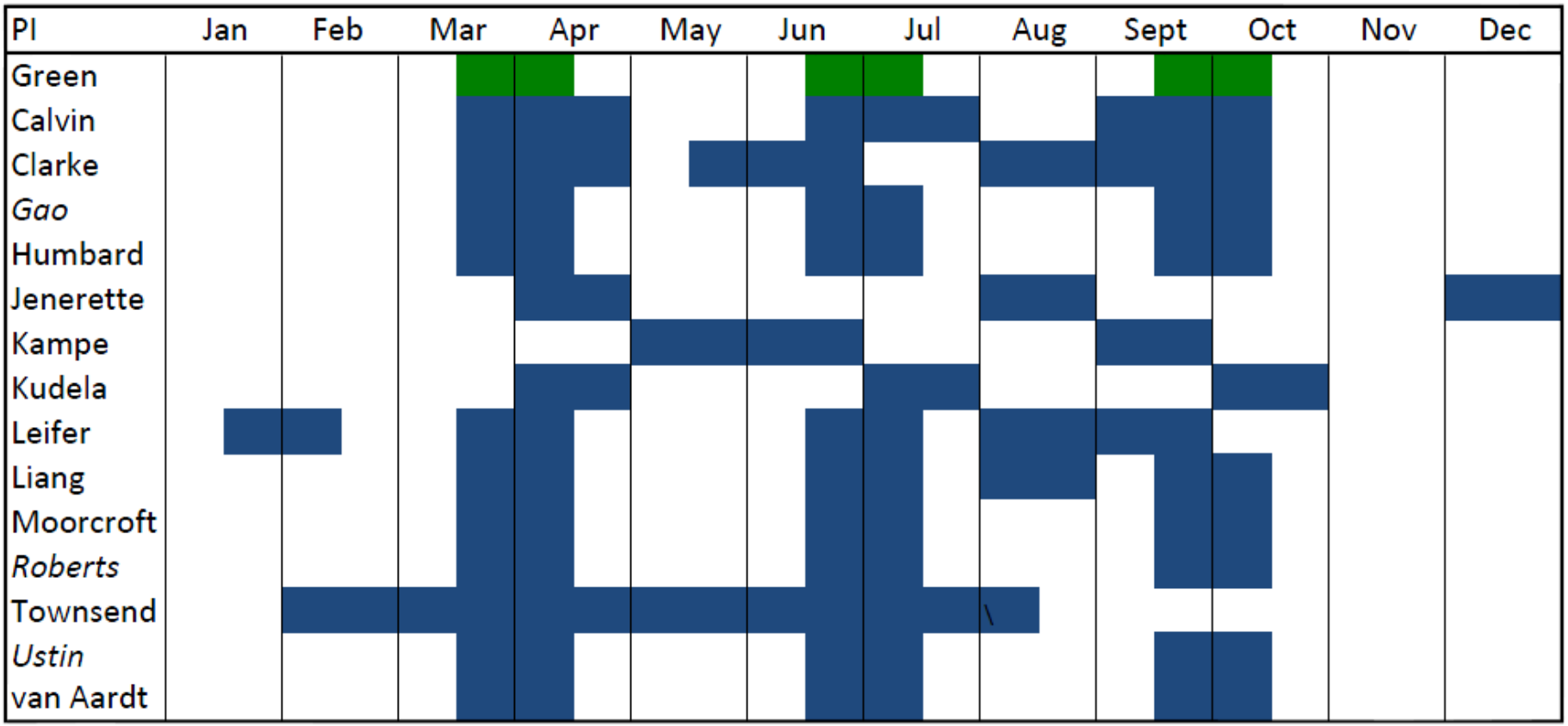
- Harvard/Paul Moorcroft - Linking Terrestrial Biosphere Models with Imaging Spectrometry Measurements of Ecosystem Composition, Structure, and Function
- UC Santa Barbara/Dar Roberts - HyspIRI discrimination of plant species and functional types along a strong environmental-temperature gradient
- UWI/Philip Townsend - Measurement of ecosystem metabolism across climatic and vegetation gradients in California for the 2013-2014 NASA AVIRIS/MASTER airborne campaign
- UC Davis/Susan Ustin - Identification of Plant Functional Types By Characterization of Canopy Chemistry Using an Automated Advanced Canopy Radiative Transfer Model
- Sonoma State/Matthew Clark - Spectral and temporal discrimination of vegetation cover across California with simulated HyspIRI imagery
- NRL/Bo-Cai Gao - Characterization and Atmospheric Corrections to the AVIRIS-Classic and AVIRISng Data to Support the HyspIRI Preparatory Airborne Activities
- USGS/Bernard Hubbard - Using simulated HyspIRI data for soil mineral mapping, relative dating and flood hazard assessment of alluvial fans in the Salton Sea basin, Southern California
- UC Riverside/George Jenerette - Assessing Relationships Between Urban Land Cover, Surface Temperature, and Transpiration Along a Coastal to Desert Climate Gradient
- NEON/Thomas Kampe - Synergistic high-resolution airborne measurements of ecosystem structure and process at NEON sites in California
- UC Santa Cruz/Raphael Kudela - Using HyspIRI at the Land/Sea Interface to Identify Phytoplankton Functional Types
- Bubbleology/Ira Leifer - Hyperspectral imaging spectroscopic investigation of California natural and anthropogenic fossil methane emissions in the short-wave and thermal infrared
- UMD/Shunlin Liang - Characterizing surface energy budget of different surface types under varying climatic conditions from AVIRIS and MASTER data
- RIT/Jan van Aardt - Investigating the impact of spatially-explicit sub-pixel structural variation on the assessment of vegetation structure from HyspIRI data
- UNV/Wendy Calvin - Energy and Mineral Resources: Surface composition mapping that identifies resources and the changes and impacts associated with their development

HyspIRI Preparatory Airborne Science
(Ecosystems, Seasonal, Climate, Coastal, Urban, Resources)

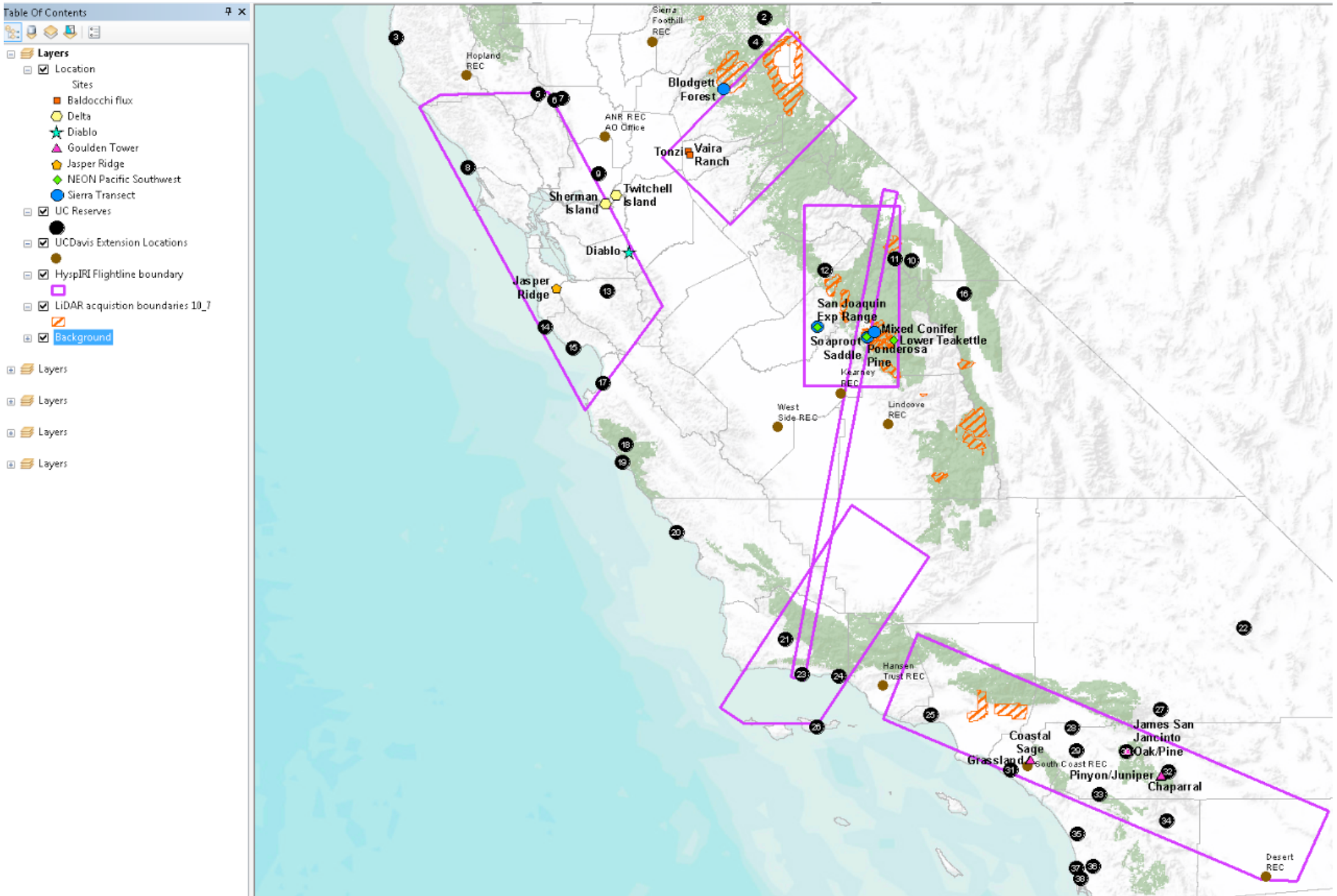




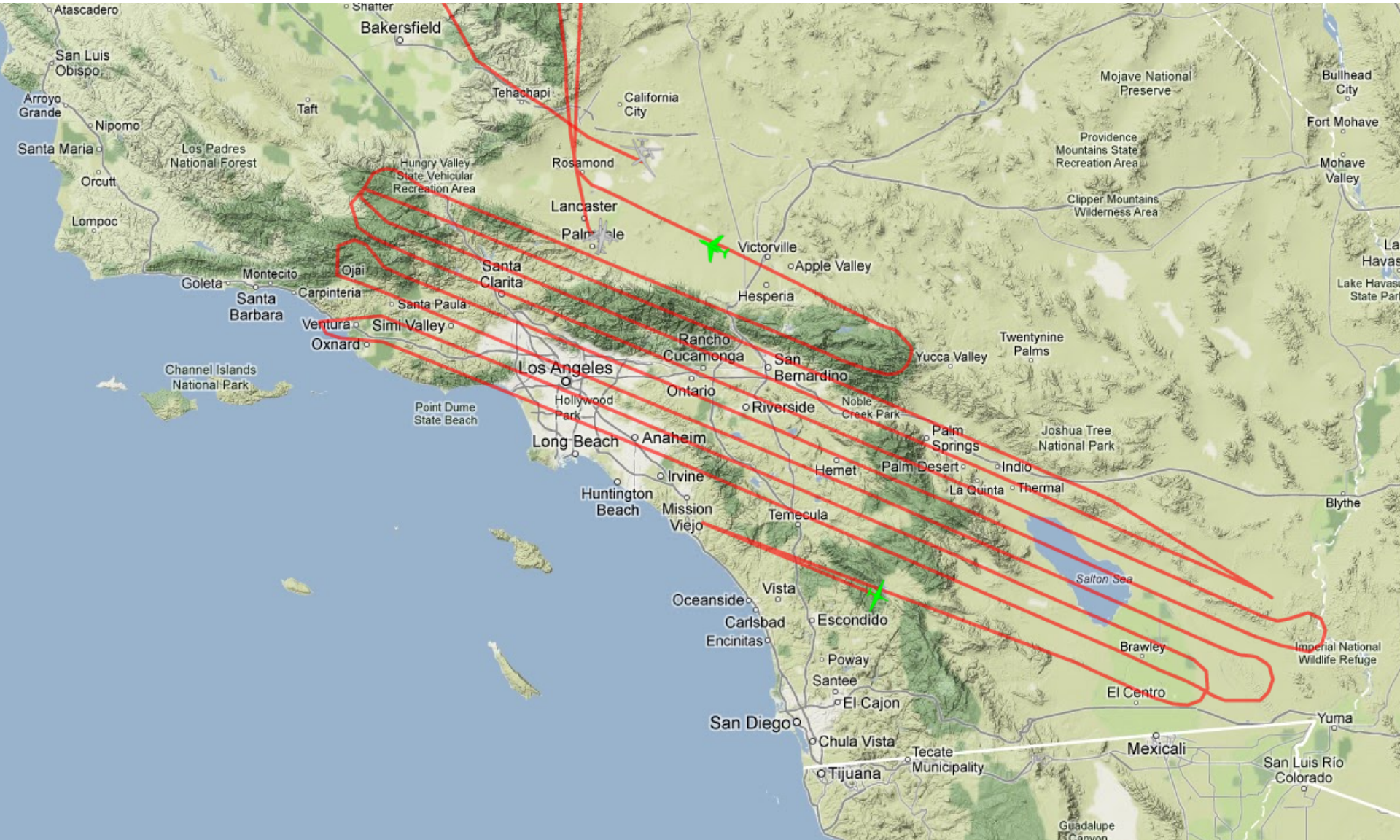
Approximate Timing



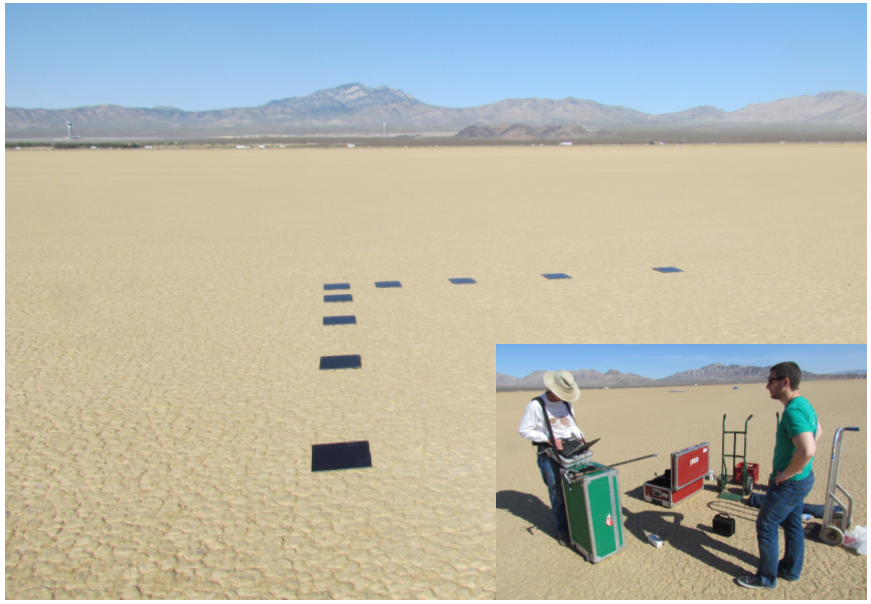
Infrastructure location



HyspIRI Preparatory Science
Flight 22 May 2013

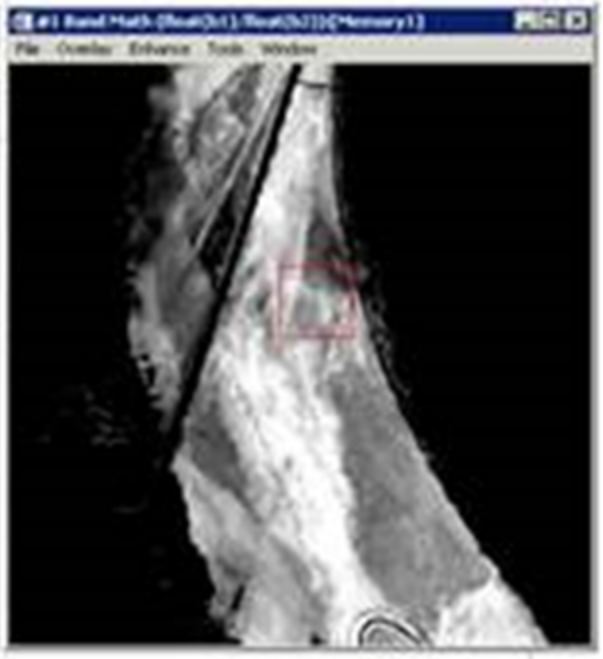


Example AVIRIS Calibration Validation Experiment
Ivanpah Playa Calibration Site 2012

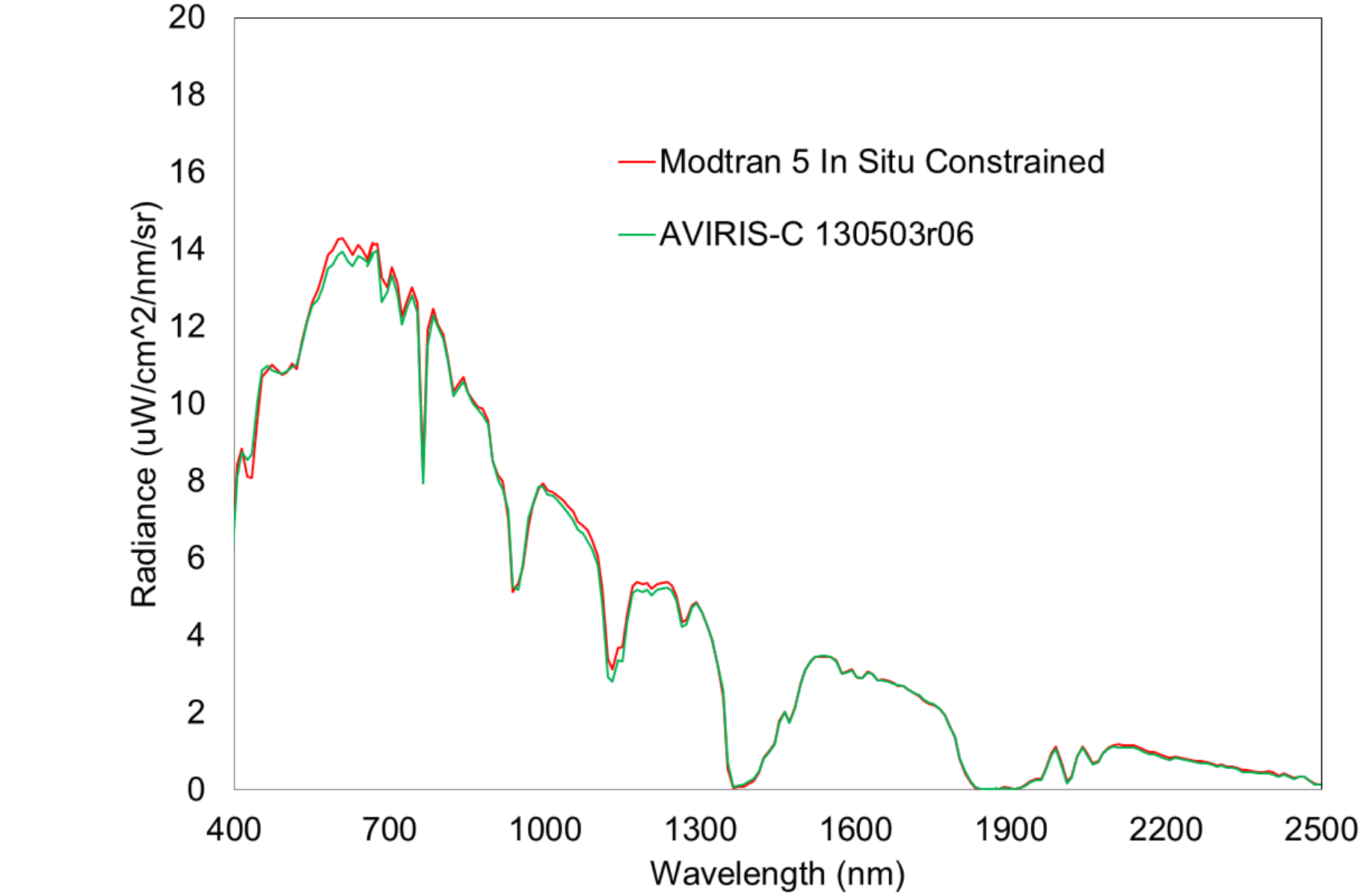


AVIRIS-C Calibration Experiment 3 May 2013

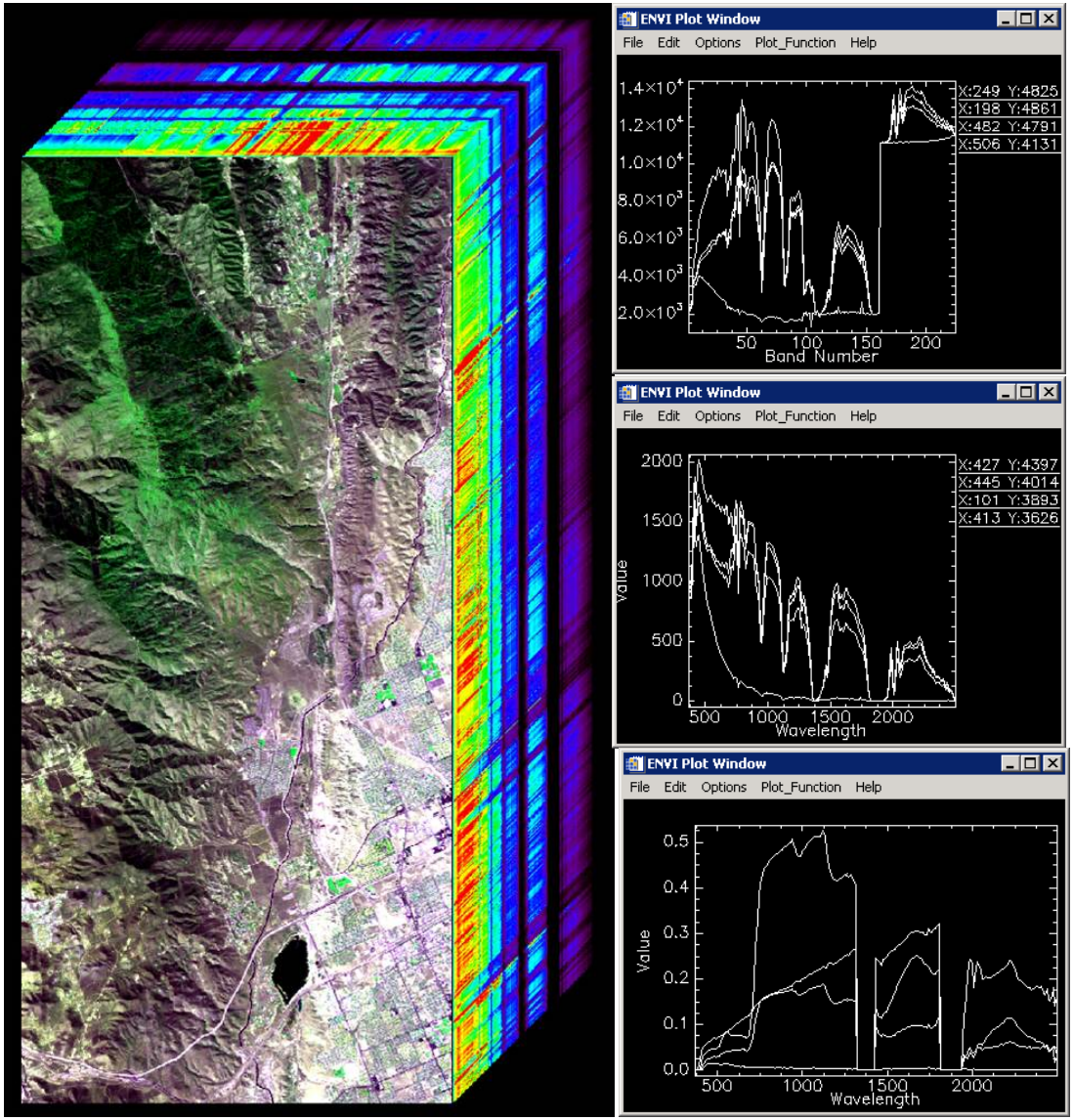
Ivanpah Tarp Location 130503



Preliminary Results 3 May 2013 HyspIRI Preparatory Campaign



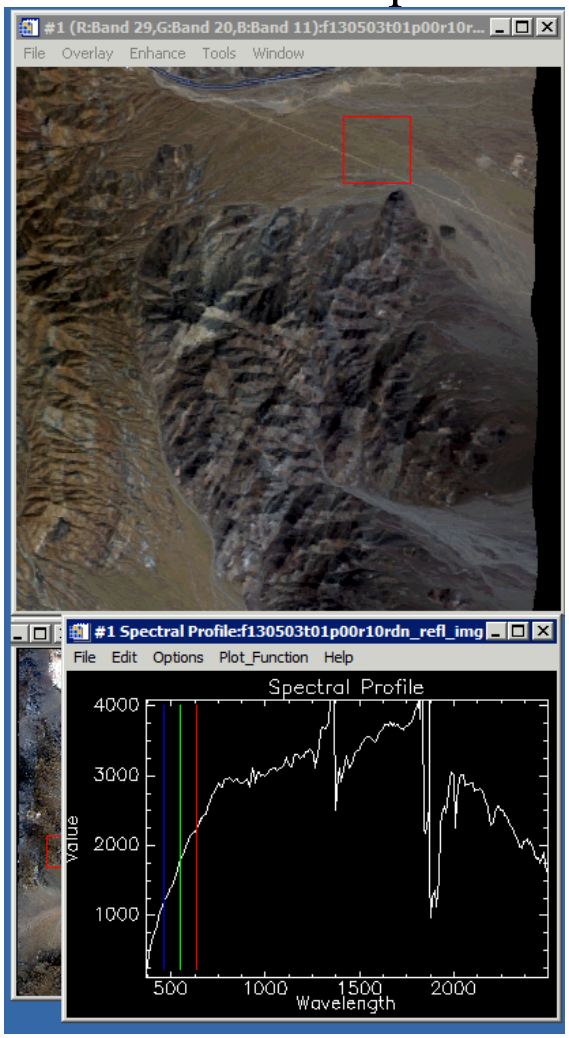
HyspIRI Airborne Campaign – First Flights March 29, 2013, Palmdale CA



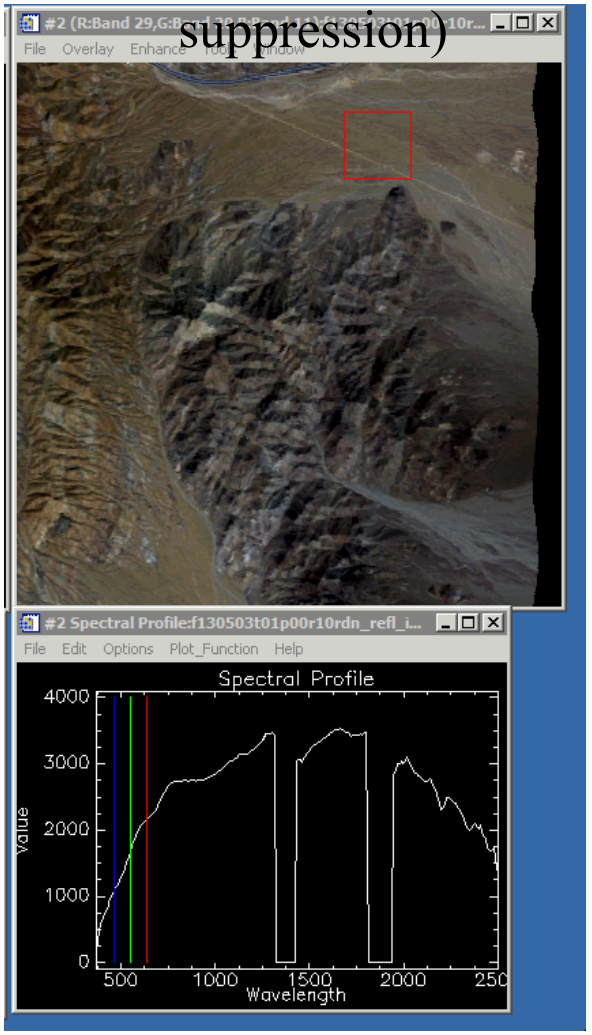
AVIRIS image cube and Level 1a, 1b and 2 spectra. The reflectance spectra (L2) will be used to address the full range of science objectives including ecosystems and climate.

F130503t01p00r10 (typical spectrum)

ATREM output

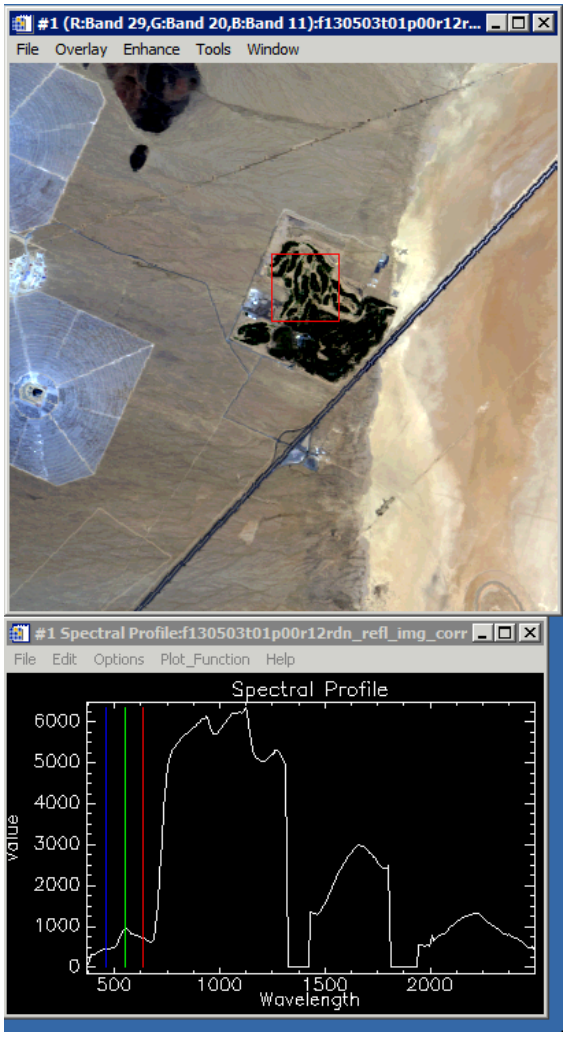


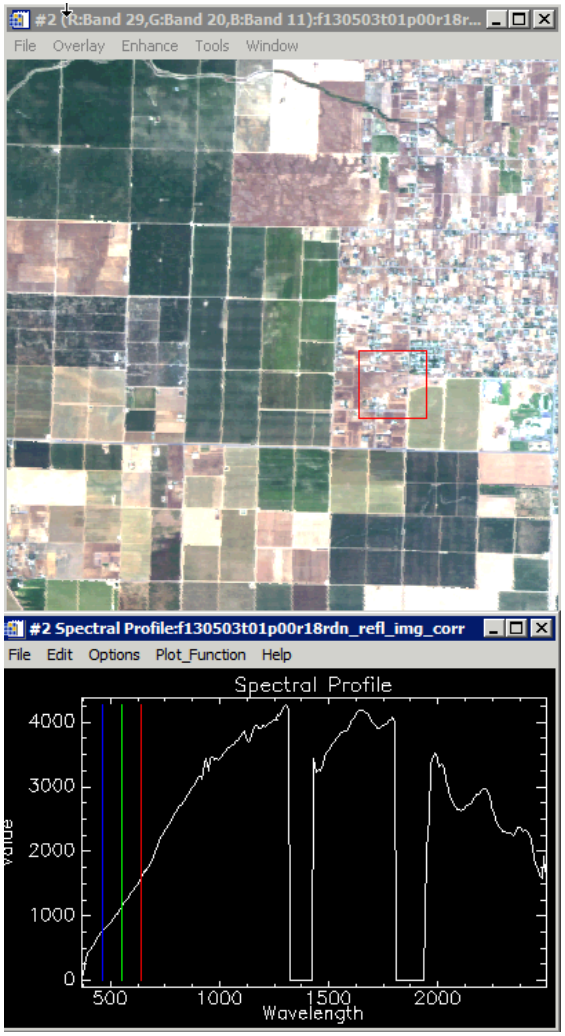
Final L2 product (after residual suppression)

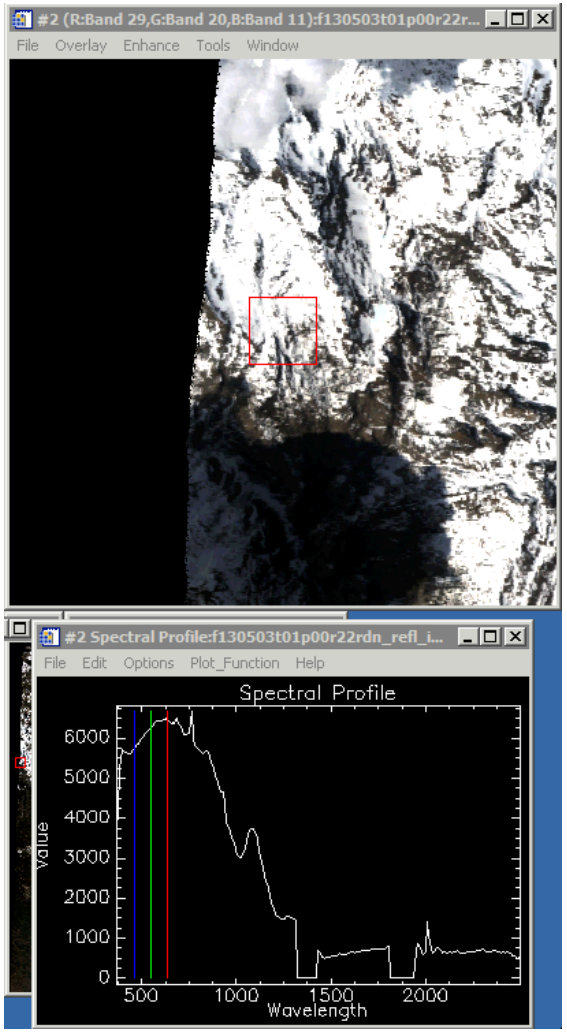


Vegetation (f130503t01p00r12)

Final L2 product (after residual suppression)

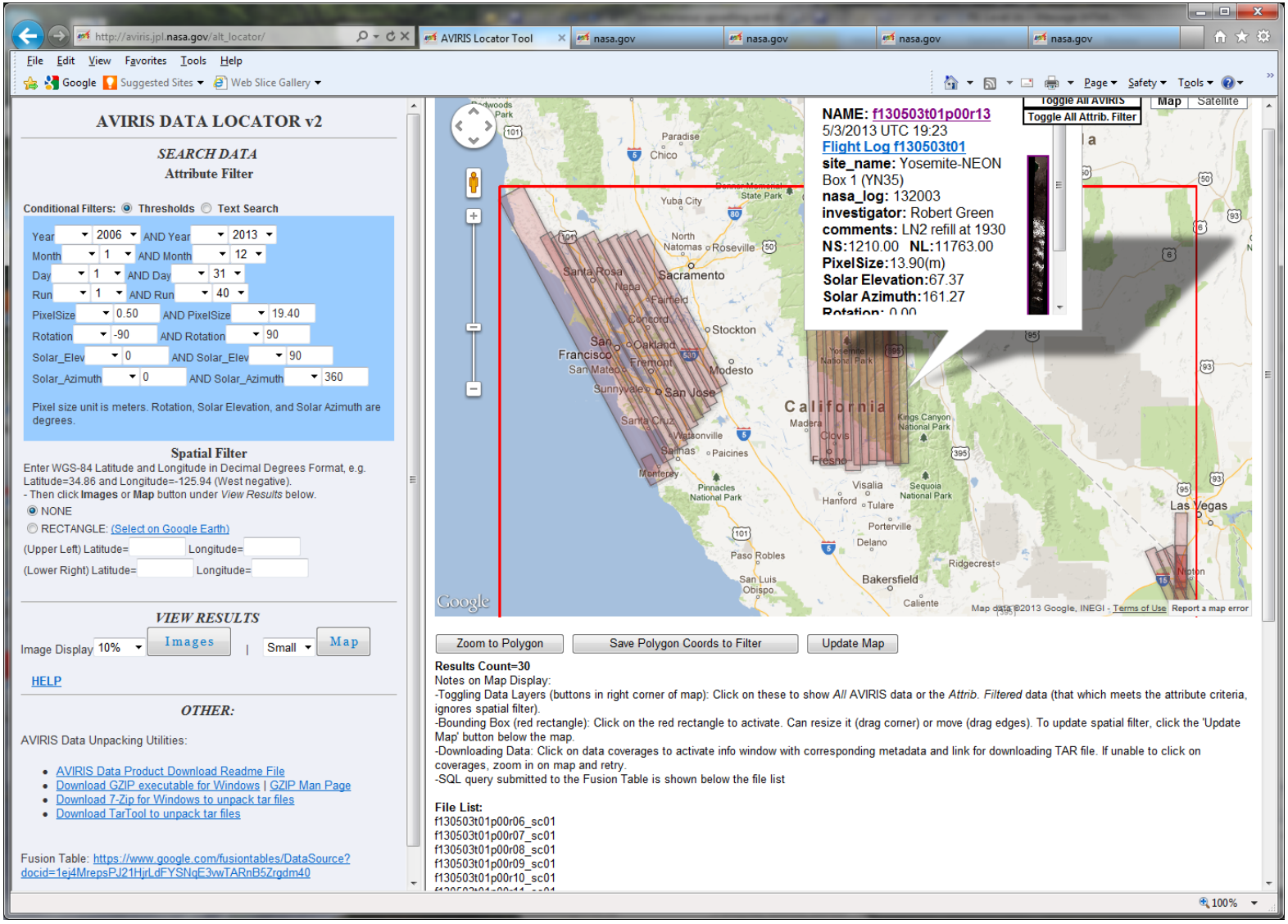




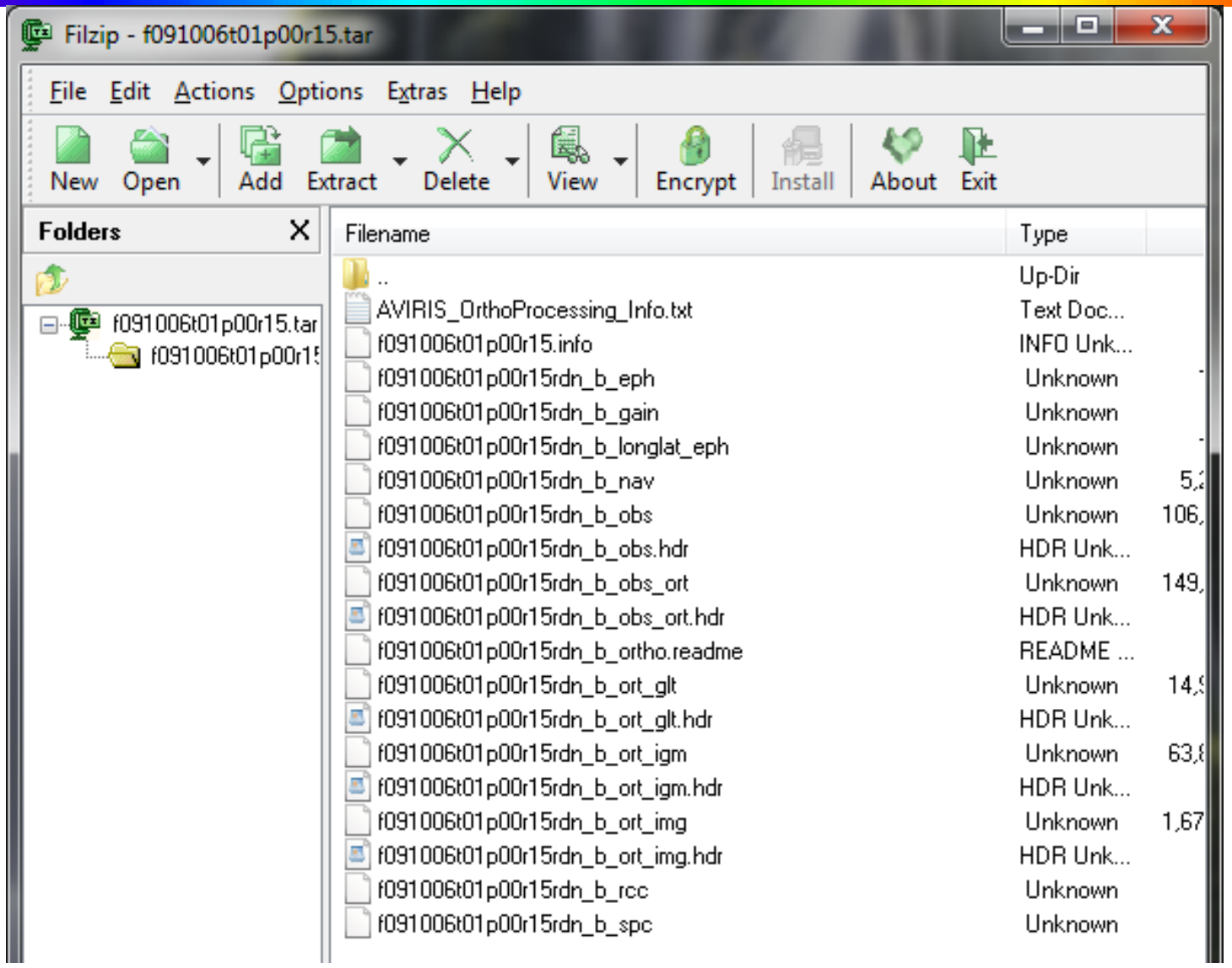


AVIRIS Locator/Download Tool
L1b Radiance

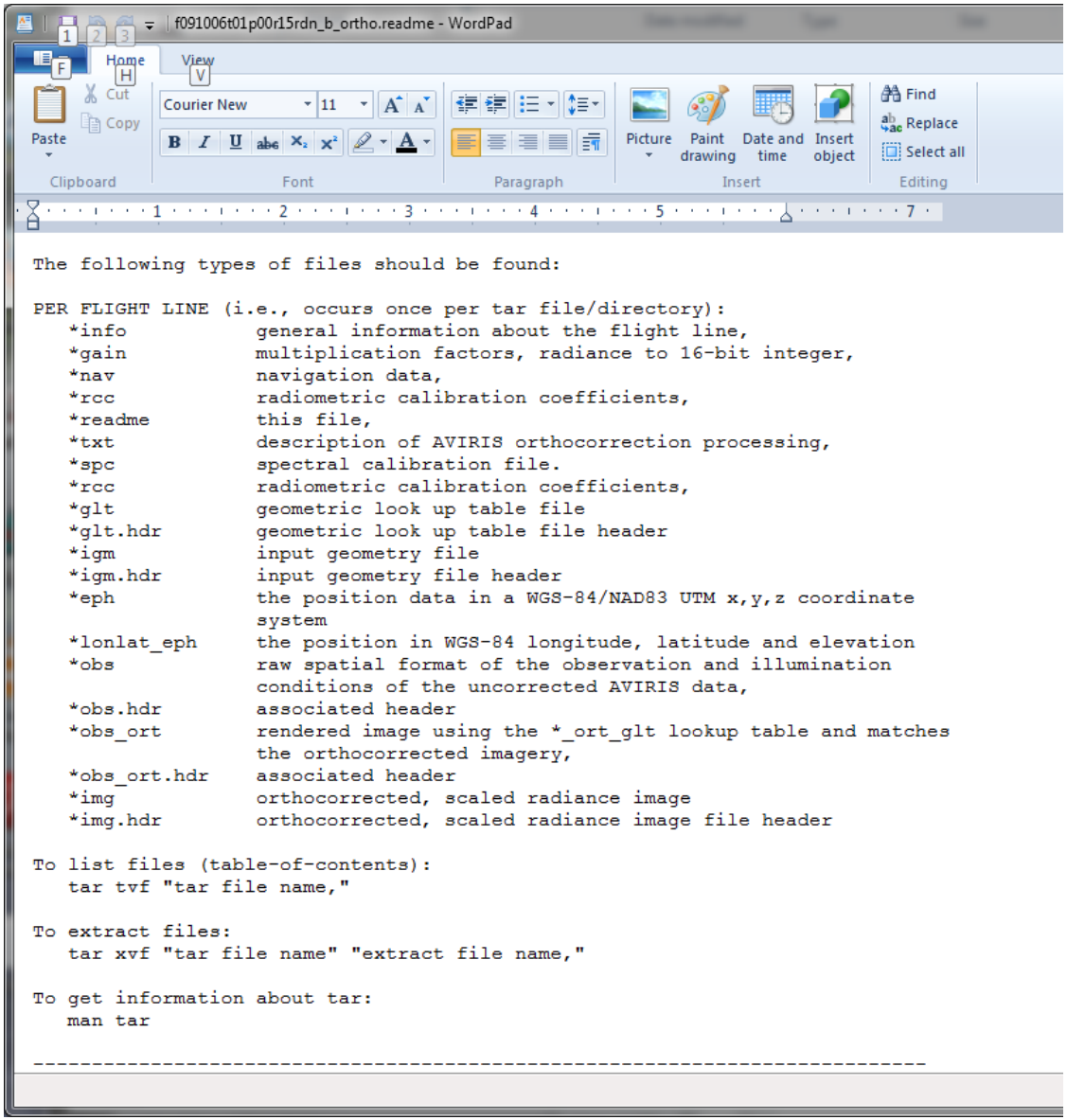
- http://aviris.jpl.nasa.gov/alt_locator



Contents of an AVIRIS tar file

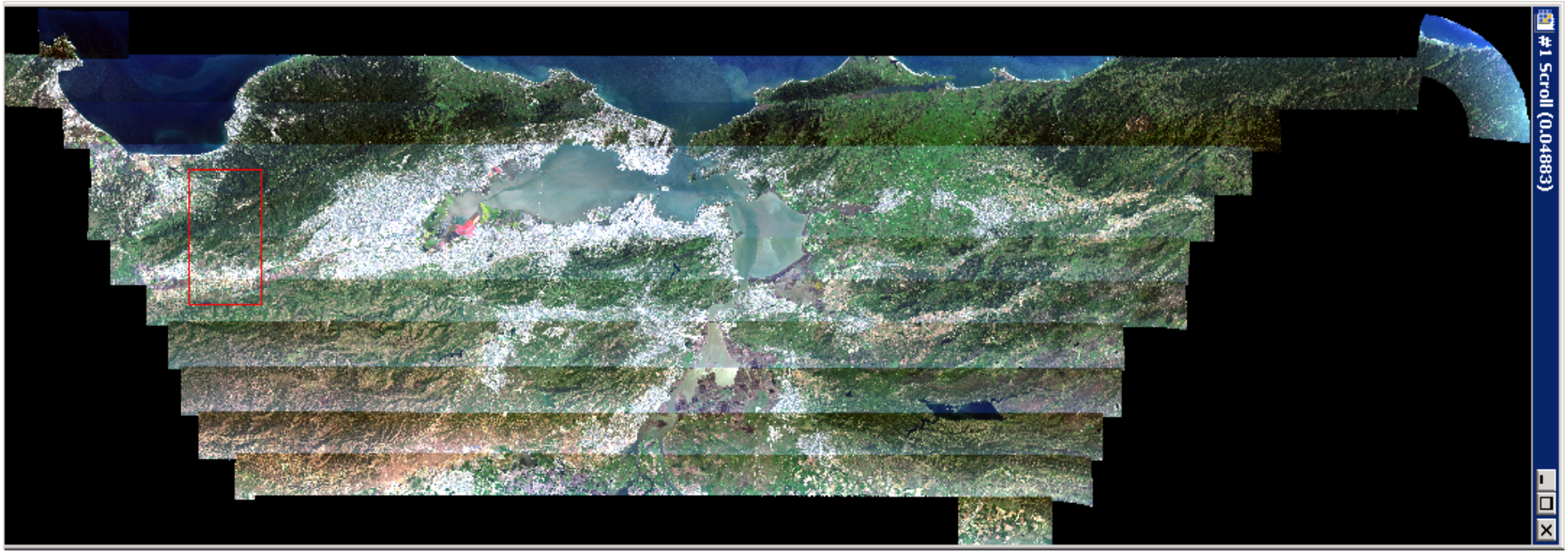


Readme File

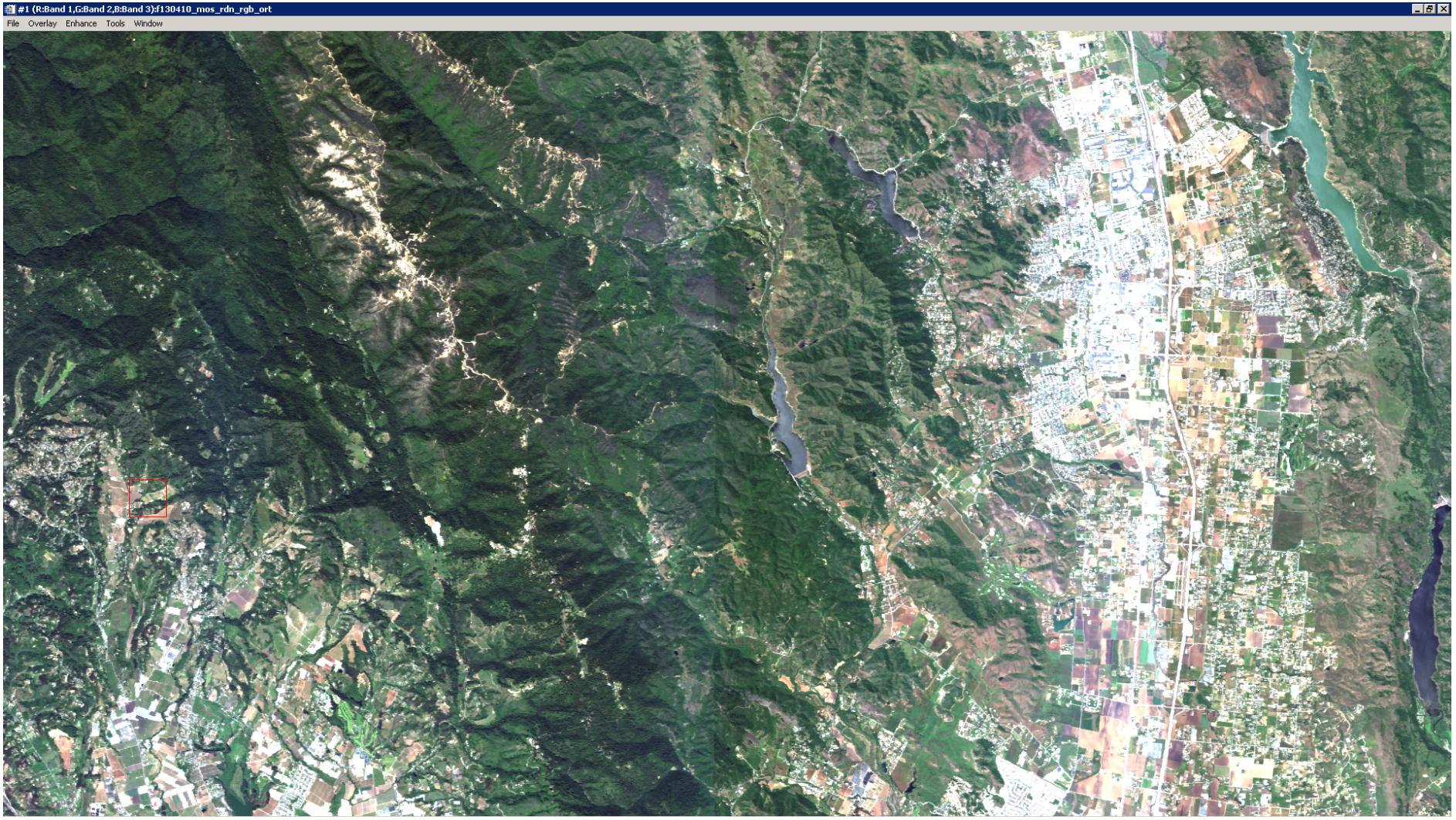



```
The following types of files should be found:

PER FLIGHT LINE (i.e., occurs once per tar file/directory):
   *info           general information about the flight line,
   *gain           multiplication factors, radiance to 16-bit integer,
   *nav            navigation data,
   *rcc            radiometric calibration coefficients,
   *readme         this file,
   *txt            description of AVIRIS orthocorrection processing,
   *spc            spectral calibration file.
   *rcc            radiometric calibration coefficients,
   *glt            geometric look up table file
   *glt.hdr        geometric look up table file header
   *igm            input geometry file
   *igm.hdr        input geometry file header
   *eph            the position data in a WGS-84/NAD83 UTM x,y,z coordinate
                   system
   *lonlat_eph     the position in WGS-84 longitude, latitude and elevation
   *obs            raw spatial format of the observation and illumination
                   conditions of the uncorrected AVIRIS data,
   *obs.hdr        associated header
   *obs_ort        rendered image using the *_ort_glt lookup table and matches
                   the orthocorrected imagery,
   *obs_ort.hdr    associated header
   *img            orthocorrected, scaled radiance image
   *img.hdr        orthocorrected, scaled radiance image file header

To list files (table-of-contents):
   tar tvf "tar file name,"

To extract files:
   tar xvf "tar file name" "extract file name,"

To get information about tar:
   man tar

--------------------------------------------------------------------------------
```

Mosaic Tool



Portion of a Mosaic



AVIRIS-C Summary

- Successful collection the first season of the HyspIRI preparatory airborne campaign
- A calibration/validation experiment was held on the 3rd of May
- Level 1b data are being loaded into the AVIRIS locator/download tool
- Test Level 2 data well be added to the tool starting next week
- We replaced the on-board calibrator bulb on AVIRIS yesterday
  - It should last for 2-3 years
- Summer season AVIRIS measurements for the HyspIRI preparatory airborne campaign have begun.