

# Land Product Characterization System

STAR JPSS Science Team Meeting  
*11 August 2016*

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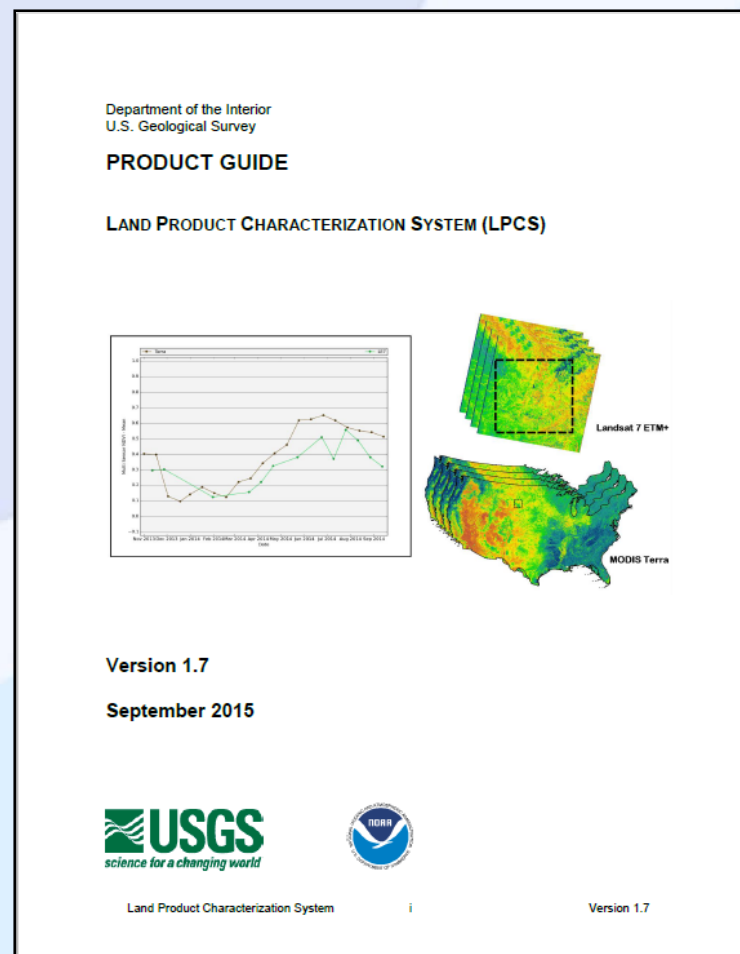
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Steve Foga: SGT/EROS

Linda Owen: SGT/EROS

Ryan Longhenry: USGS/EROS



LPCS



USGS  
science for a changing world



Land Product Characterization System

USGS Home  
Contact USGS  
Search USGS

# Land Product Characterization System (LPCS)

What is LPCS

Highlights of LPCS

1. Inventory & Ordering
2. Analysis Tools

Path Forward

1. Status and Readiness
2. CEOS LPV collaboration

Summary

# Land Product Characterization System (LPCS)

## What is LPCS

### Highlights of LPCS

1. Inventory & Ordering
2. Analysis Tools

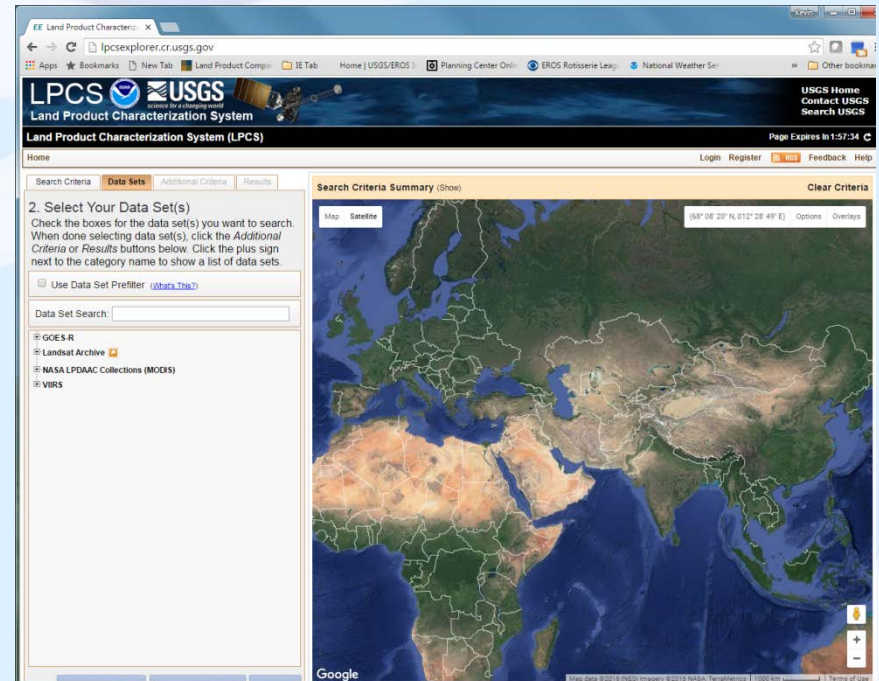
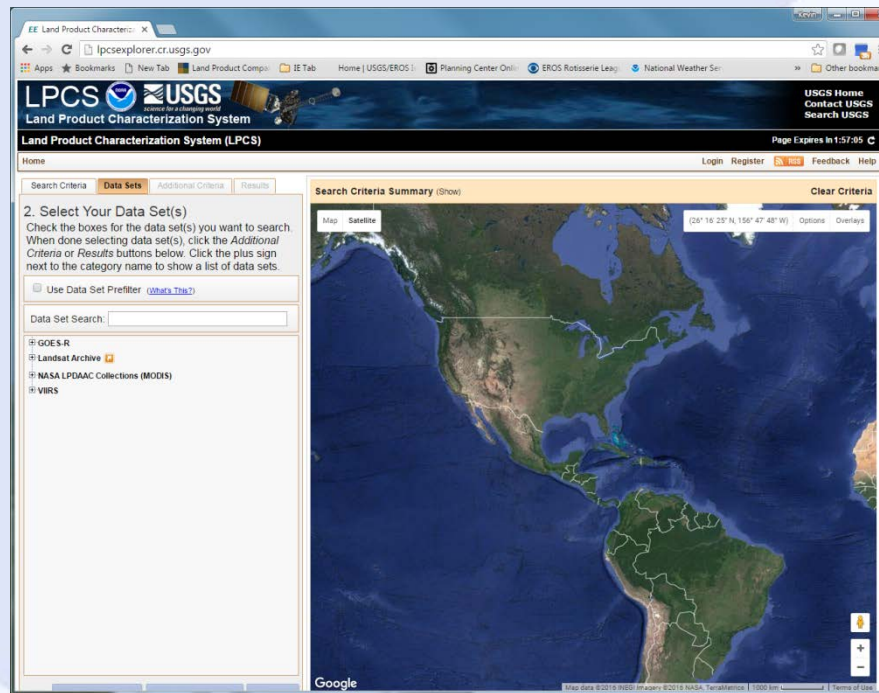
### Path Forward

1. Status and Readiness
2. CEOS LPV collaboration

### Summary

# What is LPCS

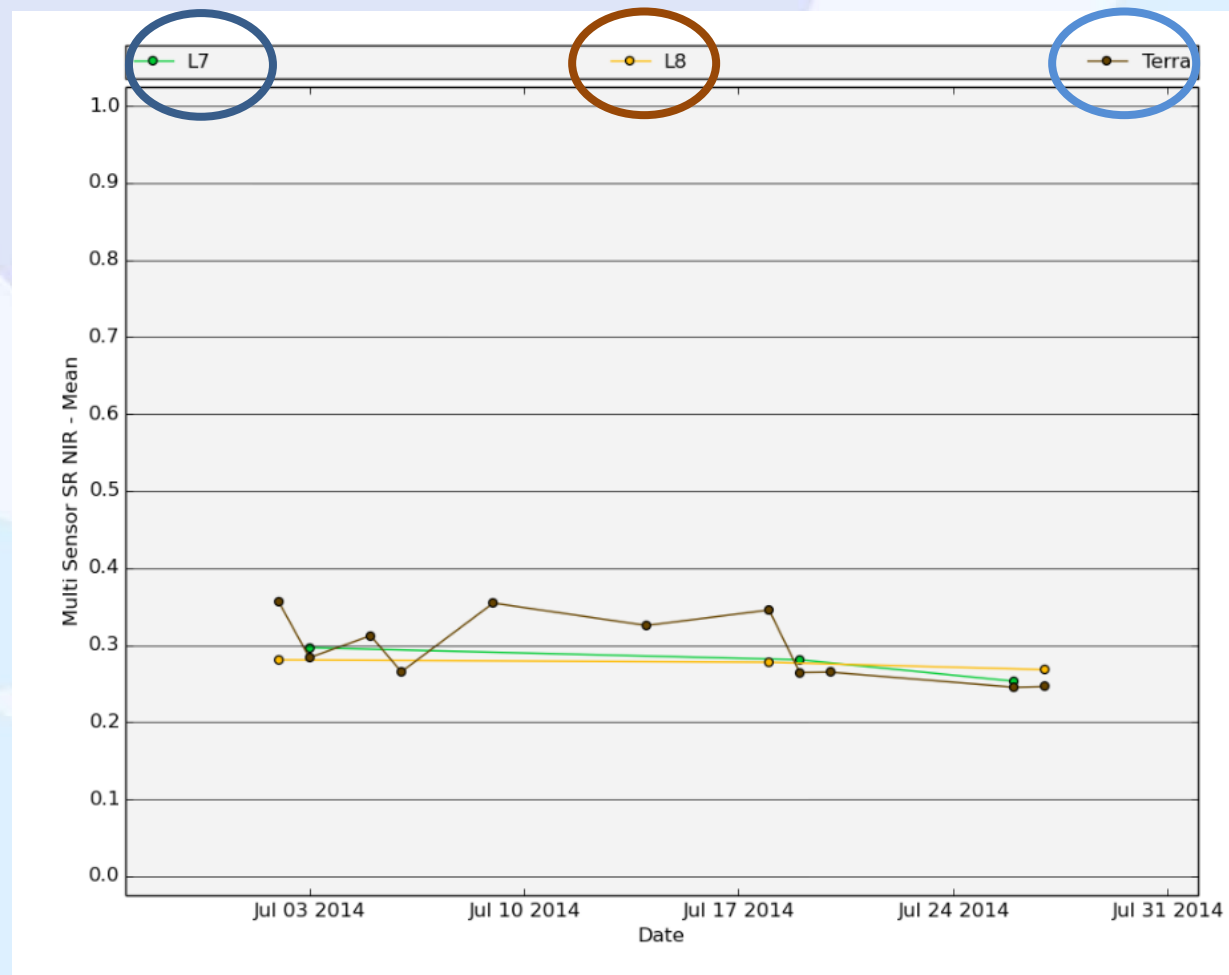
A web-based system designed for comparative analysis of **global** satellite higher-level land products.



## What is LPCS: Output example

Trending of similar bands of data from multiple sensors.

*Near-IR Surface Reflectance*



# What is LPCS

A web-based system designed for comparative analysis of global satellite higher-level land products.

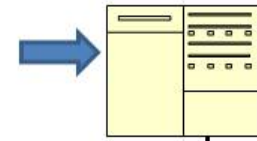
- Inventory & order data
- Advanced processing
- Basic analysis
- Output charts , images, & tables

## Land Product Characterization System



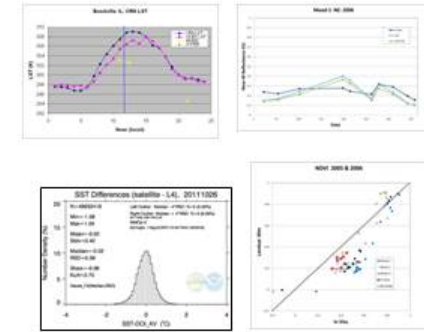
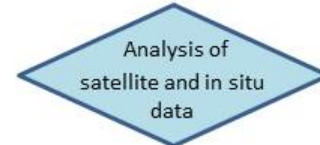
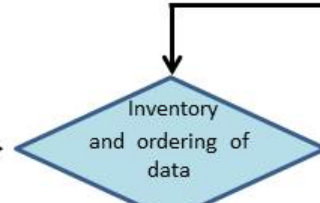
SNPP & JPSS VIIRS  
GOES-R ABI  
Landsat-7 & -8  
MODIS  
Sentinel-2 & 3  
others..  
& In Situ

On demand data acquisition  
Automated data acquisitions



Data and Inventory information stored at EROS.

Feedback / Additional Analysis



Generate statistics, charts and reports



Review by cal/val teams.  
Product algorithm updates.

# Land Product Characterization System (LPCS)

What is LPCS

Highlights of LPCS

1. **Inventory & Ordering**
2. Analysis Tools

Path Forward

1. Status and Readiness
2. CEOS LPV collaboration

Summary



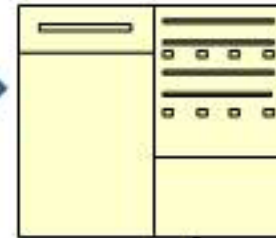
# Inventory and Ordering

## Land Product Characterization System

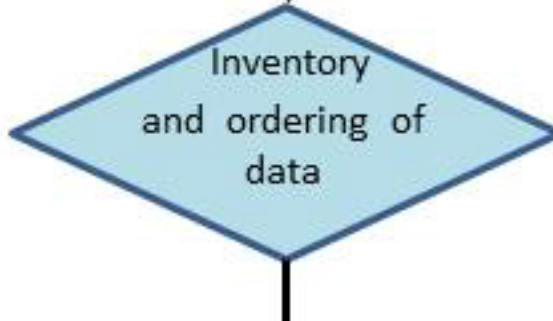


SNPP & JPSS VIIRS  
GOES-R ABI  
Landsat-7 & -8  
MODIS  
Sentinel-2 & 3  
others..  
& In Situ

On demand data acquisition  
Automated data acquisitions



Data and  
Inventory  
information  
stored at  
EROS.





# Inventory and Ordering

Begin at Search Criteria and Data Select tabs of LPCS.  
*Included data sets not arbitrary.*

The screenshot displays the Land Product Characterization System (LPCS) interface. At the top, the header includes the logos for NOAA and USGS, with the tagline "science for a changing world". Navigation links for "USGS Home", "Contact USGS", and "Search USGS" are in the top right. Below the header, the page title is "Land Product Characterization System (LPCS)" and a "Page Expires In 1:59:07" timer is visible. The main navigation bar contains "Home", "Login", "Register", "RSS", "Feedback", and "Help".

The "Data Sets" tab is active, showing a section titled "2. Select Your Data Set(s)". The instructions state: "Check the boxes for the data set(s) you want to search. When done selecting data set(s), click the *Additional Criteria* or *Results* buttons below. Click the plus sign next to the category name to show a list of data sets." Below this, there is a checkbox for "Use Data Set Prefilter" with a link to "(What's This?)". A "Data Set Search:" input field is present.

The data set selection list is as follows:

- GOES-R
  - ABI
    - Simulated GOES-R ABI (5/30/2013-6/30/2013)
- Landsat Archive
  - Landsat Surface Reflectance - L8 OLI/TIRS
  - Landsat Surface Reflectance - L7 ETM+
  - Landsat Surface Reflectance - L4-5 TM
- NASA LPDAAC Collections (MODIS)
  - MODIS Vegetation Indices
  - MODIS Land Surface Reflectance
- VIIRS
  - NASA
  - NOAA

On the right side, the "Search Criteria Summary (Show)" section features a satellite map of North America. The map includes a coordinate display for (53° 26' 08" N, 155° 33' 59" W) and buttons for "Map", "Satellite", "Options", and "Overlays".

# Inventory and Ordering

Included data sets not arbitrary, will permit comparison of land products from multiple sensor systems.

## Current

- 3 Landsat SR products
- 16 MODIS SR and NDVI
- Sample VIIRS
- Simulated GOES-R ABI

## Future

- VIIRS
- GOES-R ABI
- Sentinel 2
- Sentinel 3
- in situ

LPCS User Requirements Database										
Organization	Mission	Instrument	Variable	Product Name	Spatial Coverage	Spatial Scale	Temporal Coverage	Temporal Scale	Validation Sites List	
USGS/NASA	Landsat	Landsat 4-5	SR	Landsat Surface Reflectance L4-5 TM	Global	30 m				Daily (AM local time)
USGS/NASA	Landsat	Landsat 7	SR	Landsat Surface Reflectance L7 ETM+	Global	30 m				Daily (AM local time)
USGS/NASA	Landsat	Landsat 8	SR	Landsat Surface Reflectance L8 OLI/TIRS	Global	30 m				Daily (AM local time)
NASA	EOS	MODIS	NDVI/EVI	MOD13A1 Vegetation Indices 16-Day L3 Global 500m	Global	500 m				Daily (AM local time)
NASA	EOS	MODIS	NDVI/EVI	MOD13A2 Vegetation Indices 16-Day L3 Global 1km	Global	1000 m				Daily (AM local time)
NASA	EOS	MODIS	NDVI/EVI	MOD13A3 Vegetation Indices Monthly L3 Global 1km	Global	1000 m				Daily (AM local time)
NASA	EOS	MODIS	NDVI/EVI	MOD13Q1 Vegetation Indices 16-Day L3 Global 250m	Global	250 m				Daily (AM local time)
NASA	EOS	MODIS	NDVI/EVI	MYD13A1 Vegetation Indices 16-Day L3 Global 500m	Global	500 m				Daily (PM local time)
NASA	EOS	MODIS	NDVI/EVI	MYD13A2 Vegetation Indices 16-Day L3 Global 1km	Global	1000 m				Daily (AM local time)
NASA	EOS	MODIS	NDVI/EVI	MYD13A3 Vegetation Indices Monthly L3 Global 1km	Global	1000 m				Daily (PM local time)
NASA	EOS	MODIS	NDVI/EVI	MYD13Q1 Vegetation Indices 16-Day L3 Global 250m	Global	250 m				Daily (PM local time)
NASA	EOS	MODIS	SR	MOD09A1 Surface Reflectance 8-Day L3 Global 500m	Global	500 m				Daily (AM local time)
NASA	EOS	MODIS	SR	MOD09GA Surface Reflectance Daily L2G Global 1km and 500m	Global	500 m				Daily (AM local time)
NASA	EOS	MODIS	SR	MOD09GQ Surface Reflectance Daily L2G Global 250m	Global	250 m				Daily (AM local time)
NASA	EOS	MODIS	SR	MOD09Q1 Surface Reflectance 8-Day L3 Global 250m	Global	250 m				Daily (AM local time)
NASA	EOS	MODIS	SR	MYD09A1 Surface Reflectance 8-Day L3 Global 500m	Global	500 m				Daily (PM local time)
NASA	EOS	MODIS	SR	MYD09GA Surface Reflectance Daily L2G Global 1km and 500m	Global	500 m				Daily (PM local time)
NASA	EOS	MODIS	SR	MYD09GQ Surface Reflectance Daily L2G Global 250m	Global	250 m				Daily (PM local time)
NASA	EOS	MODIS	SR	MYD09Q1 Surface Reflectance 8-Day L3 Global 250m	Global	250 m				Daily (PM local time)
NOAA	GOES-R	ABI	NDVI	Simulated TOA NDVI	CONUS	2222 m		31 May, 3 June, 26 Jun	1800, 1900, 2000 UTC	
NOAA	S-NPP	VIIRS	NDVI	Sample VIIRS Vegetation Index	SW CONUS	500 m		30 May - 29 June 2013	Daily (PM local time)	
NASA	S-NPP	VIIRS	NDVI	Sample VIIRS Vegetation Index	SW CONUS	488 m		31 May, 3 June, 26 Jun	Daily (PM local time)	
NASA	EOS	MODIS	land cover	MCD12Q1 Land Cover Type Yearly L3 Global 500 m SIN Grid	Global	500 m				Annual
NASA	EOS	MODIS	LST	MOD11A1 LST and Emissivity Daily L3 Global 1 km Grid SIN	Global	1000 m				Daily (AM local time)
NASA	EOS	MODIS	LST	MYD11A1 LST and Emissivity Daily L3 Global 1 km Grid SIN	Global	1000 m				Daily (PM local time)
USGS/NASA	Landsat	Landsat 8	Albedo	TBD						
USGS/NASA	Landsat	Landsat 8	LST	TBD						
NOAA	GOES-R	ABI	TBD	TBD						
NOAA	GOES-R	ABI	TBD	TBD						
NOAA	GOES-R	ABI	TBD	TBD						
NOAA	GOES-R	ABI	TBD	TBD						
NOAA	S-NPP	VIIRS	TBD	TBD						
NOAA	S-NPP	VIIRS	TBD	TBD						
NOAA	S-NPP	VIIRS	TBD	TBD						
NOAA	S-NPP	VIIRS	TBD	TBD						
NASA	S-NPP	VIIRS	TBD	TBD						
NASA	S-NPP	VIIRS	TBD	TBD						
NASA	S-NPP	VIIRS	TBD	TBD						
NASA	S-NPP	VIIRS	TBD	TBD						
ESA	Sentinel-2	MSI	TBD	TBD						
	CRN	in situ	TBD	TBD						
	SURFRAD	in situ	TBD	TBD						
	AERONET	in situ	TBD	TBD						
	EOS Land Core	in situ	TBD	TBD						
				Currently available in LPCS						
				Soon to be available						
				Planned to be available						

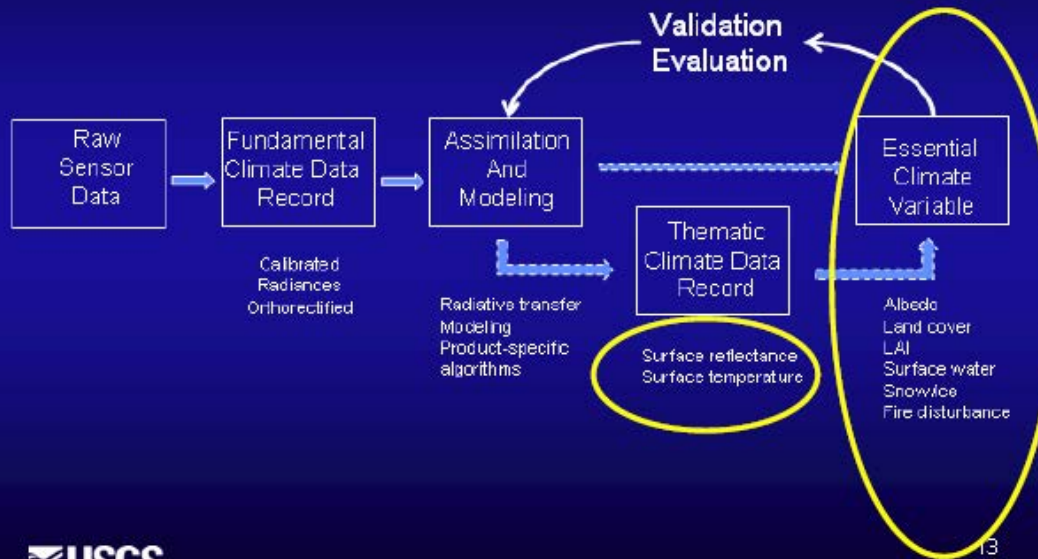
# Inventory and Ordering

## USGS-NOAA validation synergy

### USGS Requirements

- Landsat ECVs

### Processing Data into Information



### USGS ECVs

- Albedo
- Land Cover
- LAI
- Surface Water
- Snow/Ice
- Fire disturbance
- LST

# USGS-NOAA validation synergy

Several products of mutual interest  
(e.g. **GOES-R ABI**)

## BASELINE PRODUCTS

Aerosol Detection (Including Smoke and Dust)  
 Aerosol Optical Depth (AOD)  
 Volcanic Ash: Detection and Height  
 Cloud and Moisture Imagery  
 Cloud Optical Depth  
 Cloud Particle Size Distribution  
 Cloud Top Phase  
 Cloud Top Height  
 Cloud Top Pressure  
 Cloud Top Temperature  
 Hurricane Intensity  
 Lightning Detection: Events, Groups & Flashes  
 Rainfall Rate / QPE  
 Legacy Vertical Moisture Profile  
 Legacy Vertical Temperature Profile  
 Derived Stability Indices  
 Total Precipitable Water  
 Clear Sky Masks  
 Radiances  
 Downward Shortwave Radiation: Surface  
 Reflected Shortwave Radiation: TOA  
 Derived Motion Winds  
 Fire/Hot Spot Characterization  
 Land Surface Temperature (Skin)  
 Snow Cover  
 Sea Surface Temperature (Skin)  
 Energetic Heavy Ions  
 Mag. Electrons & Protons: Low Energy  
 Mag. Electrons & Protons: Med & High Energy  
 Solar & Galactic Protons  
 Geomagnetic Field  
 Solar Flux: EUV  
 Solar Flux: X-Ray  
 Solar Imagery: X-Ray

## OPTION 2 PRODUCTS

Aerosol Partical Size  
 Aircraft Icing Threat  
 Cloud Ice Water Path  
 Cloud Layers/Heights  
 Cloud Liquid Water  
 Cloud Type  
 Convective Initiation  
 Enhanced "V" / Overshooting Top Detection  
 Low Cloud and Fog  
 Tropopause Folding Turbulence Prediction  
 Visibility  
 Probability of Rainfall  
 Rainfall Potential  
 Absorbed Shortwave Radiation: Surface  
 Downward Longwave Radiation: Surface  
 Upward Longwave Radiation: Surface  
 Upward Longwave Radiation: TOA  
 Ozone Total  
 SO2 Detection  
 Flood/Standing Water  
 Ice Cover  
 Snow Depth (Over Plains)  
 Surface Albedo  
 Surface Emissivity  
 Vegetation Fraction: Green  
 Vegetation Index  
 Currents  
 Currents: Offshore  
 Sea and Lake Ice: Age  
 Sea and Lake Ice: Concentration  
 Sea and Lake Ice: Motion

### KEY

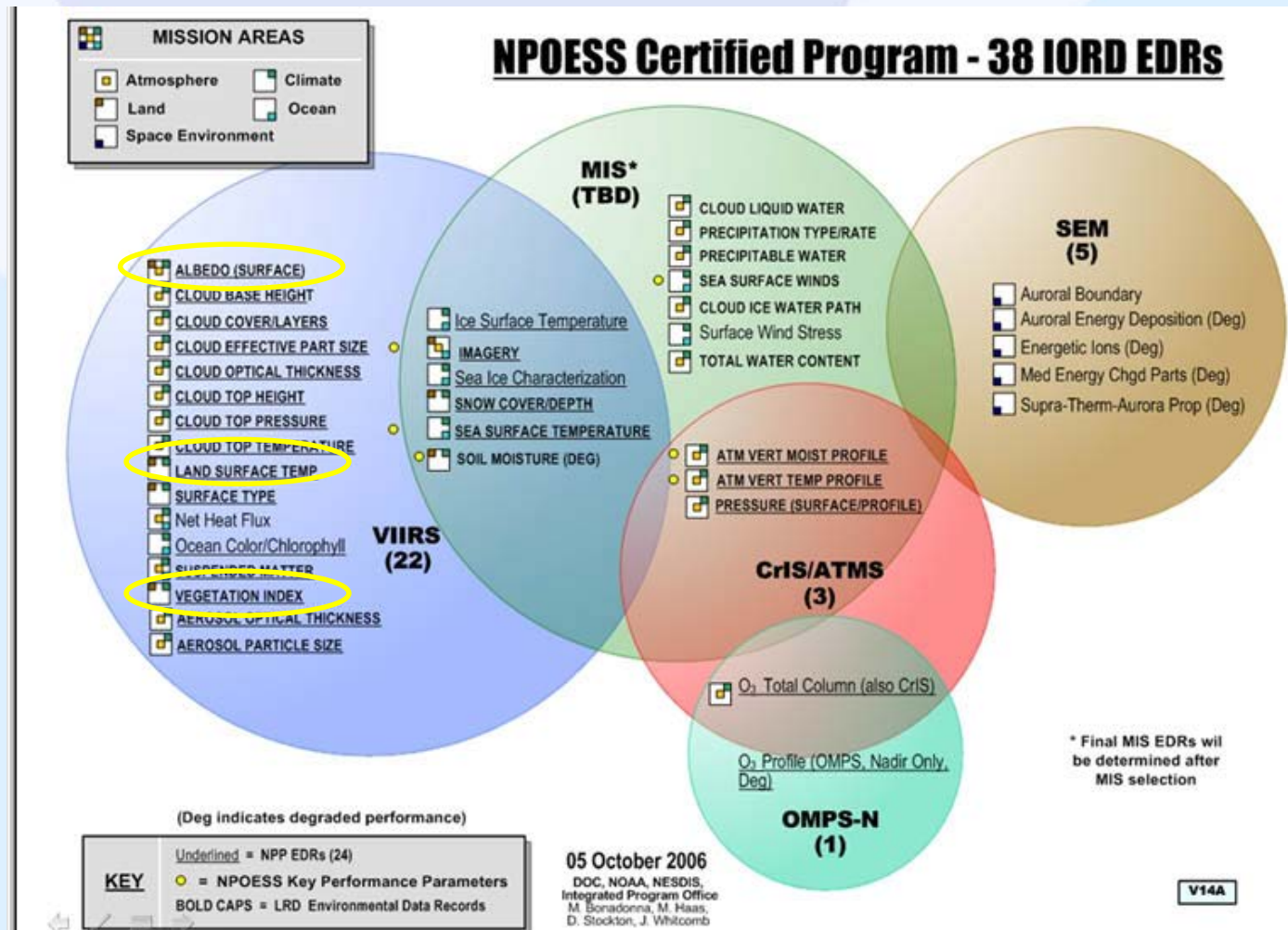
ABI	SUVI	EXIS
GLM	SEISS	MAG

ABI: Advanced Baseline Imager  
 SUVI: Solar Ultraviolet Imager  
 EXIS: Extreme Ultraviolet and X-ray Irradiance Suite  
 GLM: Geostationary Lightning Mapper  
 SEISS: Space Environment In-Situ Suite  
 MAG: Magnetometer



# USGS-NOAA validation synergy

Several products of mutual interest  
(e.g. VIIRS)



# Inventory and Ordering

Several options to search and order data. Can search by entering latitude and longitude information or interactively drawing area of interest .

**LPCS**  **USGS**  
science for a changing world  
**Land Product Characterization System**

**USGS Home**  
**Contact USGS**  
**Search USGS**

**Land Product Characterization System (LPCS)** Page Expires In 1:58:51 C

Home Login Register  RSS Feedback Help

**Search Criteria** Data Sets Additional Criteria Results

**1. Enter Search Criteria**  
To narrow your search area: type in an address or place name, enter coordinates or click the map to define your search area (for advanced map tools, view the [help documentation](#)), and/or choose a date range.

**Address/Place** Path/Row Feature Circle

Show Clear

**Coordinates** Predefined Area Cal/Val Sites Shapefile KML

Degree/Minute/Second Decimal

1. Lat: 50° 30' 48" N, Lon: 121° 48' 59" W	 
2. Lat: 46° 40' 46" N, Lon: 111° 47' 48" W	 
3. Lat: 41° 30' 30" N, Lon: 117° 25' 18" W	 
4. Lat: 44° 20' 22" N, Lon: 124° 37' 44" W	 

Use Map Add Coordinate Clear Coordinates

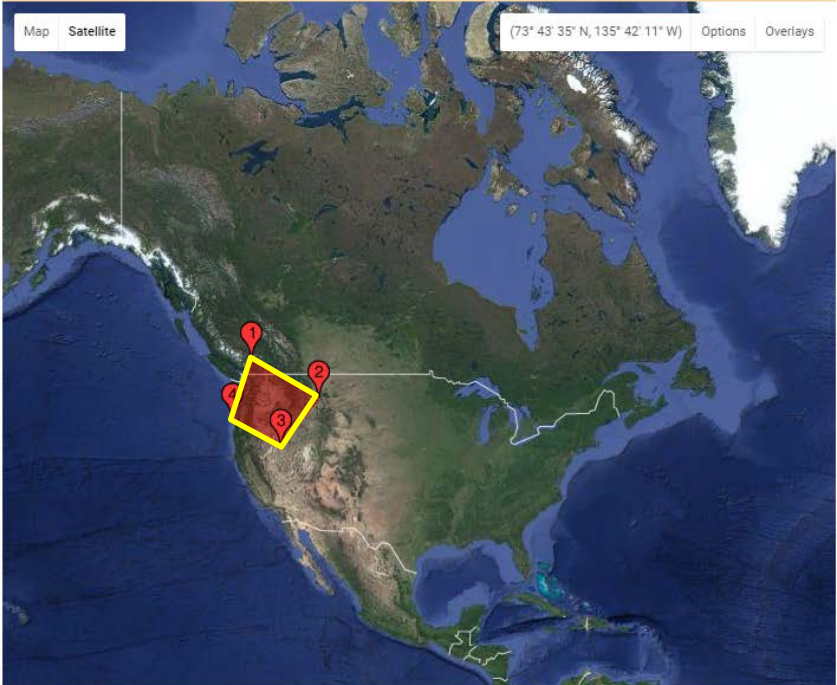
**Date Range** Result Options

Search from:  to:

Search months: (all)

**Search Criteria Summary (Show)** Clear Criteria

Map Satellite (73° 43' 35" N, 135° 42' 11" W) Options Overlays





# Inventory and Ordering

**NEW:** Can search by location of several in situ networks.

The screenshot displays the Land Product Characterization System (LPCS) interface. At the top, the header includes the logos for LPCS, NASA, and USGS, along with the tagline "science for a changing world". The main navigation bar contains "Home", "Login", "Register", "RSS", "Feedback", and "Help". The page also indicates "Page Expires In 1:59:30".

The central section is titled "Search Criteria Summary (Show)" and "Clear Criteria". It features a map of the United States with a search area highlighted. The map shows coordinates (71° 31' 29" N, 139° 34' 13" W) and options for "Map" and "Satellite".

On the left side, there is a "1. Enter Search Criteria" section. It provides instructions: "To narrow your search area: type in an address or place name, enter coordinates or click the map to define your search area (for advanced map tools, view the [help documentation](#)), and/or choose a date range." Below this, there are input fields for "Address/Place", "Path/Row", "Feature", and "Circle". A blue arrow points to the "Address/Place" input field. There are "Show" and "Clear" buttons next to the input fields.

Below the input fields, there are tabs for "Coordinates", "Predefined Area", "Cal/Val Sites", "Shapefile", and "KML". The "Cal/Val Sites" tab is selected, and an "Add Site" button is visible.

At the bottom, there is a "Date Range" section with "Search from:" and "to:" fields (both set to "mm/dd/yyyy") and a "Search months:" dropdown menu set to "(all)". There are also buttons for "Data Sets »", "Additional Criteria »", and "Results »".

On the right side, a dropdown menu titled "Add Cal/Val Site" is open, showing a list of site types: "Select One", "AERONET", "NEON Relocatable Terrestrial", "NEON Core Terrestrial", "USCRN", "SURFRAD", and "EOS Land Validation Core Sites".

# Inventory and Ordering

**NEW:** Can search by location of several in situ networks – example: Grand Morin, France.

The screenshot displays the LPCS (Land Product Characterization System) web interface. The header includes the logos for LPCS, NASA, and USGS, along with the text "science for a changing world". The main navigation bar contains "Home", "Login", "Register", "RSS", "Feedback", and "Help". The page also indicates "Page Expires In 1:59:30".

The search interface is divided into several sections:

- Search Criteria Summary (Show) Clear Criteria:** A summary section at the top right of the search area.
- Map:** A satellite map showing a coastal region with coordinates (71° 31' 29" N, 139° 34' 13" W). It includes "Map" and "Satellite" buttons, and "Options" and "Overlays" links.
- Add Cal/Val Site:** A dropdown menu showing a list of sites. The selected site is "cs\_gmorin".
- Search Criteria:** A section on the left with the following options:
  - 1. Enter Search Criteria:** A text input field with "Show" and "Clear" buttons.
  - Address/Place:** A dropdown menu.
  - Path/Row:** A dropdown menu.
  - Feature:** A dropdown menu.
  - Circle:** A dropdown menu.
  - Coordinates:** A dropdown menu.
  - Predefined Area:** A dropdown menu.
  - Cal/Val Sites:** A dropdown menu (highlighted by a blue arrow).
  - Shapefile:** A dropdown menu.
  - KML:** A dropdown menu.
  - Add Site:** A button.
  - Date Range:** A section with "Search from:" and "to:" date pickers, and a "Search months:" dropdown menu.
  - Result Options:** A section with "Data Sets »", "Additional Criteria »", and "Results »" buttons.

# Inventory and Ordering

**NEW:** Can search by location of several in situ networks.

The screenshot displays the USGS Land Product Characterization System (LPCS) search interface. At the top, the header includes the USGS logo and the text "science for a changing world". The main title is "Land Product Characterization System (LPCS)". The interface is divided into several sections:

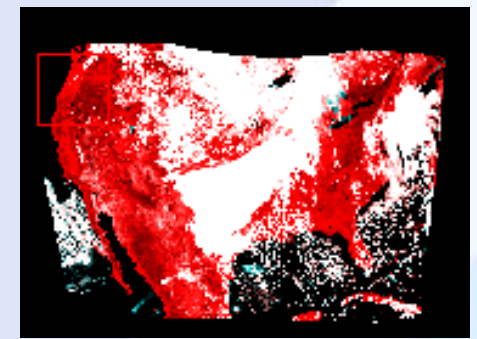
- Search Criteria Summary (Show):** A summary of the search criteria, including a "Clear Criteria" button.
- Map:** A satellite map of Europe with a red location pin placed over Paris, France. A yellow arrow points from the search criteria input field to this pin. The map shows various countries including England, Netherlands, Belgium, Luxembourg, France, and Switzerland.
- Search Criteria Input:** A section titled "1. Enter Search Criteria" with instructions: "To narrow your search area: type in an address or place name, enter coordinates or click the map to define your search area (for advanced map tools, view the [help documentation](#)), and/or choose a date range." It includes tabs for "Address/Place", "Path/Row", "Feature", and "Circle". Below this is a text input field with "Show" and "Clear" buttons.
- Coordinates:** A section with tabs for "Predefined Area", "Cal/Val Sites", "Shapefile", and "KML". It has sub-tabs for "Degree/Minute/Second" and "Decimal". A list of coordinates is shown: "1. Lat: 48° 27' 18" N, Lon: 002° 57' 36" E". Below this are "Use Map", "Add Coordinate", and "Clear Coordinates" buttons.
- Date Range:** A section with a "Result Options" tab. It includes "Search from:" and "to:" fields with date pickers, and a "Search months:" dropdown menu set to "(all)".

At the bottom of the search criteria section, there are buttons for "Data Sets >", "Additional Criteria >", and "Results >".



# Inventory and Ordering

Search for Landsat 8 data on date of simulated GOES-R ABI data (23 April 2013) (provided by Univ. Wisc./CIMSS).



*Users can search for multiple sensors over selected range of dates.*

**LPCS** **USGS**  
science for a changing world  
**Land Product Characterization System**

**Land Product Characterization System (LPCS)** Page Expires In 1:49:39

Home Login Register RSS Feedback Help

**Search Criteria** Data Sets Additional Criteria Results

**Search Criteria Summary** (Show) Clear Criteria

Map Satellite (29° 13' 44" N, 158° 22' 44" W) Options Overlays

**1. Enter Search Criteria**  
To narrow your search area: type in an address or place name, enter coordinates or click the map to define your search area (for advanced map tools, view the [help documentation](#)), and/or choose a date range.

Address/Place Path/Row Feature Circle

Show Clear

Coordinates Predefined Area Cal/Val Sites Shapefile KML

Degree/Minute/Second Decimal

1. Lat: 47° 16' 45" N, Lon: 125° 51' 33" W		
2. Lat: 50° 03' 51" N, Lon: 119° 21' 19" W		
3. Lat: 42° 40' 56" N, Lon: 119° 00' 14" W		
4. Lat: 42° 25' 24" N, Lon: 125° 19' 55" W		

Use Map Add Coordinate Clear Coordinates

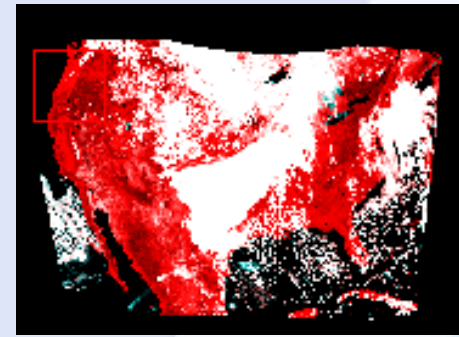
Date Range Result Options

Search from: 04/23/2013 to: 04/23/2013

Search months: (all)

# Inventory and Ordering

Search for Landsat 8 data on date of simulated GOES-R ABI data (23 April 2013).



*Users can view browse images to select clear scenes for further processing.*

**LPCS** Land Product Characterization System

USGS Home Contact USGS Search USGS

Page Expires In 1:57:39

Home Login Register RSS Feedback Help

Search Criteria Data Sets Additional Criteria **Results**

### 4. Search Results

If you selected more than one data set to search, use the dropdown to see the search results for each specific data set.

**Note:** You must be logged in to download and order scenes

Show Result Controls

Data Set

Landsat Surface Reflectance - L8 OLI/TIRS

4		Acquisition Date:23-APR-13 Path:45 Row:25
5		Entity ID:LC80450272013113LGN01 Coordinates:47.4492,-120.26091 Acquisition Date:23-APR-13 Path:45 Row:27
6		Entity ID:LC80450262013113LGN01 Coordinates:48.8662,-119.69798 Acquisition Date:23-APR-13 Path:45 Row:26
7		Entity ID:LC80450282013113LGN01 Coordinates:46.02972,-120.79977 Acquisition Date:23-APR-13 Path:45 Row:28

Search Criteria Summary (Show) Clear Criteria

Map Satellite

BRITISH COLUMBIA (43° 38' 38" N, 104° 11' 39" W) Options Overlays

WASHINGTON MONTANA

OREGON IDAHO WYOMING

NEVADA UTAH COLORADO CALIFORNIA



# Inventory and Ordering

## Higher Level Products

Choose higher level products from selected data. *Additional ECVs and CDRs will be added to menu as available.*

### Select Product Contents

#### Source Products

- [Source Products](#)
- [Source Metadata](#)

#### Climate Data Records

- [Top of Atmosphere Reflectance](#)
- [Surface Reflectance](#)
- [Band 6 Brightness Temperature](#)

#### Spectral Indices

- [Surface Reflectance NDVI](#)
- [Surface Reflectance NDMI](#)
- [Surface Reflectance NBR](#)
- [Surface Reflectance NBR2](#)
- [Surface Reflectance SAVI](#)
- [Surface Reflectance EVI](#)

#### Other Products

- [CFMask \(standalone file\)](#)
- [Solr Index](#)

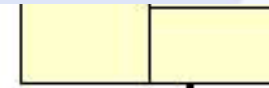
#### Product Customization





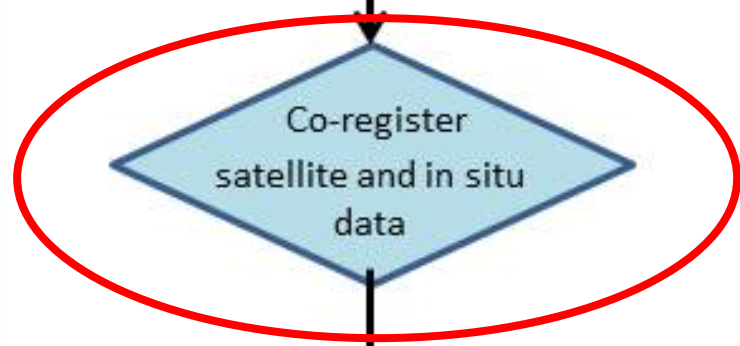
# Advanced Processing

SNPP & JPSS VIIRS  
GOES-R ABI  
Landsat-7 & -8  
MODIS  
Sentinel-2 & 3  
others..  
& In Situ



stored at  
EROS.

Additional Analysis



# Advanced Processing

## Define Output Products *Product Customization*

- 1. Auto-registration of data to common map projections for analysis.
- 2. User defines area of interest for analysis
- 3. Match pixel size for all images (30 – 5000 m)
- 4. Several resampling options

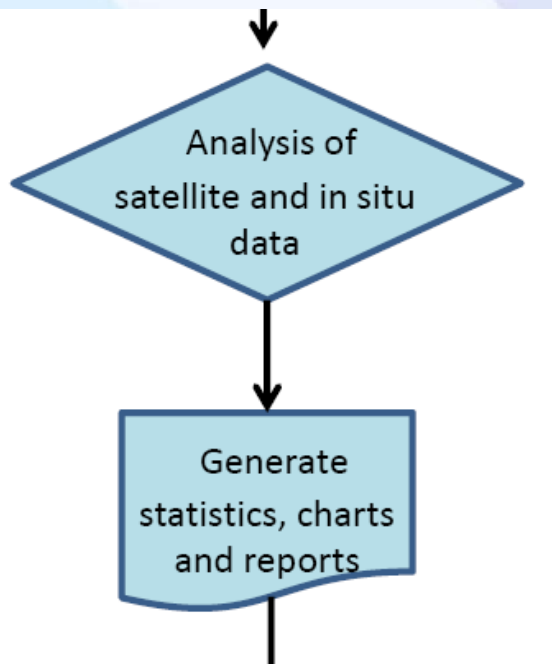
Output formats include

The screenshot shows a web interface titled "Product Customization" with the following sections and elements:

- 1 Reproject Products:** A dropdown menu for "Projection:" with options: Geographic (selected), Albers Equal Area, Sinusoidal, and Universal Transverse Mercator.
- 2 Modify Image:** Four input fields for coordinates: "Upper left X coordinate", "Upper left Y coordinate", "Lower right X coordinate", and "Lower right Y coordinate".
- 3 Pixel Resizing:** An input field for pixel size and a dropdown menu for units, currently set to "Meters".
- 4 Resample Method:** A dropdown menu with options: Nearest Neighbor (selected), Bilinear Interpolation, and Cubic Convolution.
- Order Description (optional):** A large empty text area for additional information.
- Submit:** A button at the bottom right.

# Analysis Tools

*Input products resized, remapped and output products generated.*



### Example Input Products

Simulated GOES-R ABI  
(Univ. Wisc./CIMMS)

↓

TOA Refl.

↓

Pixel Resizing

Landsat ETM+ (7),  
Landsat OLI/TIRS (8)

↓

Surface Refl.

↓

Reproject

MODIS MOD/MYD09 (Surface Refl.)  
MODIS MOD/MYD13 (NDVI & EVI)

↓

Surface Refl.

↓

Modify Extents

↓

### Output Products

Simulated GOES-R ABI

Landsat

MODIS

↓

Tables and charts provided for individual bands or indices

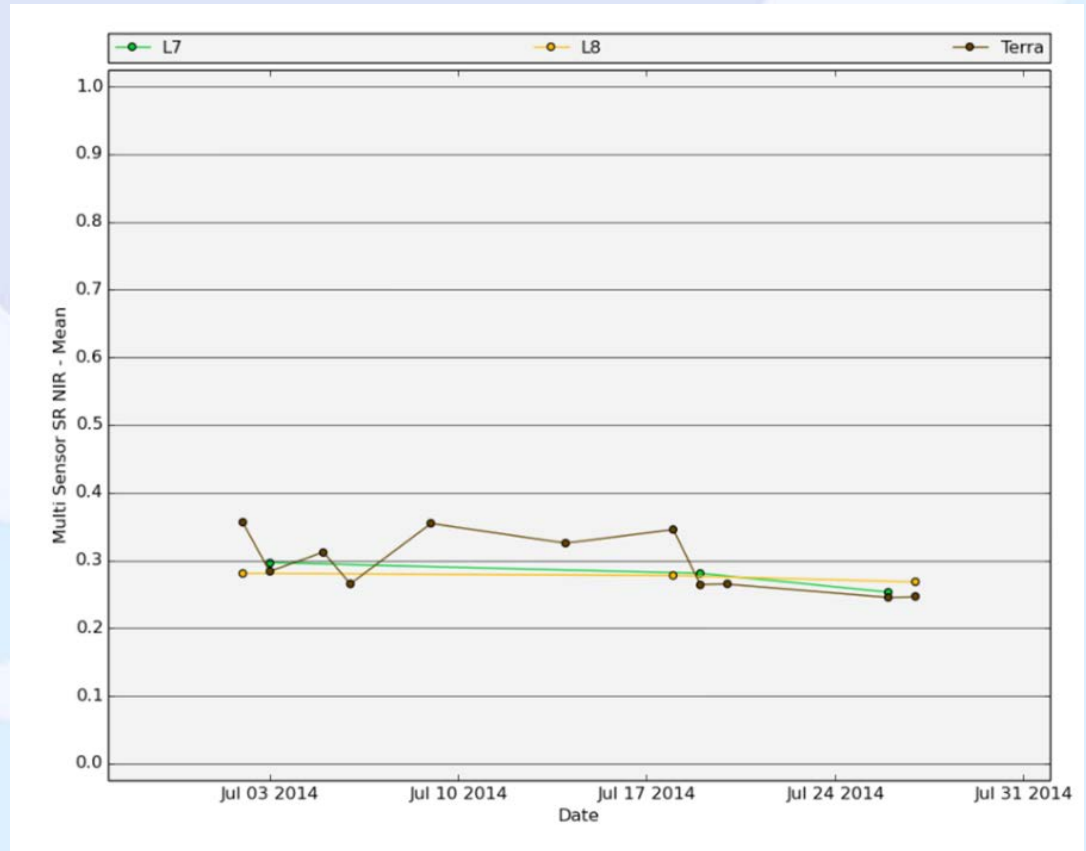
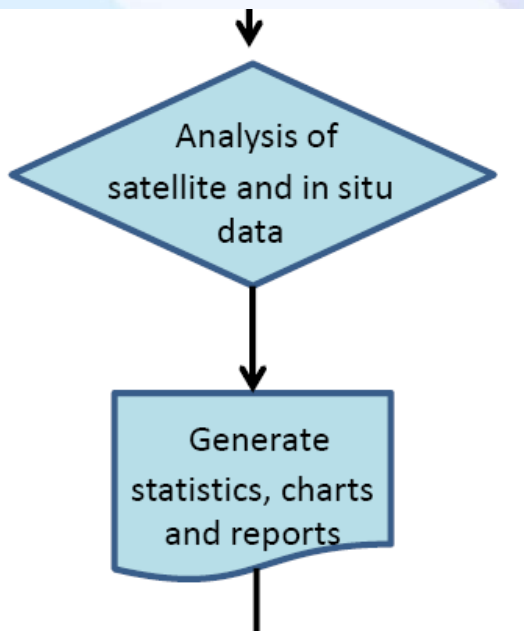
	A	B	C	D	E	F	G
1	DATE	DOY	MINIMUM	MAXIMUM	MEAN	STDDEV	VALID
2	7/2/2014	183	854	6850	3562.327	693.2124	yes
3	7/3/2014	184	349	8094	2836.911	495.3851	yes
4	7/5/2014	186	290	6780	3122.295	493.9331	yes
5	7/6/2014	187	308	4667	2653.052	575.2196	yes
6	7/9/2014	190	815	5553	3545.954	658.4303	yes
7	7/14/2014	195	191	7778	3254.757	636.479	yes
8	7/18/2014	199	1253	5621	3455.974	681.7747	yes
9	7/19/2014	200	343	5165	2643.57	393.5894	yes
10	7/20/2014	201	404	8447	2648.748	691.372	yes
11	7/26/2014	207	309	5266	2452.574	376.6008	yes
12	7/27/2014	208	457	4713	2462.386	465.7057	yes
13							

Near-IR time series inter-comparisons

Minimum, maximum, mean and standard deviation values

## Analysis Tools

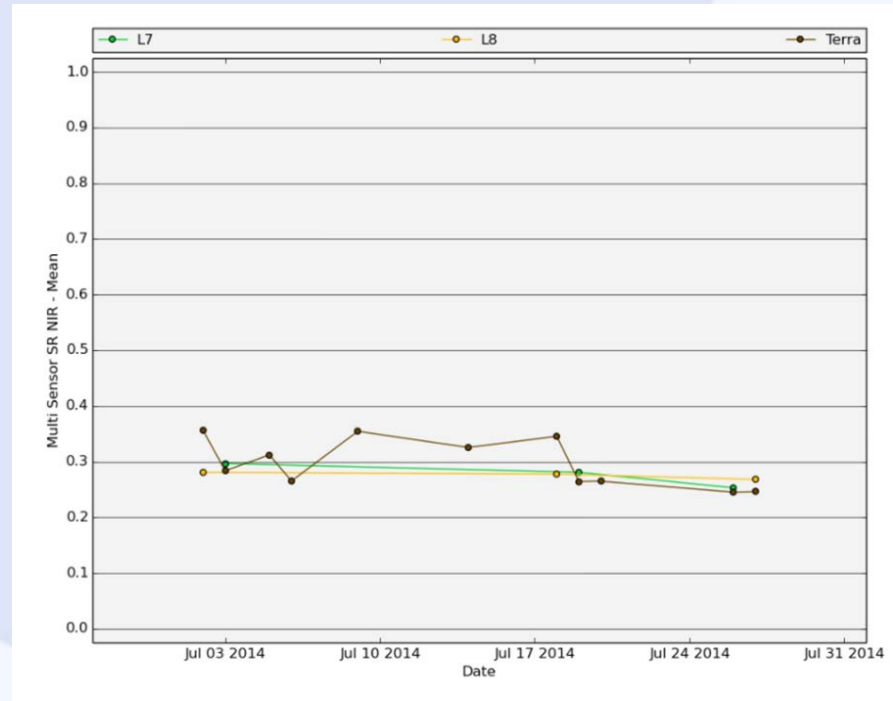
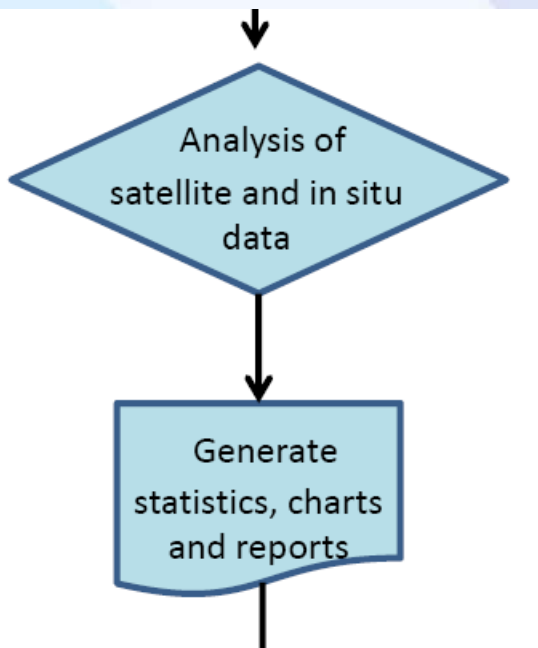
Output products include several charts, e.g., sensor values vs. time.



*Near-IR Surface Reflectance (L7, L8, and Terra/MODIS).*

# Analysis Tools

Tables provided with additional data for more intensive analyses.



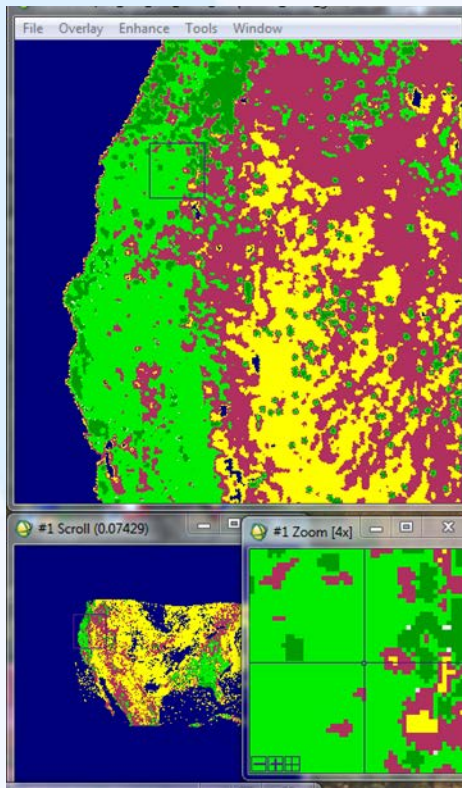
	A	B	C	D	E	F	G
1	DATE	DOY	MINIMUM	MAXIMUM	MEAN	STDDEV	VALID
2	7/2/2014	183	854	6850	3562.327	693.2124	yes
3	7/3/2014	184	349	8094	2836.911	495.3851	yes
4	7/5/2014	186	290	6780	3122.295	493.9331	yes
5	7/6/2014	187	308	4667	2653.052	575.2196	yes
6	7/9/2014	190	815	5553	3545.954	658.4303	yes
7	7/14/2014	195	191	7778	3254.757	636.479	yes
8	7/18/2014	199	1253	5621	3455.974	681.7747	yes
9	7/19/2014	200	343	5165	2643.97	393.5894	yes
10	7/20/2014	201	404	8447	2648.748	691.372	yes
11	7/26/2014	207	309	5266	2452.574	376.6008	yes
12	7/27/2014	208	457	4713	2462.386	465.7057	yes
13							



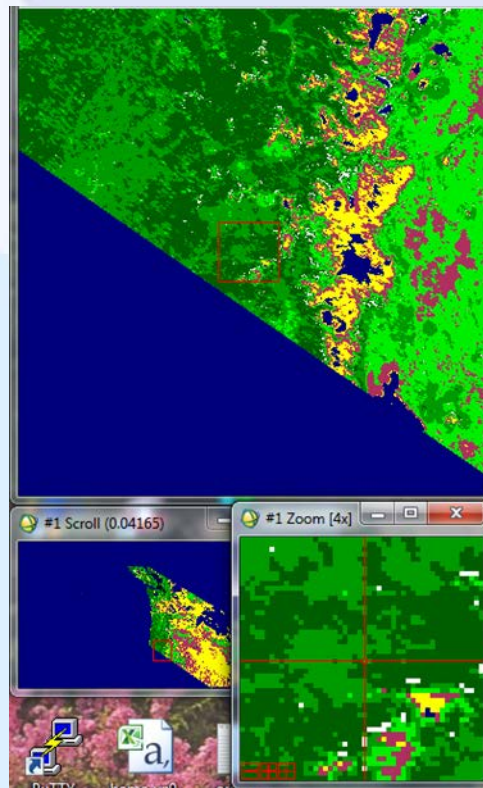
## Analysis Tools

LPCS also provides as output products **georegistered images** of input images for additional analysis (same map projection, cell size, etc., as defined within product customization).

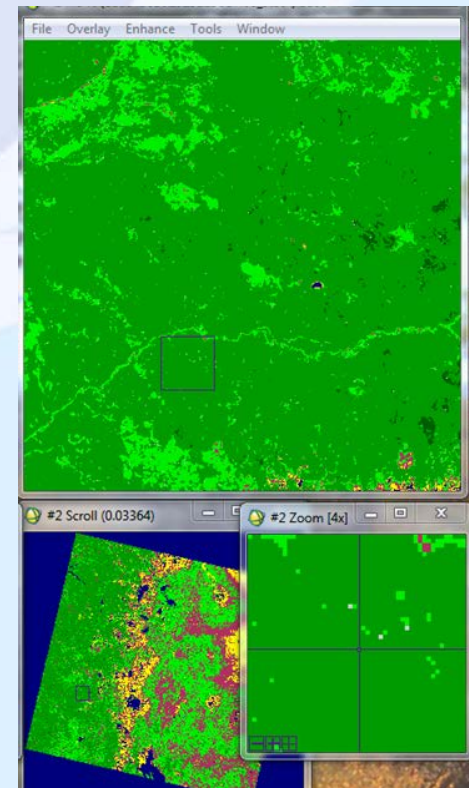
Simulated GOES-R ABI



VIIRS



Landsat 8



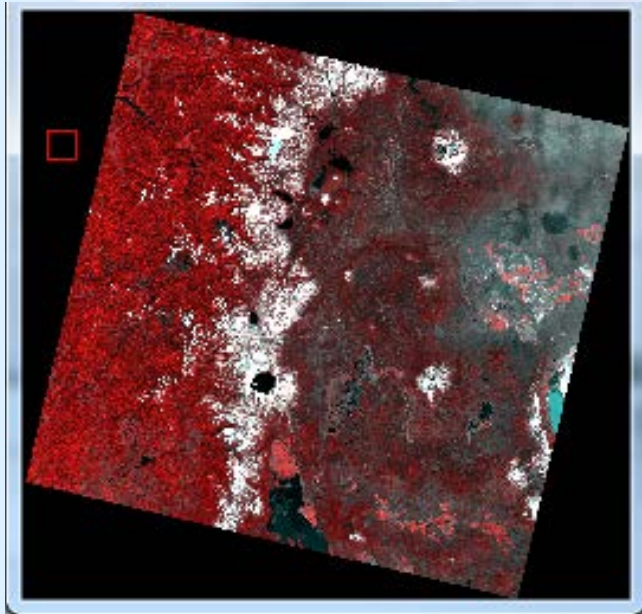


# Analysis Tools

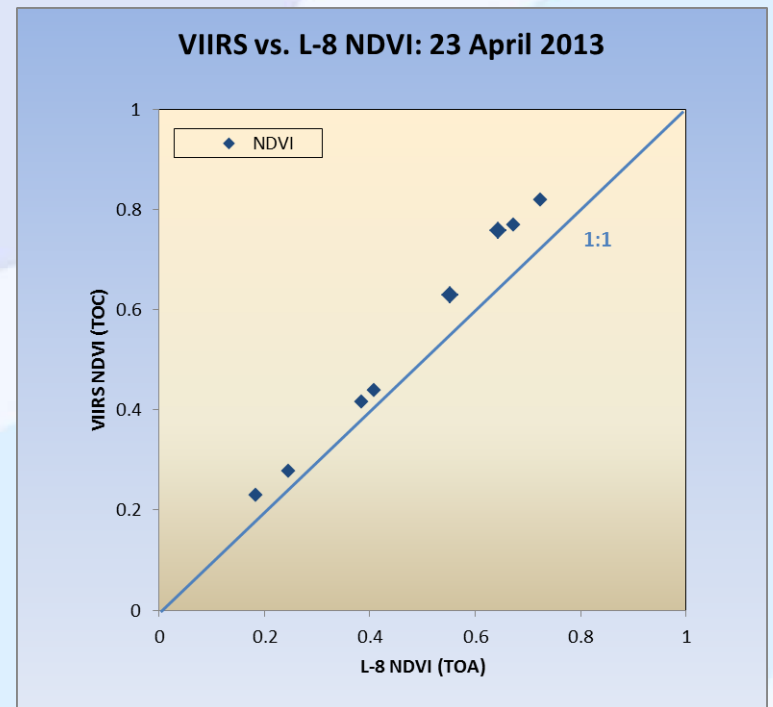
## Example of Potential Analysis

*VIIRS (TOC) NDVI* compared to *Landsat-8 (TOA) NDVI*

Each point within figures represents 100 km<sup>2</sup> sample area.



Landsat 8: 23 April 2013, NW USA.



# Land Product Characterization System (LPCS)

What is LPCS

Why LPCS developed/hosted at EROS

Highlights of LPCS

1. Inventory & Ordering
2. Analysis Tools

**Path Forward**

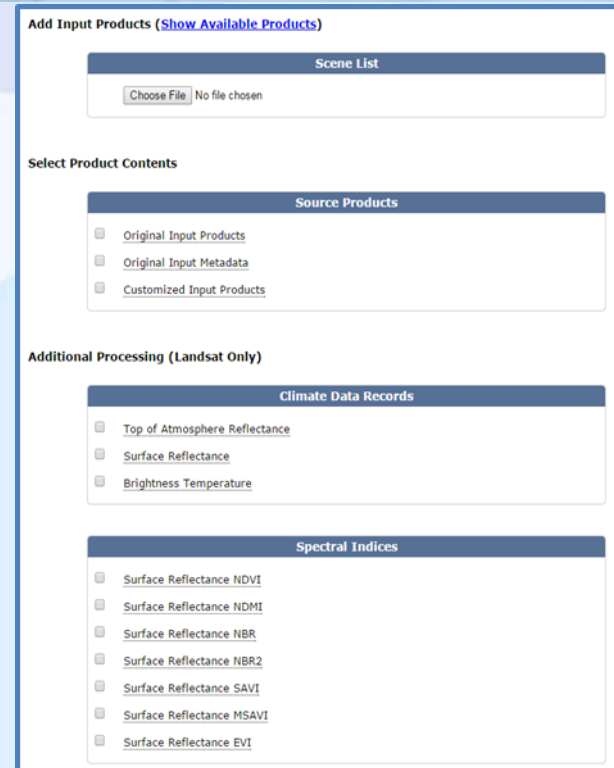
- 1. Status and Readiness**
2. CEOS LPV collaboration

Summary

# LPCS Status and Readiness

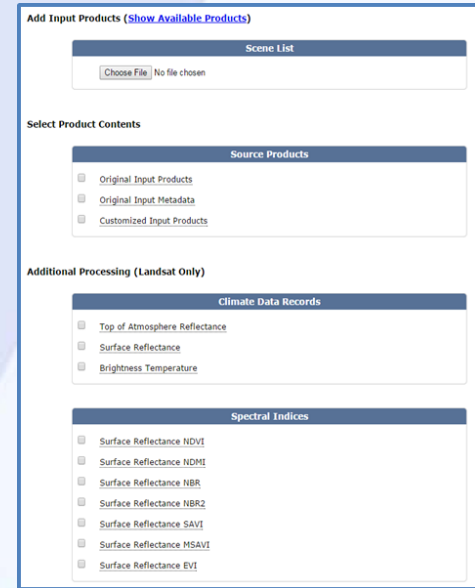
Current: two – step process

- 1) Users order and download data, and
- 2) Retrieve downloaded data into product customization system for processing and product generation.



# LPCS Status and Readiness

Future: one – step seamless ordering and processing of data (Jan 2017).



Release timelines:

Task	Aug-16	Sep-16	Oct-16	Nov-16	Dec-16	Jan-17
Internal (USGS/EROS) system testing		■				
External (NESDIS and NASA Science teams) testing				■		
Public Release						■

# LPCS Status and Readiness

Introduction of future *data sets* and *analysis tools* within LPCS are planned, however, dependent on additional resources.

## Current



**Landsat 8**



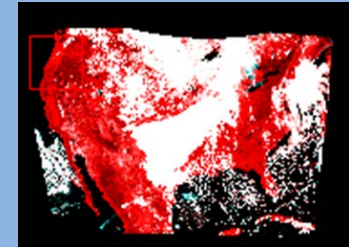
## Future



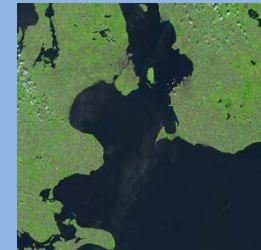
Joint Polar Satellite System (JPSS) Visible Infrared Imaging Radiometer Suite (VIIRS)



NOAA-NASA Geostationary Operational Environmental Satellites - R Series (GOES-R)



European Space Agency (ESA) Sentinel-2



**sentinel-3**

→ GMES MEDIUM RESOLUTION LAND AND OCEAN MISSION



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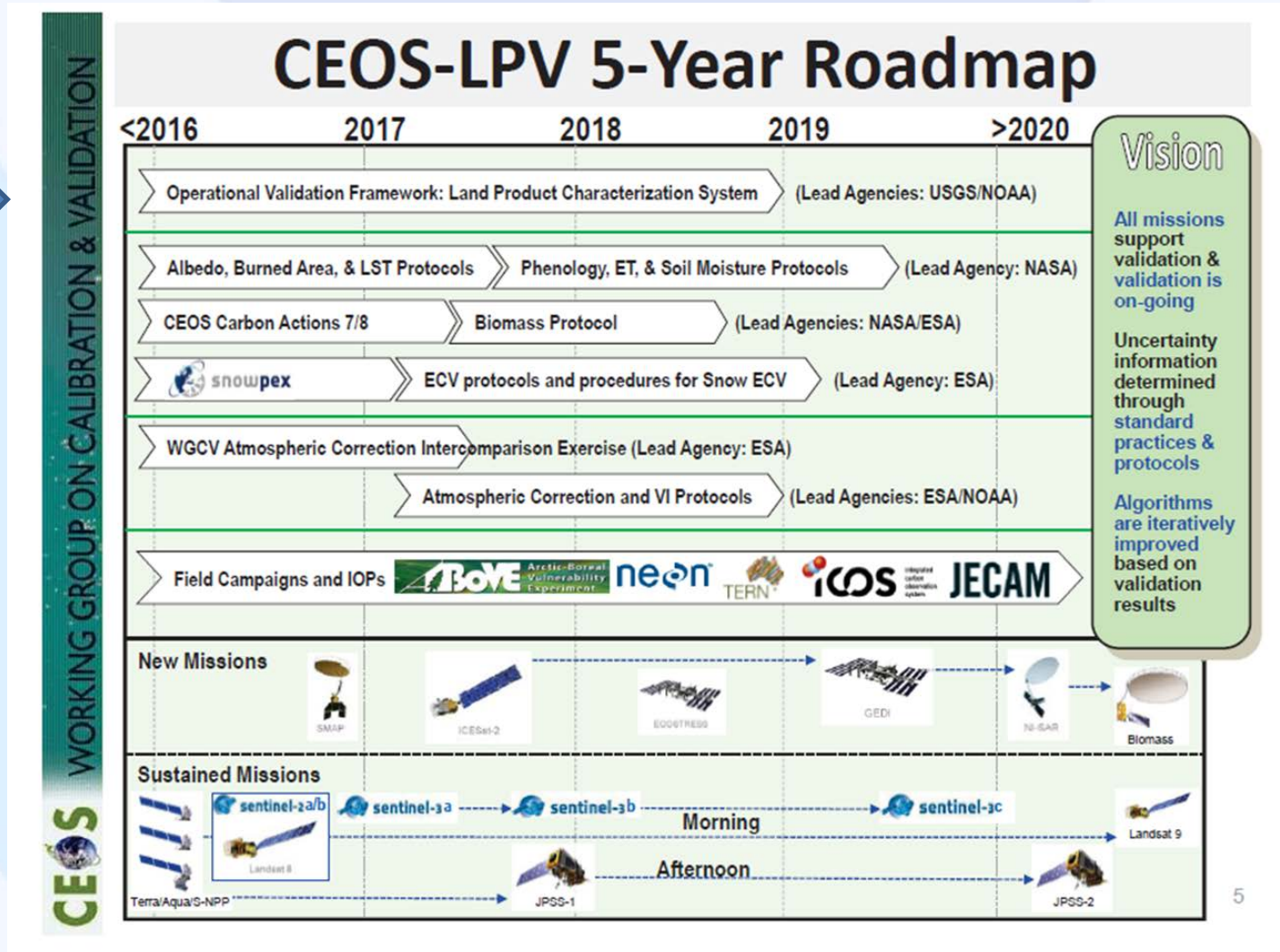
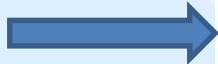
1. Status and Readiness
- 2. CEOS LPV collaboration**

Summary



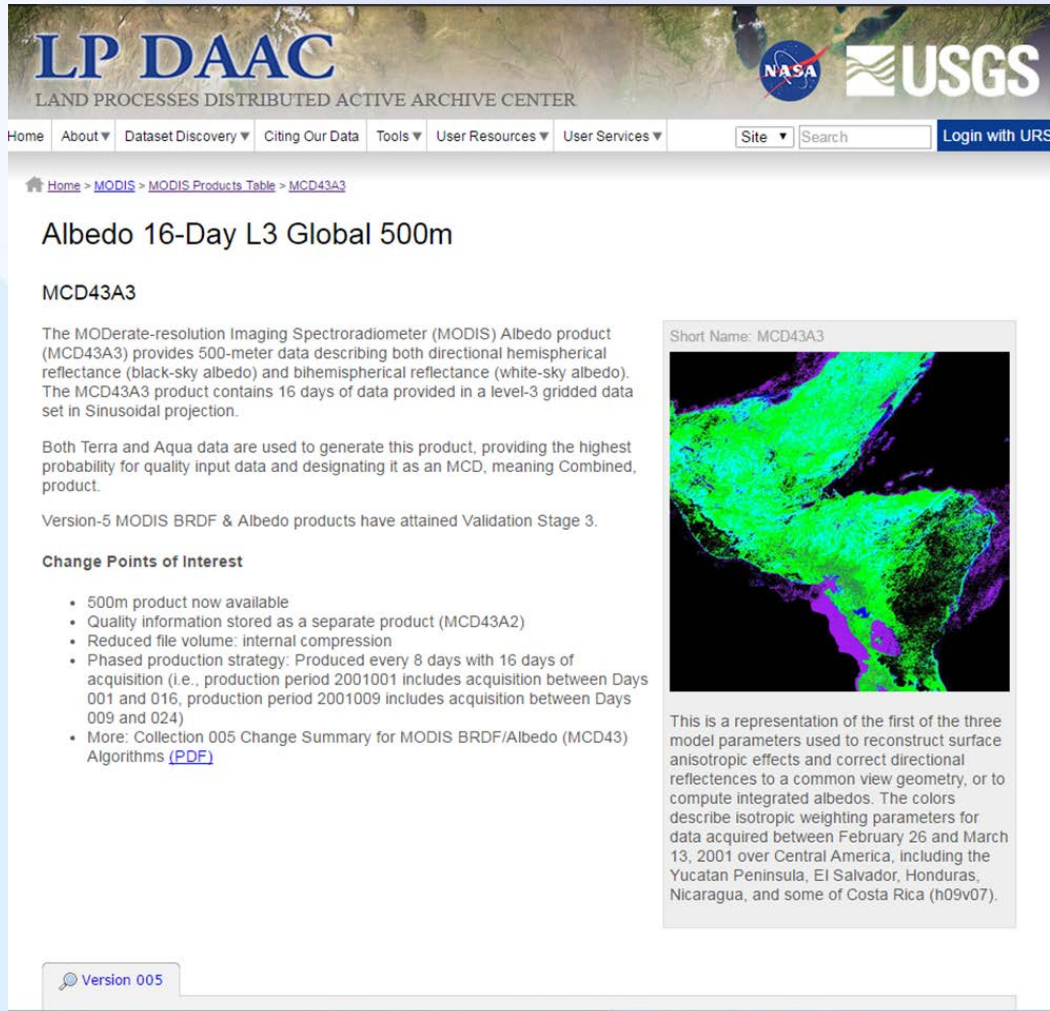
# CEOS LPV collaboration

LPCS proposed/accepted as CEOS-LPV Online Validation Tool.



# CEOS LPV collaboration

Albedo (MODIS MCD43A3) planned for addition to LPCS as requested by CEOS-LPV.



**LP DAAC**  
LAND PROCESSES DISTRIBUTED ACTIVE ARCHIVE CENTER

Home About Dataset Discovery Citing Our Data Tools User Resources User Services Site Search Login with URS

Home > MODIS > MODIS Products Table > MCD43A3

## Albedo 16-Day L3 Global 500m

### MCD43A3

The MODerate-resolution Imaging Spectroradiometer (MODIS) Albedo product (MCD43A3) provides 500-meter data describing both directional hemispherical reflectance (black-sky albedo) and bihemispherical reflectance (white-sky albedo). The MCD43A3 product contains 16 days of data provided in a level-3 gridded data set in Sinusoidal projection.

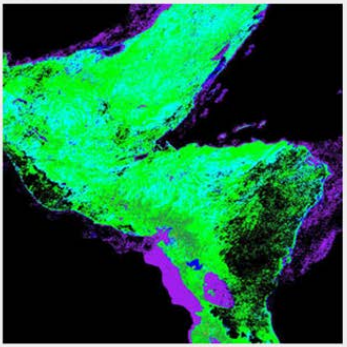
Both Terra and Aqua data are used to generate this product, providing the highest probability for quality input data and designating it as an MCD, meaning Combined, product.

Version-5 MODIS BRDF & Albedo products have attained Validation Stage 3.

#### Change Points of Interest

- 500m product now available
- Quality information stored as a separate product (MCD43A2)
- Reduced file volume: internal compression
- Phased production strategy: Produced every 8 days with 16 days of acquisition (i.e., production period 2001001 includes acquisition between Days 001 and 016, production period 2001009 includes acquisition between Days 009 and 024)
- More: Collection 005 Change Summary for MODIS BRDF/Albedo (MCD43) Algorithms ([PDF](#))

Short Name: MCD43A3




This is a representation of the first of the three model parameters used to reconstruct surface anisotropic effects and correct directional reflectances to a common view geometry, or to compute integrated albedos. The colors describe isotropic weighting parameters for data acquired between February 26 and March 13, 2001 over Central America, including the Yucatan Peninsula, El Salvador, Honduras, Nicaragua, and some of Costa Rica (h09v07).

Version 005

# CEOS LPV collaboration

Additional analysis tools recommended by CEOS-LPV are under review for addition to LPCS.



The screenshot shows the LP DAAC website. The header includes the LP DAAC logo, NASA and USGS logos, and navigation links for Home, About, Dataset Discovery, Citing Our Data, Tools, User Resources, and User Services. A search bar and a 'Login with URS' button are also present. The main content area is titled 'LDOPE Tools' and contains a paragraph about the LDOPE facility, a detailed paragraph about the software tools, and a paragraph about distribution constraints. A right-hand sidebar contains a 'Download' section with links to various installation files and a 'Manuals' section with links to the Users Manual, Installation Instructions, and two tool documentation files. A citation is provided at the bottom of the page.

ATA Data Discovery DAAC Community Science Disciplines

## LP DAAC

LAND PROCESSES DISTRIBUTED ACTIVE ARCHIVE CENTER

Home About Dataset Discovery Citing Our Data **Tools** User Resources User Services Site Search Login with URS

Home > Tools > LDOPE Tools

### LDOPE Tools

The Land Data Operational Products Evaluation ([LDOPE](#)) facility, collocated with the MODIS Adaptive Processing System (MODAPS) at the Goddard Spaceflight Center (GSFC), is responsible for the overall coordination of the QA activities in support of the MODIS Science Team.

LDOPE develops and maintains a number of software tools designed to manipulate, visualize, and analyze MODIS data. A subset of LDOPE QA tools is available to the user community to help parse and interpret the QA Science Dataset (SDS) layers. Written in C, they are executed either from the command-line or invoked via scripts. These tools, numbering about two-dozen, are provided as command-line executables and source code. Previously, a number of platforms were supported. The new release (version 1.7) consolidates the availability of the software in Windows, Linux and Mac OSX operating systems. While the User Manual is in the process of being updated, a shorter set of instructions is available to help users install the tools and get started. The syntax descriptions and examples provided in the User Guide are still valid, and users are advised to consult them for further insight.

No distribution or re-use constraints associated with this software exists. Users and developers using or modifying this software should credit the original authorship for these tools. Please acknowledge the use of these tools, including use of significant code fragments taken from the source code, with a sentence such as "Software tools provided by the MODIS land quality assessment group (Roy et al. 2002)".

Roy, D.P., Borak, J.S., Devadiga, S., Wolfe, R.E., Zheng, M., Descloitres, J., 2002, The MODIS Land Product Quality Assessment Approach, *Remote Sensing of Environment*, 83, 62-76.

#### Download

Please log in to download files.

- Windows 32 bit
- Windows 64 bit
- LDOPE-1.7-linux-32-installer.run.zip
- LDOPE-1.7-linux-64-installer.run.zip
- Mac OSX
- Test code

#### Manuals

- [Users Manual](#)
- [Installation Instructions for LDOPE Tools](#)
- [L2G\\_Lite\\_Tool\\_Doc](#)
- [Comp\\_SDS\\_Diff\\_Tool\\_Doc](#)

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2. Analysis Tools

Path Forward

1. Status and Readiness
2. Expectations for User Interactions

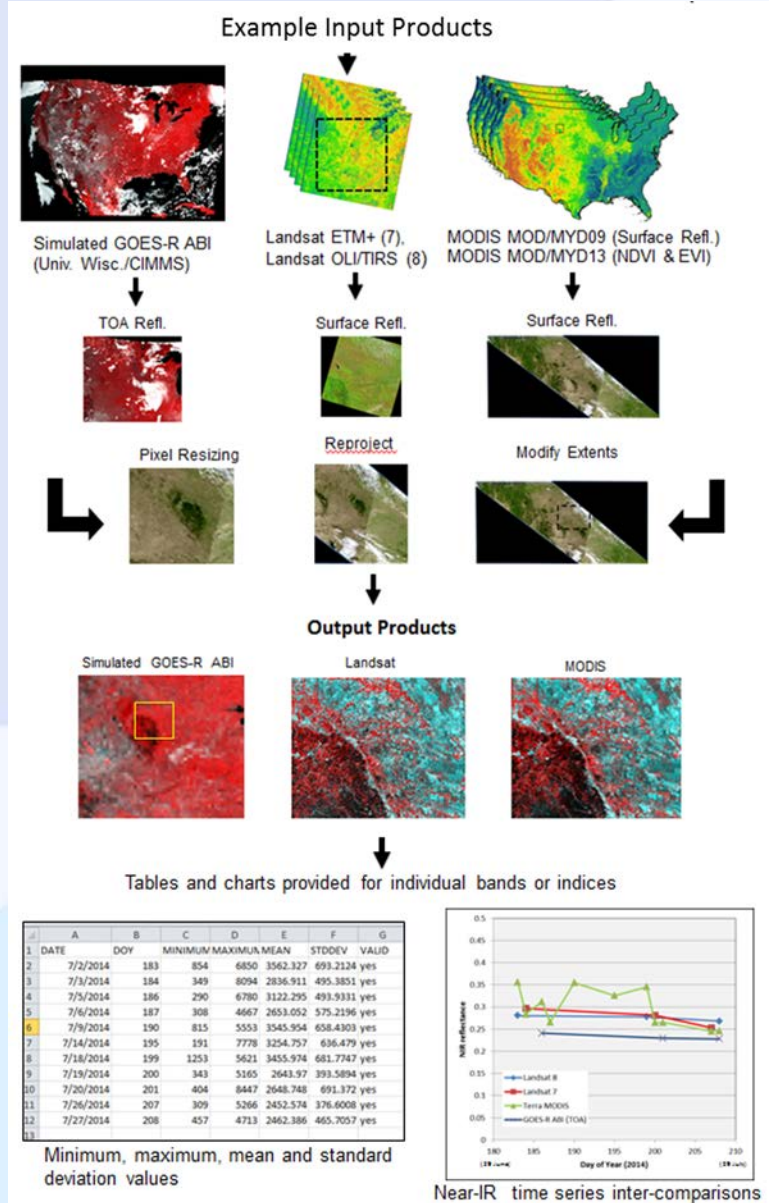
**Summary**



# Summary

A web-based system designed for comparative analysis of global satellite higher-level land products.

- Inventory & order data
- Advanced processing
- Basic analysis
- Output charts , images, & tables



Questions?