

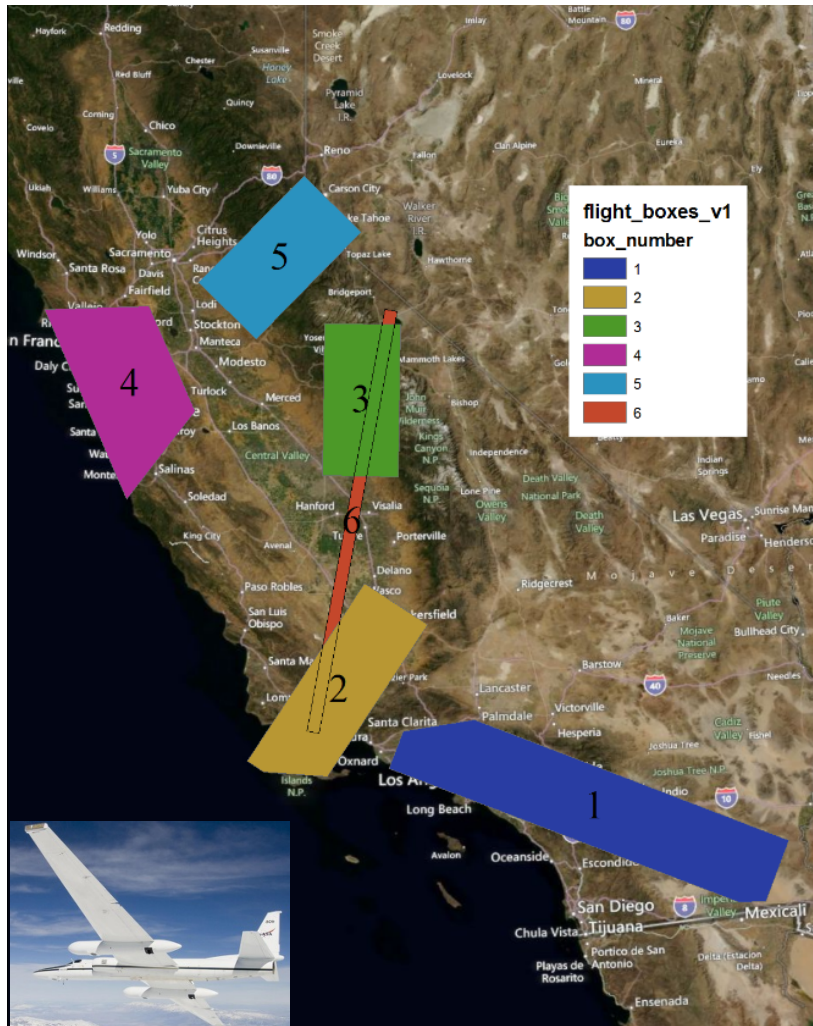


HyspIRI Aircraft campaign: science goals, project overviews & data sharing

[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





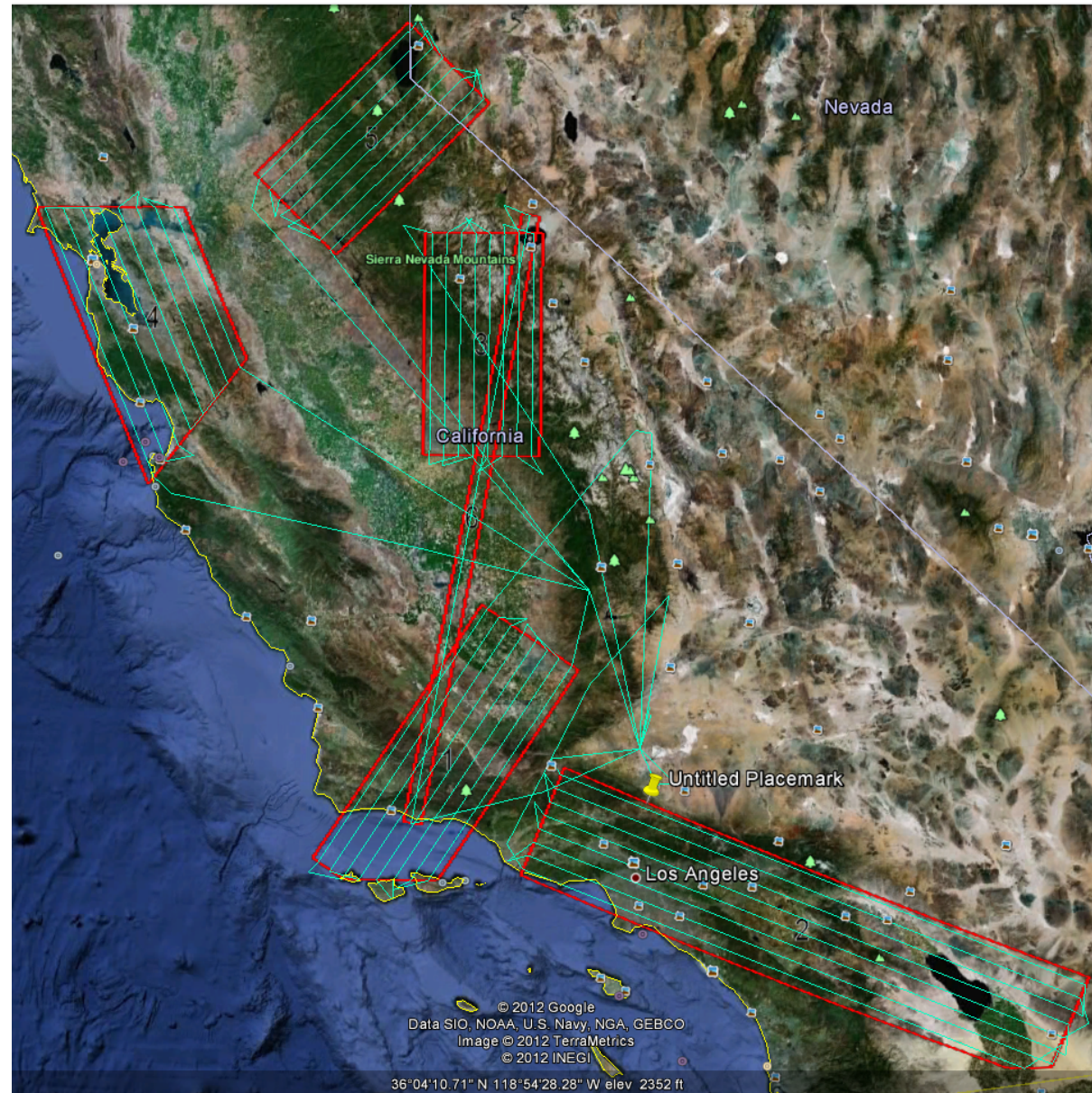
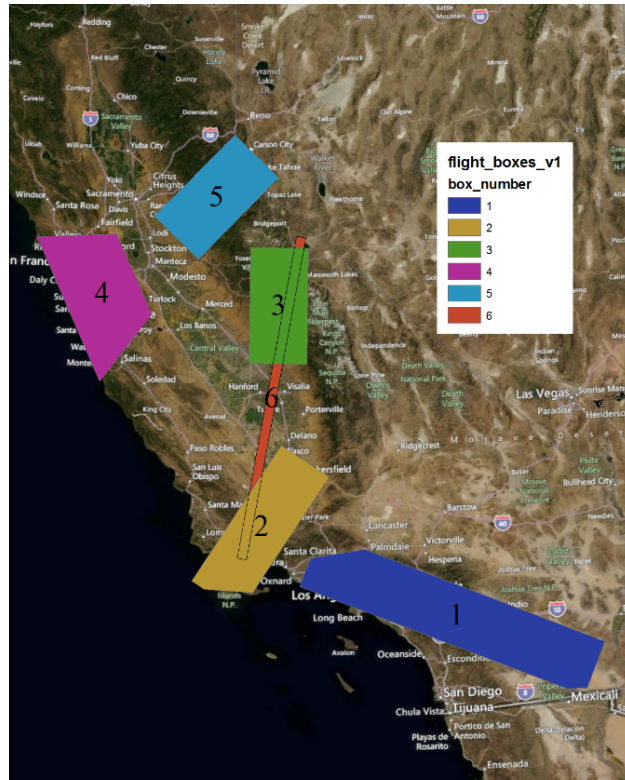
HyspIRI Preparatory Airborne Activities Projects



- 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

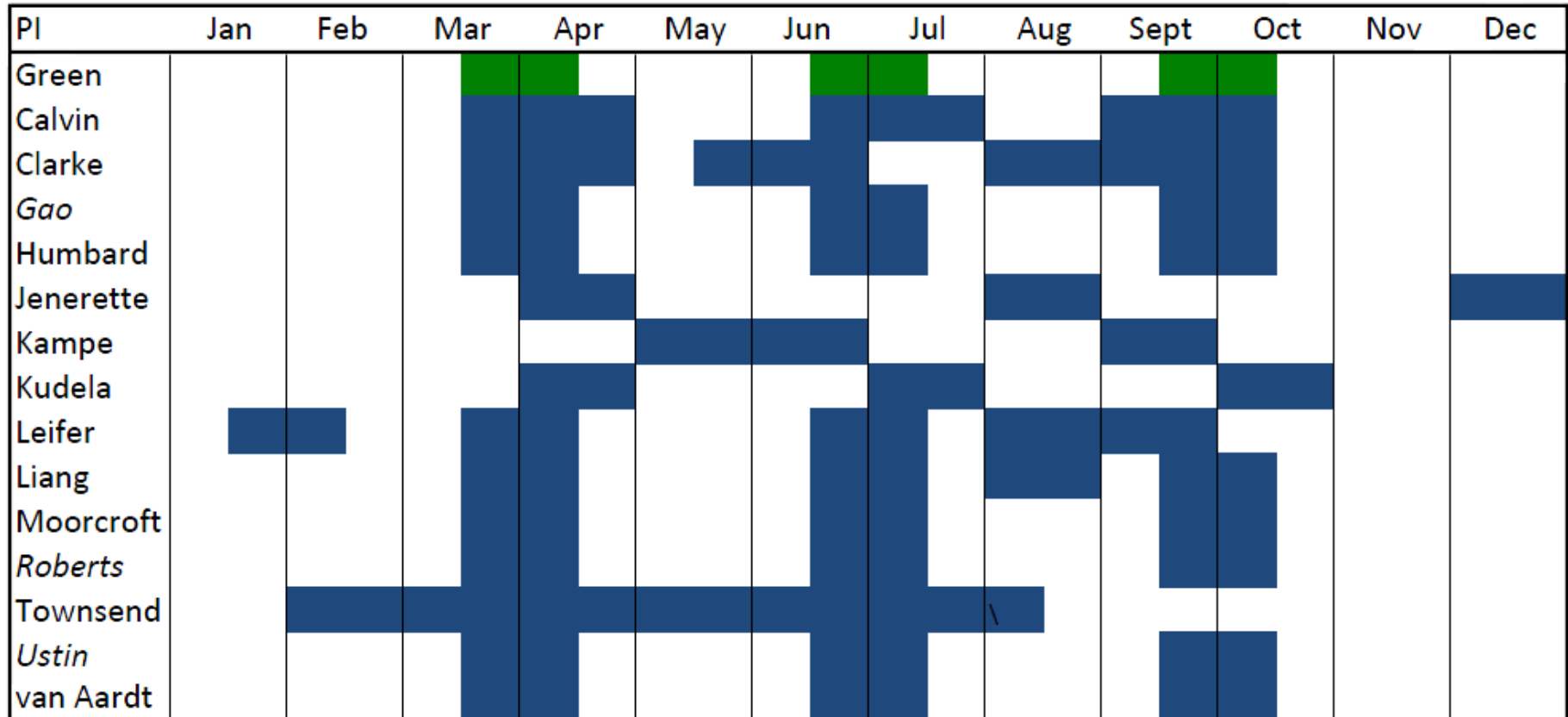


HyspIRI Preparatory Airborne Science (Ecosystems, Seasonal, Climate, Coastal, Urban, Resources)





Approximate Timing





Infrastructure location



Table Of Contents

Layers

☒ Location

Sites

Baldocchi flux

Delta

Diablo

Goulden Tower

Jasper Ridge

NEON Pacific Southwest

Sierra Transect

☒ UC Reserves

UCDavis Extension Locations

HyspIRI Flightline boundary

LiDAR acquisition boundaries 10_7

☒ Background

Layers

Layers

Layers

Layers

The map displays the Western United States, specifically California and Nevada, with various infrastructure locations marked. The map includes a legend on the left side, which categorizes the locations into several groups:

- Location Sites:** Baldocchi flux (orange square), Delta (yellow circle), Diablo (blue star), Goulden Tower (pink triangle), Jasper Ridge (orange diamond), NEON Pacific Southwest (green diamond), and Sierra Transect (blue circle).
- UC Reserves:** Indicated by black dots.
- UCDavis Extension Locations:** Indicated by brown dots.
- HyspIRI Flightline boundary:** Indicated by a purple outline.
- LiDAR acquisition boundaries 10_7:** Indicated by orange hatched areas.
- Background:** Indicated by a blue square.

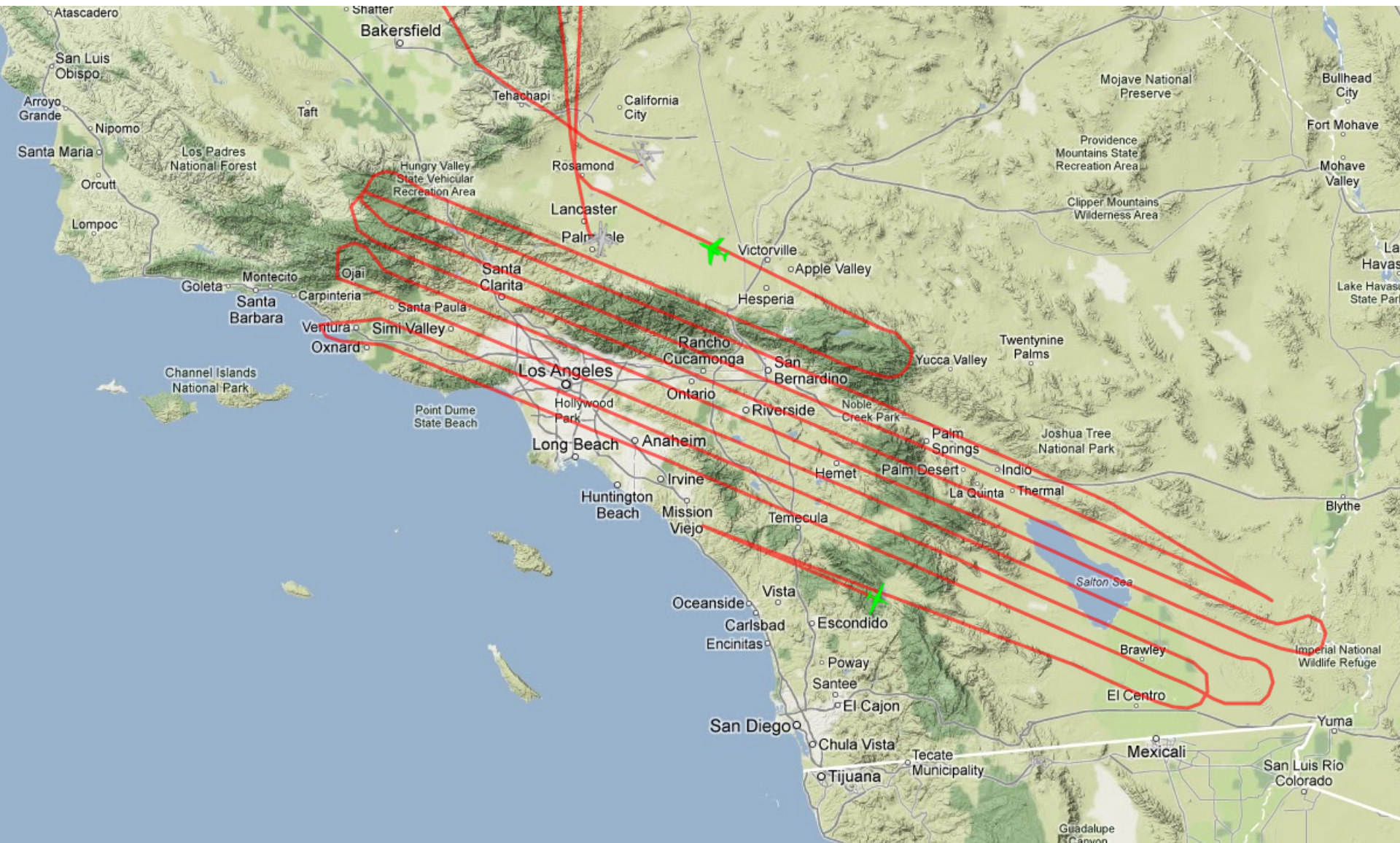
The map shows several labeled locations, including:

- Sierra Foothill REC
- Hopland REC
- Blodgett Forest
- Tonzi Vaira Ranch
- Sierra REC
- ANR REC AO Office
- Sherman Island
- Twitchell Island
- Diablo
- Jasper Ridge
- San Joaquin Exp Range
- Soaproot
- Saddle Pine
- Kearney REC
- West Side REC
- Lindero REC
- Hansen Trust REC
- Coastal Sage
- Grassland
- South Coast REC
- James San Jancinto
- Oak/Pine
- Pinyon/Juniper
- Chaparral
- Desert REC

The map also shows various numbered locations (1-38) and several acquisition boundaries (10_7) outlined in orange hatched areas. The background is a light blue color.

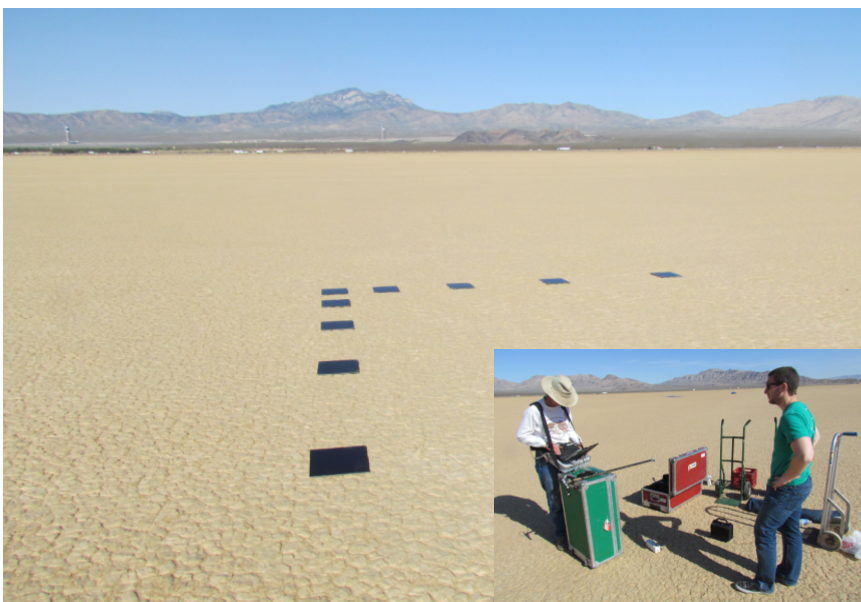


August 11, 2010





Example AVIRIS Calibration Validation Experiment Ivanpah Playa Calibration Site 2012

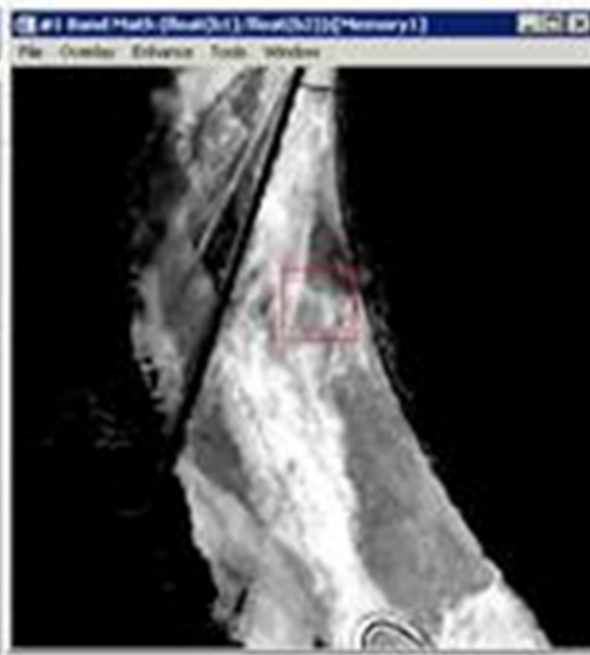


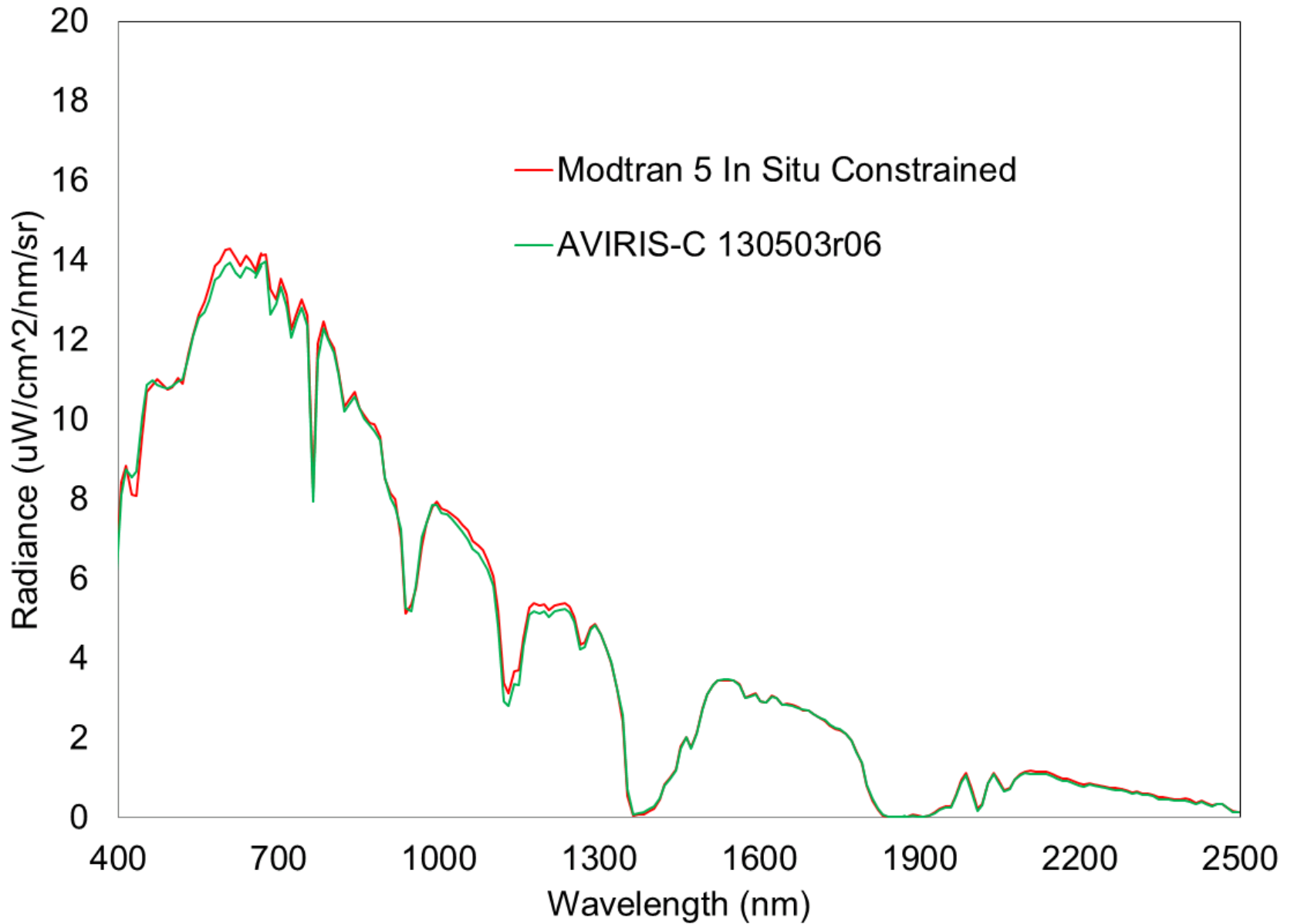


AVIRIS-C Calibration Experiment 3 May 2013



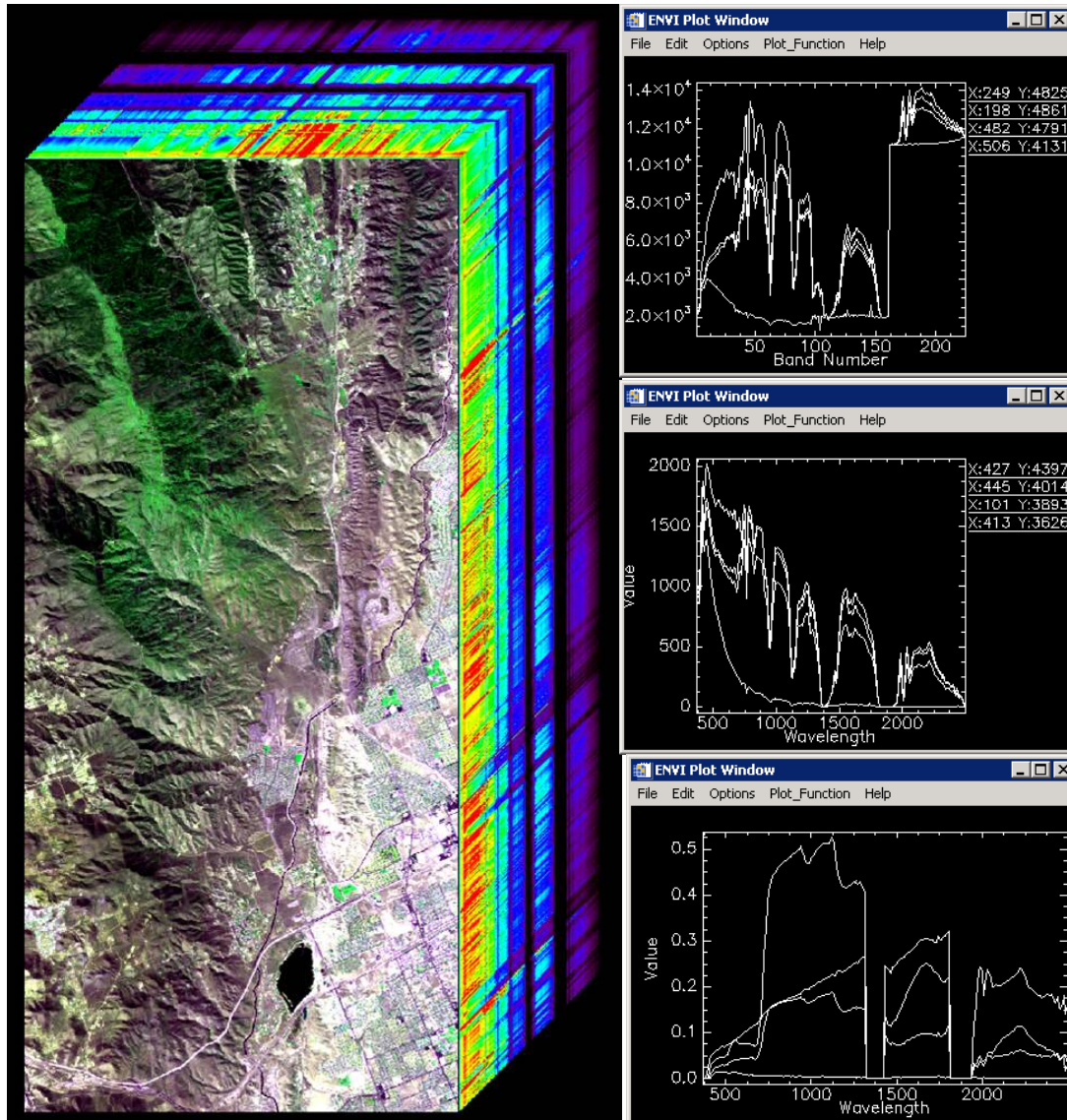
Ivanpah Tarp Location 130503







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



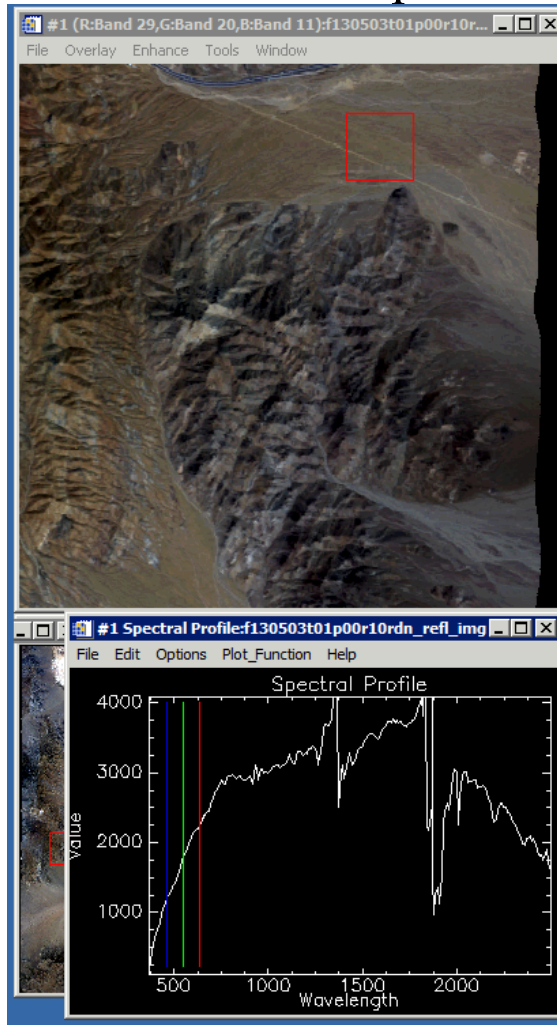
AVIRIS image cube and Level 1a, 1b and 2 spectra. The reflectance spectra (L2) will be used to address the full range of science objectives including ecosystems and climate.



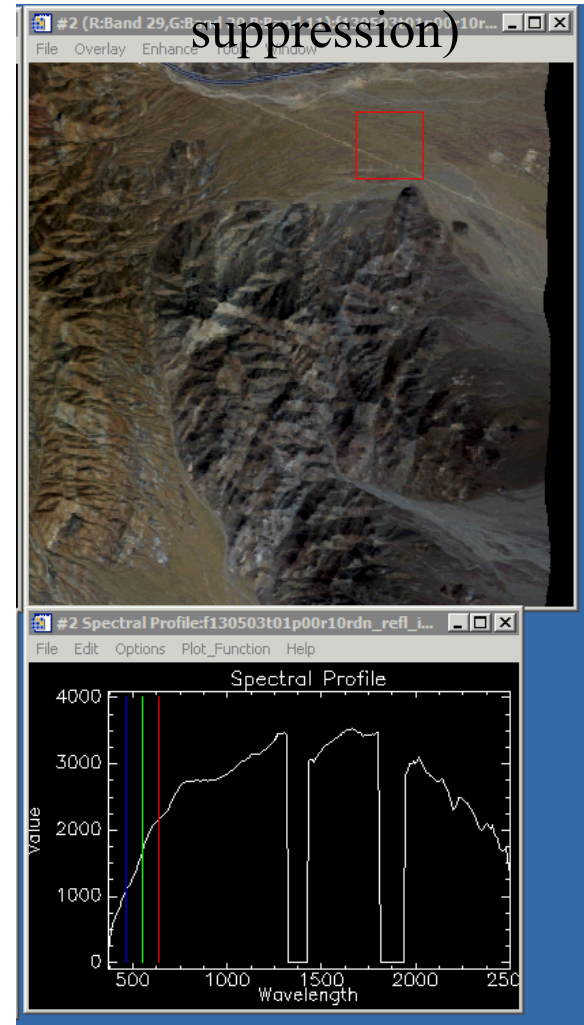
F130503t01p00r10 (typical spectrum)



ATREM output



Final L2 product (after residual suppression)

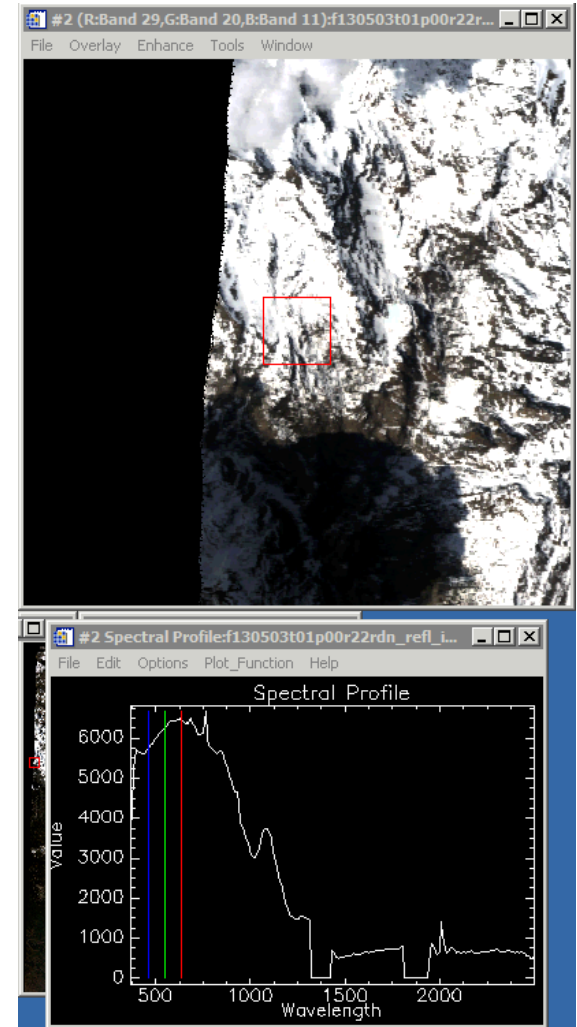
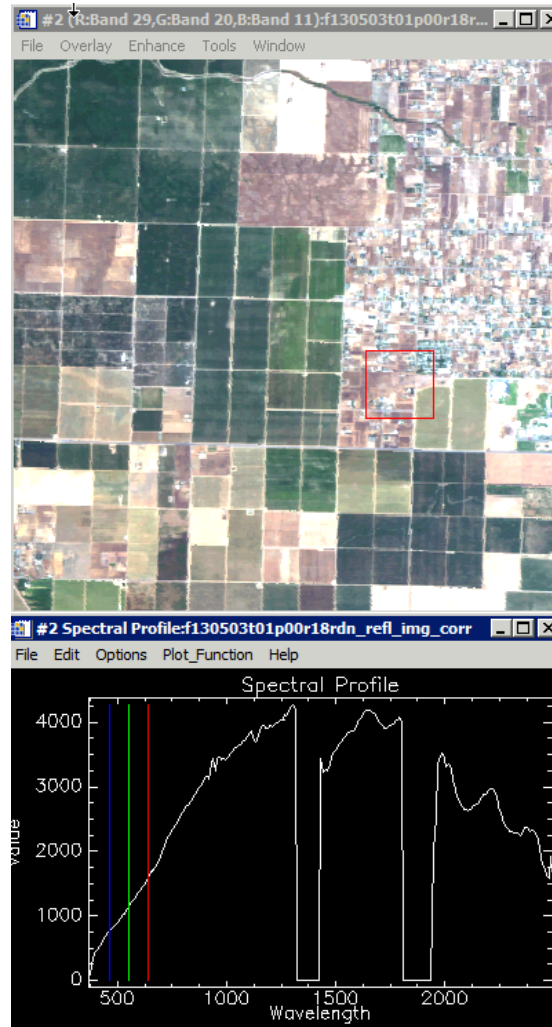
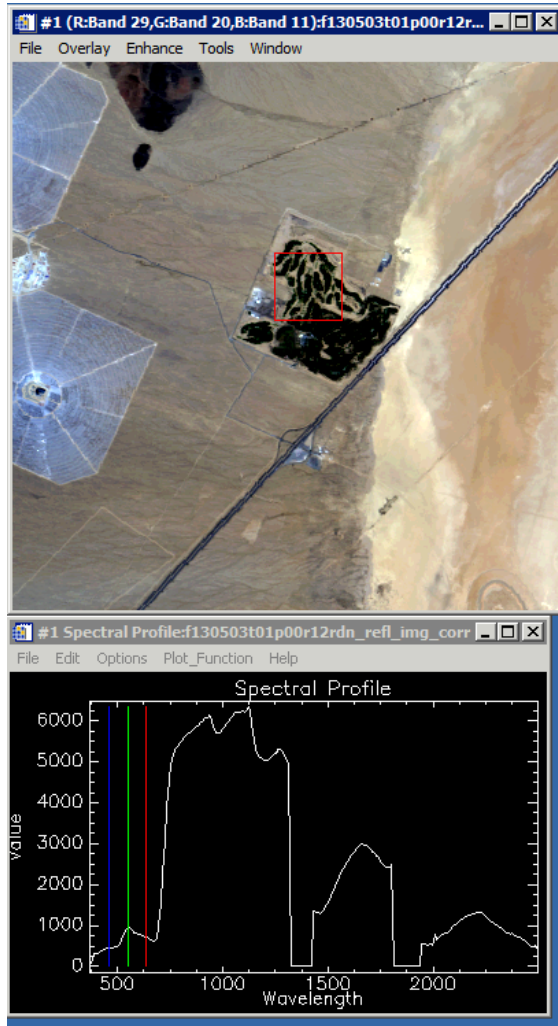




Vegetation (f130503t01p00r12)



Final L2 product (after residual suppression)





AVIRIS Locator/Download Tool

L1b Radiance



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

AVIRIS DATA LOCATOR v2

SEARCH DATA
Attribute Filter

Conditional Filters: ☒ Thresholds ☐ Text Search

Year: 2006 AND Year: 2013
Month: 1 AND Month: 12
Day: 1 AND Day: 31
Run: 1 AND Run: 40
PixelSize: 0.50 AND PixelSize: 19.40
Rotation: -90 AND Rotation: 90
Solar_Elev: 0 AND Solar_Elev: 90
Solar_Azimuth: 0 AND Solar_Azimuth: 360

Pixel size unit is meters. Rotation, Solar Elevation, and Solar Azimuth are degrees.

Spatial Filter
Enter WGS-84 Latitude and Longitude in Decimal Degrees Format, e.g. Latitude=34.86 and Longitude=-125.94 (West negative).
- Then click **Images** or **Map** button under View Results below.

☒ NONE
☐ RECTANGLE: ([Select on Google Earth](#))
(Upper Left) Latitude= Longitude=
(Lower Right) Latitude= Longitude=

VIEW RESULTS
Image Display: 10% **Images** | Small **Map**

HELP

OTHER:
AVIRIS Data Unpacking Utilities:

- [AVIRIS Data Product Download Readme File](#)
- [Download GZIP executable for Windows | GZIP Man Page](#)
- [Download 7-Zip for Windows to unpack tar files](#)
- [Download TarTool to unpack tar files](#)

Fusion Table: <https://www.google.com/fusiontables/DataSource?docid=1e4MrepsPJ21Hjrl.dFYSNgE3wTARnB5Zrgdm40>

NAME: f130503t01p00r13
5/3/2013 UTC 19:23
Flight Log f130503t01
site_name: Yosemite-NEON
Box 1 (YN35)
nasa_log: 132003
investigator: Robert Green
comments: LN2 refill at 1930
NS:1210.00 **NL:**11763.00
PixelSize:13.90(m)
Solar Elevation:67.37
Solar Azimuth:161.27
Rotation: 0.00

Results Count=30
Notes on Map Display:
-Toggling Data Layers (buttons in right corner of map): Click on these to show *All* AVIRIS data or the *Attrib. Filtered* data (that which meets the attribute criteria, ignores spatial filter).
-Bounding Box (red rectangle): Click on the red rectangle to activate. Can resize it (drag corner) or move (drag edges). To update spatial filter, click the 'Update Map' button below the map.
-Downloading Data: Click on data coverages to activate info window with corresponding metadata and link for downloading TAR file. If unable to click on coverages, zoom in on map and retry.
-SQL query submitted to the Fusion Table is shown below the file list

File List:
f130503t01p00r06_sc01
f130503t01p00r07_sc01
f130503t01p00r08_sc01
f130503t01p00r09_sc01
f130503t01p00r10_sc01
f130503t01p00r11_sc01



Contents of an AVIRIS tar file

Filzip - f091006t01p00r15.tar

File Edit Actions Options Extras Help

New Open Add Extract Delete View Encrypt Install About Exit

Folders X

- f091006t01p00r15.tar
 - f091006t01p00r15

Filename	Type
..	Up-Dir
AVIRIS_OrthoProcessing_Info.txt	Text Doc...
f091006t01p00r15.info	INFO Unk...
f091006t01p00r15rdn_b_eph	Unknown
f091006t01p00r15rdn_b_gain	Unknown
f091006t01p00r15rdn_b_longlat_eph	Unknown
f091006t01p00r15rdn_b_nav	Unknown 5,2
f091006t01p00r15rdn_b_obs	Unknown 106,
f091006t01p00r15rdn_b_obs.hdr	HDR Unk...
f091006t01p00r15rdn_b_obs_ort	Unknown 149,
f091006t01p00r15rdn_b_obs_ort.hdr	HDR Unk...
f091006t01p00r15rdn_b_ortho.readme	README ...
f091006t01p00r15rdn_b_ort_glt	Unknown 14,9
f091006t01p00r15rdn_b_ort_glt.hdr	HDR Unk...
f091006t01p00r15rdn_b_ort_igm	Unknown 63,8
f091006t01p00r15rdn_b_ort_igm.hdr	HDR Unk...
f091006t01p00r15rdn_b_ort_img	Unknown 1,67
f091006t01p00r15rdn_b_ort_img.hdr	HDR Unk...
f091006t01p00r15rdn_b_rcc	Unknown
f091006t01p00r15rdn_b_spc	Unknown



Readme File

```
f091006t01p00r15rdn_b_ortho.readme - WordPad

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 orthorectification processing,
*spc           spectral calibration file.
*rcc           radiometric calibration coefficients,
*glc           geometric look up table file
*glc.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_glc lookup table and matches
               the orthorectified imagery,
*obs_ort.hdr   associated header
*img           orthorectified, scaled radiance image
*img.hdr       orthorectified, scaled radiance image file header

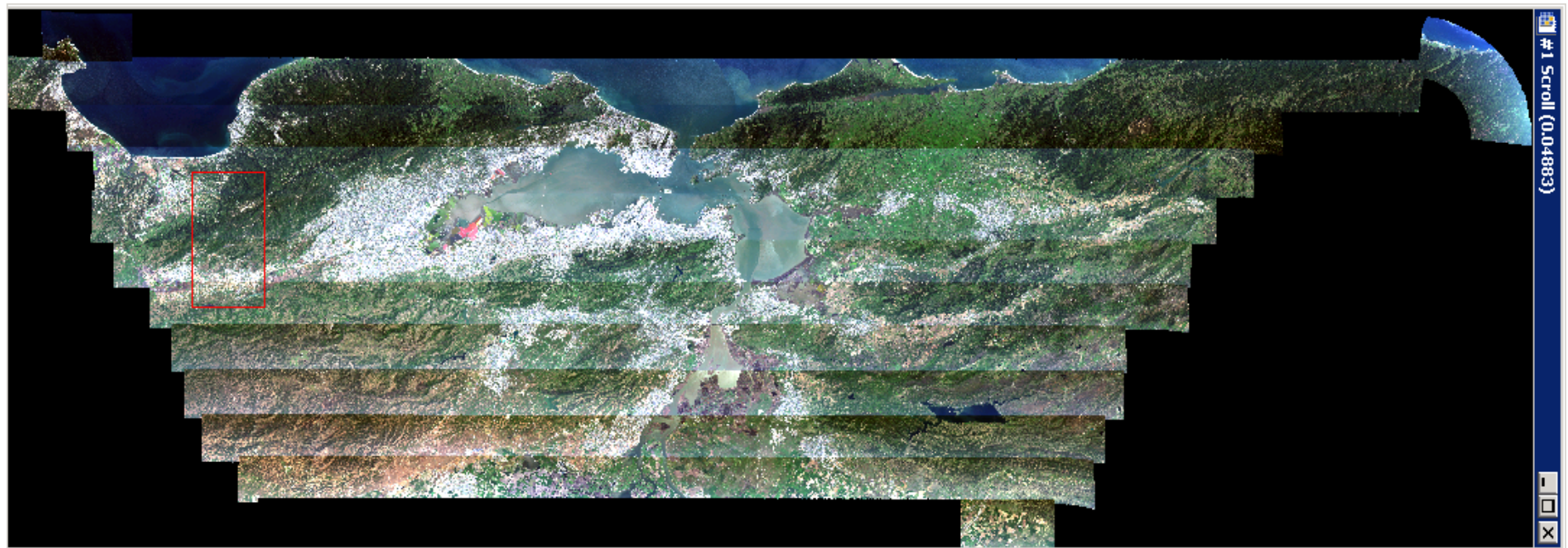
To list files (table-of-contents):
tar tvf "tar file name,"

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

To get information about tar:
man tar
```

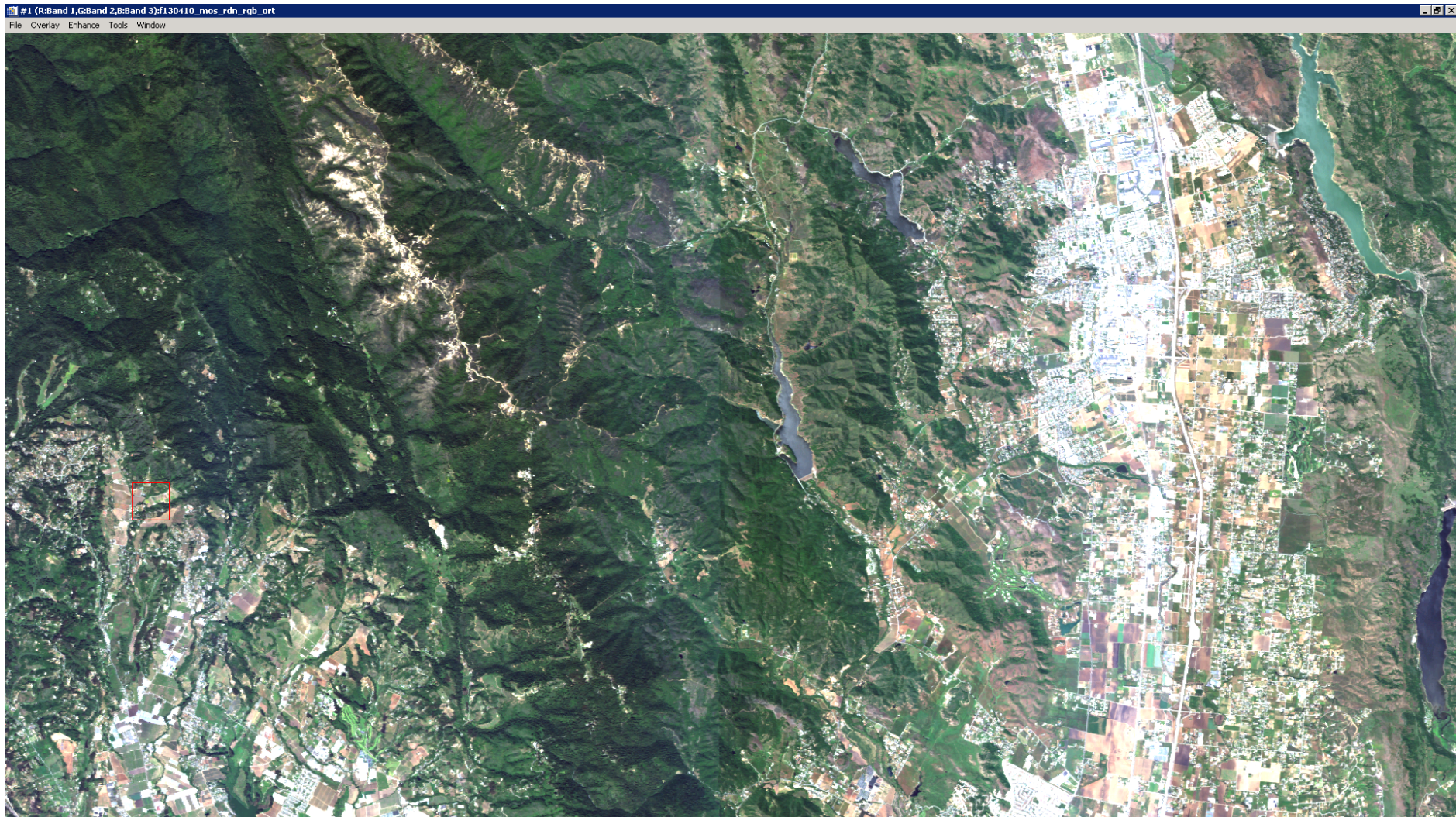


Mosaic Tool





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 will 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.