

# Land Product Characterization System



STAR JPSS Science Team Meeting  
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**USER GUIDE**

**LAND PRODUCT CHARACTERIZATION SYSTEM (LPCS)**

A screenshot of the LPCS User Guide. On the left is a line graph titled "NDVI vs Date" showing vegetation indices over time from January 2013 to September 2014. On the right is a map of the United States with a color-coded legend for MODIS Terra data, and above it is a stack of images labeled "Landsat 7 ETM+".

Version 2.6  
May 2017

USGS science for a changing world

NOAA National Oceanic and Atmospheric Administration

Land Product Characterization System i Version 2.6

**LPCS** Land Product Characterization System

Screenshots of the LPCS software interface. From left to right: a globe view, a map view with a green overlay, a screenshot of a data entry or visualization screen, a table of data with columns like DATE, LAT, LONG, and NDVI, and a line graph showing NDVI values over time.

# **Land Product Characterization System (LPCS)**

What is LPCS

Highlights of LPCS

1. Search, 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.

The screenshot shows the LPCS web application. At the top, there's a navigation bar with links like 'Home', 'Search Criteria', 'Data Sets' (which is highlighted in orange), 'Additional Criteria', and 'Results'. Below this is a section titled '2. Select Your Data Set(s)' with instructions. A checkbox 'Use Data Set Prefilter' is checked. To its right is a 'Data Set Search' input field and a tree view of datasets: GOES-R, Landsat Archive, NASA LPDAAC Collections (MODIS), and VIIRS. On the right side of the page is a map of North America and South America, with a legend for 'Satellite' imagery. The map includes coordinate markers (26° 16' 25" N, 156° 47' 48" W) and various geographical features.

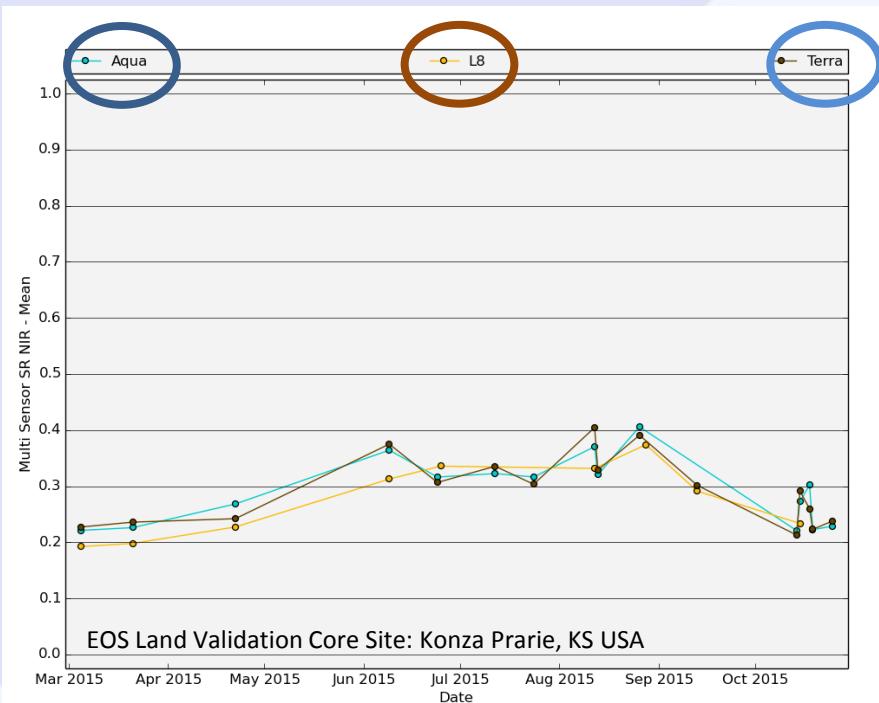
This screenshot shows the same LPCS interface but with a different map view. The map now covers Europe, Africa, and Asia. It includes coordinate markers (68° 08' 20" N, 012° 28' 49" E). The map displays satellite imagery with color-coded land cover information. The rest of the interface elements, including the header, search criteria, and dataset selection, remain consistent with the first screenshot.

# What is LPCS: Output example

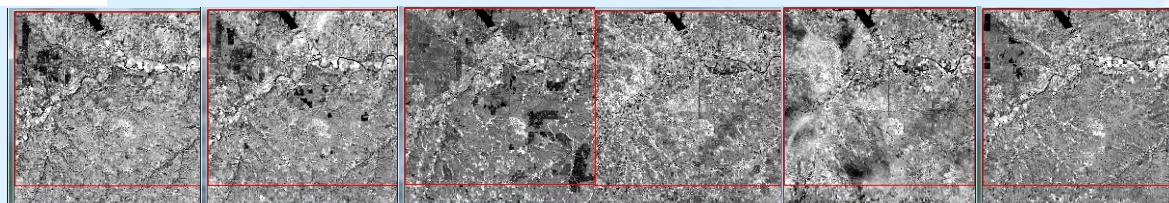
Trending of similar bands of data from multiple sensors.

## Near-IR Surface Reflectance

DATE	DOY	MINIMUM	MAXIMUM	MEAN	STDDEV	VALID
3/5/2015	64	197	3348	2211.75	254.2622	yes
3/21/2015	80	86	3435	2260.46	283.6276	yes
4/22/2015	112	101	4456	2682.246	360.7378	yes
6/9/2015	160	516	4847	3641.673	371.7797	yes
6/24/2015	175	1277	4368	3162.141	323.418	yes
7/12/2015	193	663	4415	3224.323	336.7476	yes
7/24/2015	205	287	5333	3163.501	368.4334	yes
8/12/2015	224	124	6987	3704.659	588.8336	yes
8/13/2015	225	284	5263	3203.423	390.1365	yes
8/26/2015	238	559	6009	4057.752	385.2751	yes
10/14/2015	287	173	3287	2207.415	260.9021	yes
10/15/2015	288	257	4663	2723.466	392.9907	yes
10/18/2015	291	676	4266	3021.147	584.0373	yes
10/19/2015	292	281	3474	2223.977	311.7263	yes
10/25/2015	298	280	3102	2286.152	303.9241	yes



Tables and images provided for more intensive analyses.



## What is LPCS

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

- Search, inventory & order data
- Advanced processing
- Basic analysis options
- Output charts, images, & tables

### Land Product Characterization System



SNPP & JPSS VIIRS

GOES-R ABI

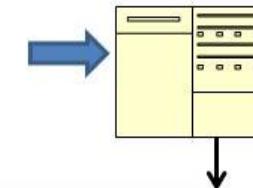
Landsat-7 & -8

MODIS

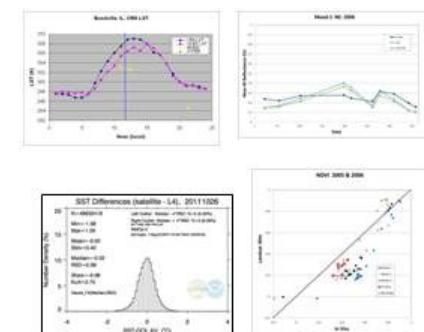
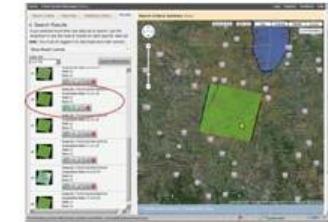
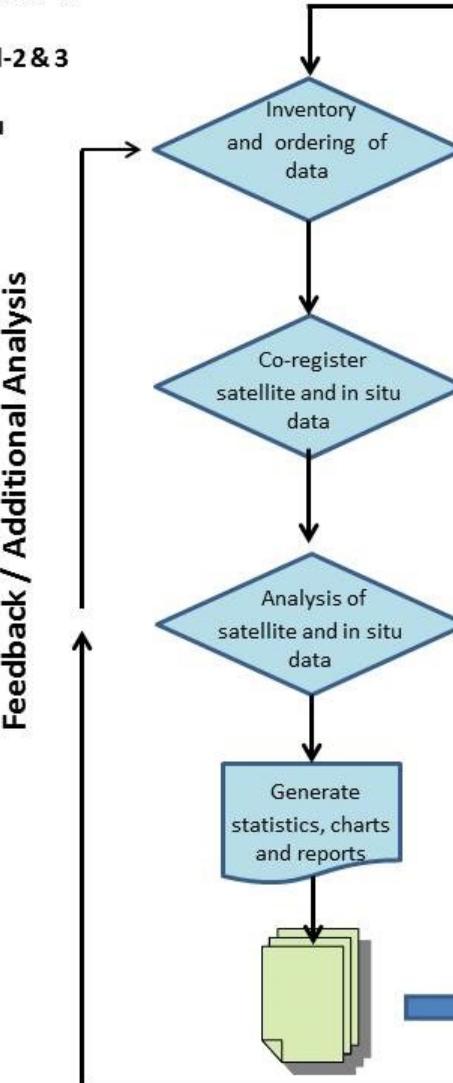
Sentinel-2 & 3  
others..

& In Situ

On demand data acquisition  
Automated data acquisitions



Data and Inventory information stored at EROS.



Review by cal/val teams.  
Product algorithm updates.

# Search, Inventory and Ordering

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

The screenshot shows the LPCS interface. On the left, there is a sidebar titled "1. Enter Search Criteria" with several input fields and buttons:

- "Address/Place" input field with "Show" and "Clear" buttons.
- "Coordinates" section with "Degree/Minute/Second" and "Decimal" radio buttons, and a list of four coordinate pairs:
  - Lat: 50° 30' 48" N, Lon: 121° 48' 59" W
  - Lat: 46° 40' 46" N, Lon: 111° 47' 48" W
  - Lat: 41° 30' 30" N, Lon: 117° 25' 18" W
  - Lat: 44° 20' 22" N, Lon: 124° 37' 44" W
- "Use Map" button.
- "Date Range" and "Result Options" sections.

On the right, there is a map of North America with a yellow polygon drawn around a specific area. Three red markers are placed at the vertices of this polygon, labeled 1, 2, and 3. The map also shows state/province boundaries and major rivers. A legend in the top right corner of the map area indicates "Map" and "Satellite" view options, and shows coordinates "(73° 43' 35" N, 135° 42' 11" W)" along with "Options" and "Overlays" buttons.

# Search, Inventory and Ordering

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

The screenshot shows the LPCS interface with a blue arrow pointing from the 'Cal/Val Sites' button on the search criteria form to the 'Add CalVal Site' dialog box. The dialog box is titled 'Add CalVal Site' and has a dropdown menu for 'Type' with the following options:

- Select One (highlighted)
- AERONET
- NEON Relocatable Terrestrial
- NEON Core Terrestrial
- USCRN
- SURFRAD
- EOS Land Validation Core Sites

The background map shows a satellite view of the Northern Hemisphere, with coordinates (71° 31' 29" N, 139° 34' 13" W) highlighted. The top right corner of the map area shows 'Page Expires in 1:59:30 C'.

# Search, Inventory and Ordering

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

The screenshot shows the LPCS interface with a search criteria summary overlay. A blue arrow points from the 'Cal/Val Sites' button in the search criteria panel to the 'Add Cal/Val Site' modal dialog.

**Search Criteria Summary (Show)**

**Add Cal/Val Site**

Type
EOS Land Validation Core Sites

**Cal/Val Site**

- cs\_konza
- cs\_fundulea
- cs\_maun
- cs\_albemarle
- cs\_ticino
- cs\_jornada
- cs\_konza**
- cs\_krasnoya
- cs\_mandalgo
- cs\_maricopa
- cs\_mongu
- cs\_sanpedro
- cs\_sevillet
- cs\_skukuza
- cs\_tapajos
- cs\_uardry
- cs\_vcr
- cs\_gourma
- cs\_aekluba
- cs\_turco
- cs\_whitecourt

# Search, Inventory and Ordering

**NEW:** Can search by location of several in situ networks (e.g., Konza Prairie, KS) .

LPCS  science for a changing world  
Land Product Characterization System

Land Product Characterization System (LPCS)

Home 1 New System Message

Login Register RSS Feedback Help

Page Expires In 1:52:42 C

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

Coordinates Predefined Area Cal/Val Sites Shapefile KML

Degree/Minute/Second Decimal

1. Lat: 39° 04' 48" N, Lon: 096° 33' 36" W  

Use Map Add Coordinate Clear Coordinates

Date Range Result Options

Search from: mm/dd/yyyy to: mm/dd/yyyy

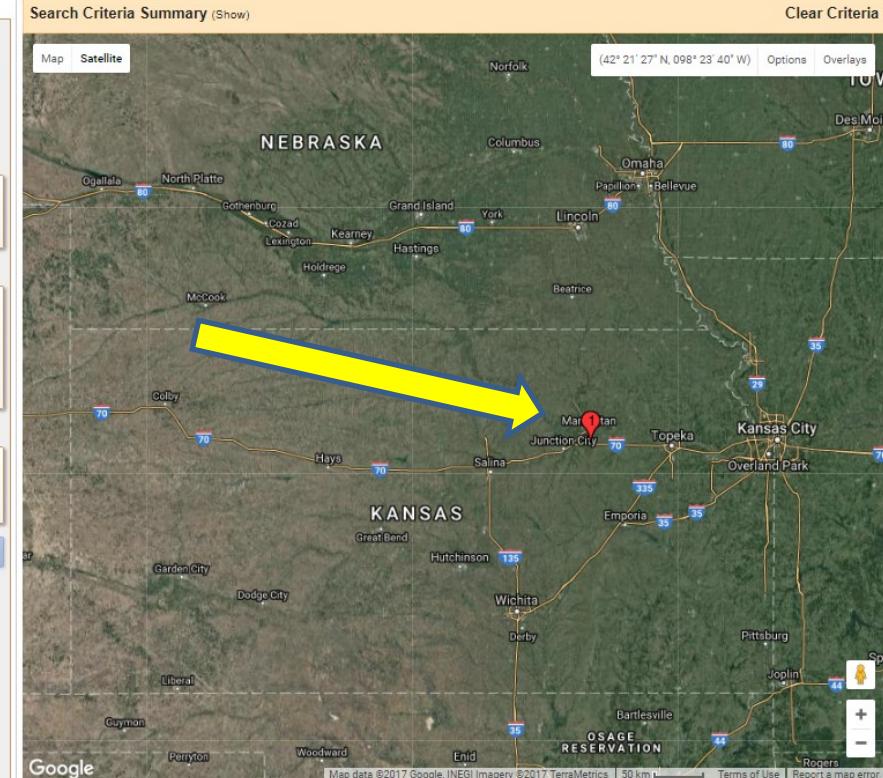
Search months: (all)

Data Sets » Additional Criteria » Results »

Search Criteria Summary (Show) Clear Criteria

Map Satellite

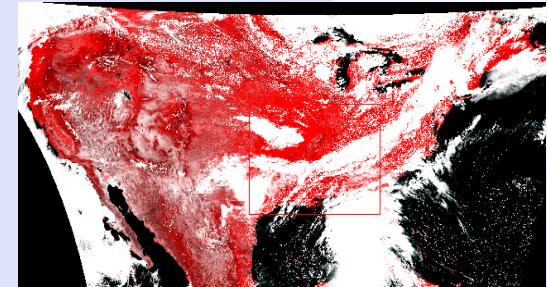
(42° 21' 27" N, 098° 23' 40" W) Options Overlays



The up-to-date Google map is not for purchase or for download; it is to be used as a guide for reference and search purposes only.

# Search, Inventory and Ordering

Search for Landsat 8 data for comparison with GOES-16 ABI data for severe hail event in S. Dakota (June 2017).



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



LPCS USGS Land Product Characterization System

Land Product Characterization System (LPCS)

Home 1 New System Message Save Criteria Load Favorite Manage Criteria Item Basket (0) kgallo@usgs.gov RSS Feedback Help Page Expires In 1:58:18 C

Search Criteria Summary (Show) Clear Criteria

Map Satellite (41° 19' 05" N, 096° 04' 35" W) Options Overlays

Address/Place Path/Row Feature Circle Show Clear

Coordinates Predefined Area Cal/Val Sites Shapefile KML

Degree/Minute/Second Decimal

1. Lat: 44° 46' 53" N, Lon: 097° 06' 20" W  X  
2. Lat: 44° 34' 00" N, Lon: 096° 22' 30" W  X  
3. Lat: 44° 23' 39" N, Lon: 096° 27' 27" W  X  
4. Lat: 44° 36' 35" N, Lon: 097° 08' 28" W  X

Use Map Add Coordinate Clear Coordinates

Date Range Result Options

Search from: 06/19/2017 to: 07/01/2017

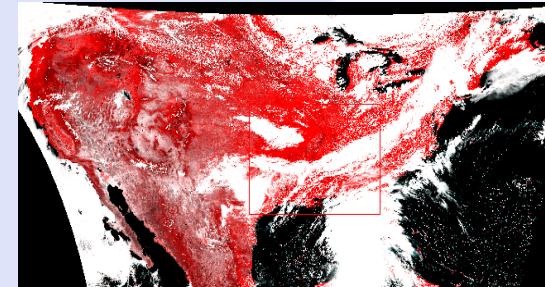
Search months: (all)

Data Sets » Additional Criteria » Results »

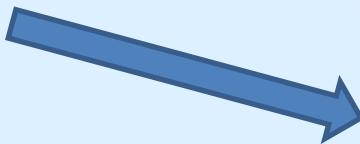
Map data ©2017 Google. Imagery ©2017 TerraMetrics. 50 km. Terms of Use Report a map error

# Search, Inventory and Ordering

Search for Landsat 8 data for comparison with GOES-16 ABI data for severe hail event in S. Dakota (June 2017).



*Selected  
Landsat 8  
data (other  
data options  
available and  
planned)*



LPCs USGS Land Product Characterization System

Land Product Characterization System (LPCS)

Home 1 New System Message Save Criteria Load Favorite Manage Criteria Item Basket (0) kgallo@usgs.gov Feedback Help Page Expires In 1:58:18 C

2. Select Your Data Set(s)  
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.

Use Data Set Prefilter ([What's This?](#))

Data Set Search:

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

Search Criteria Summary (Show)

Map Satellite (41° 19' 05" N, 096° 04' 35" W) Options Overlays Clear Criteria

Map showing the location of the severe hail event in South Dakota. The map includes state boundaries, major cities, and roads. A yellow box highlights a specific area around Watertown, South Dakota, with three numbered points (1, 2, 3) indicating the location of the highlighted area in the satellite image above. The map also shows parts of Minnesota, Nebraska, and Iowa.

# Search, Inventory and Ordering

## 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

*Included data sets not arbitrary.*

LPCS User Requirements Database					Spatial Coverage	Spatial Scale	Temporal Coverage	Temporal Scale	Validation Sites List
Organization	Mission	Instrument	Variable	Product Name					
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 (PM 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	FOS	MODIS	SR	MYD09A1 Surface Reflectance 8-Day L3 Global 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	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					
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					

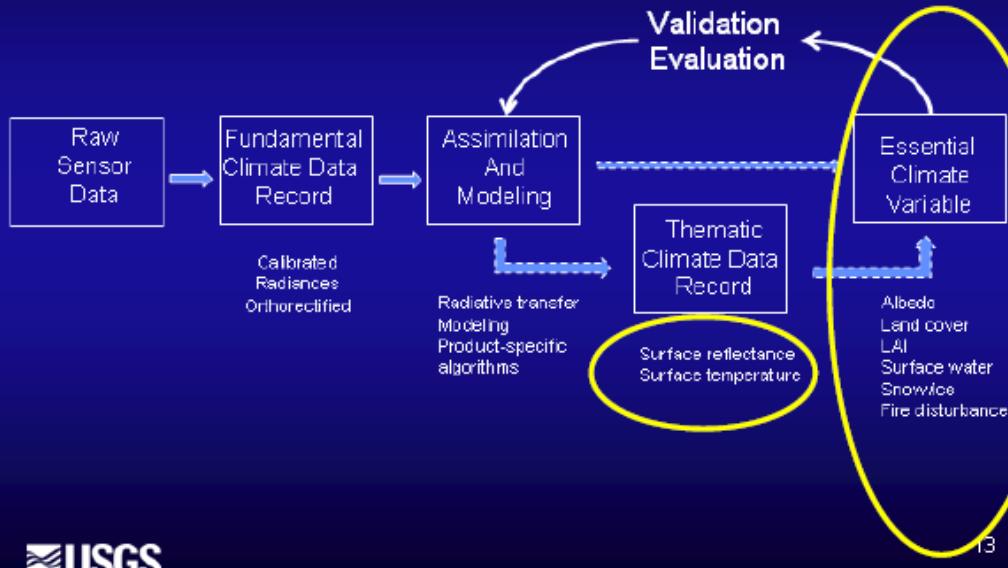
# Search, Inventory and Ordering

## USGS-NOAA validation synergy

### USGS Requirements

- Landsat ECVs

### Processing Data into Information



# USGS-NOAA validation synergy

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

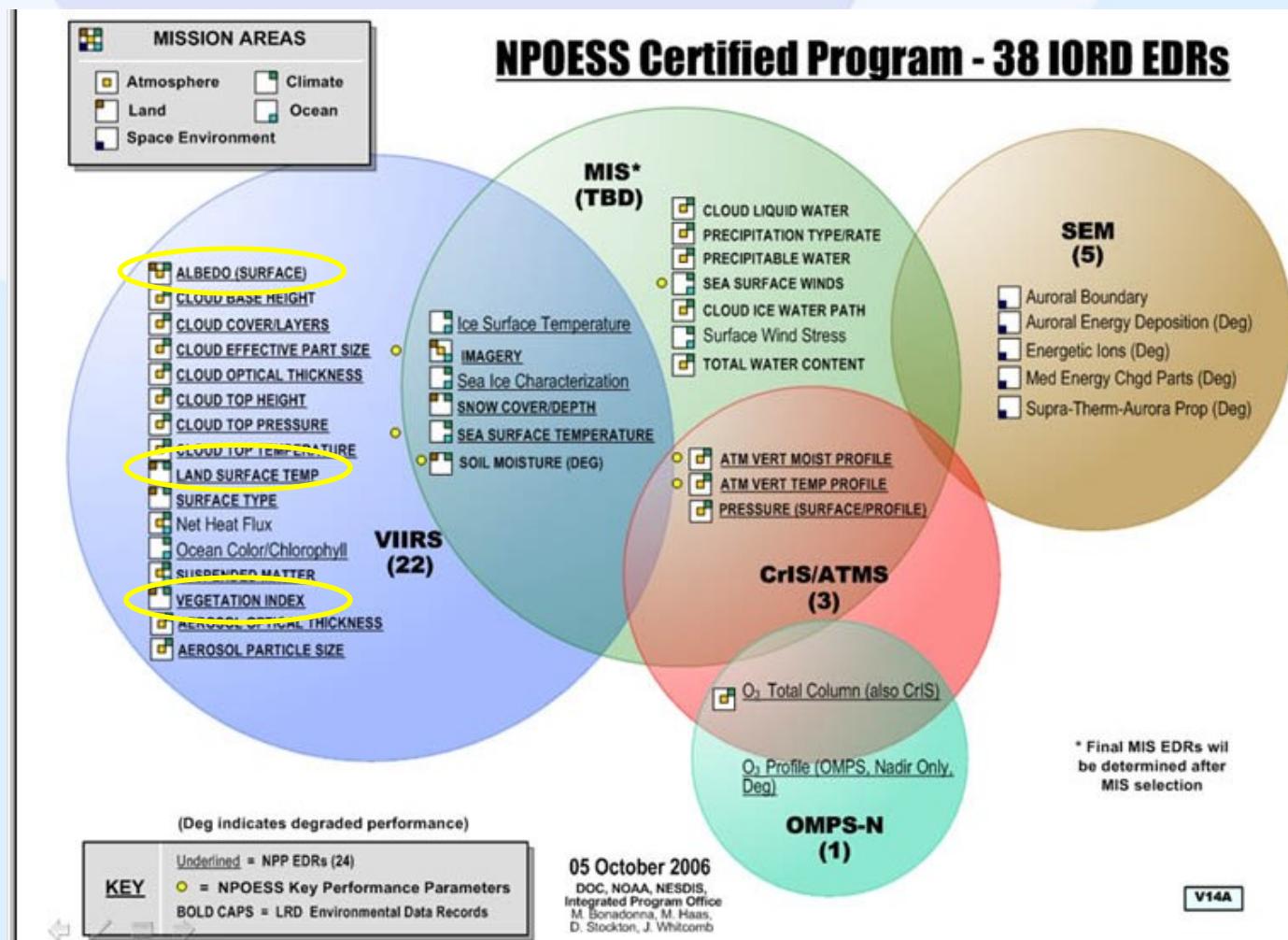
KEY		
ABI	SUFI	EXIS
GLM	SEISS	MAG

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

BASELINE PRODUCTS	OPTION 2 PRODUCTS
Aerosol Detection (Including Smoke and Dust)	Aerosol Particulate Size
Aerosol Optical Depth (AOD)	Aircraft Icing Threat
Volcanic Ash: Detection and Height	Cloud Ice Water Path
Cloud and Moisture Imagery	Cloud Layers/Heights
Cloud Optical Depth	Cloud Liquid Water
Cloud Particle Size Distribution	Cloud Type
Cloud Top Phase	Convective Initiation
Cloud Top Height	Enhanced "V" / Overshooting Top Detection
Cloud Top Pressure	Low Cloud and Fog
Cloud Top Temperature	Tropopause Folding Turbulence Prediction
Hurricane Intensity	Visibility
Lightning Detection: Events, Groups & Flashes	Probability of Rainfall
Rainfall Rate / QPE	Rainfall Potential
Legacy Vertical Moisture Profile	Absorbed Shortwave Radiation: Surface
Legacy Vertical Temperature Profile	Downward Longwave Radiation: Surface
Derived Stability Indices	Upward Longwave Radiation: Surface
Total Precipitable Water	Upward Longwave Radiation: TOA
Clear Sky Masks	Ozone Total
Radiances	SO <sub>2</sub> Detection
Downward Shortwave Radiation: Surface	Flood/Standing Water
Reflected Shortwave Radiation: TOA	Ice Cover
Derived Motion Winds	Snow Depth (Over Plains)
Fire/Hot Spot Characterization	Surface Albedo
Land Surface Temperature (Skin)	Surface Emissivity
Snow Cover	Vegetation Fraction: Green
Sea Surface Temperature (Skin)	Vegetation Index
Energetic Heavy Ions	Currents
Mag. Electrons & Protons: Low Energy	Currents: Offshore
Mag. Electrons & Protons: Med & High Energy	Sea and Lake Ice: Age
Solar & Galactic Protons	Sea and Lake Ice: Concentration
Geomagnetic Field	Sea and Lake Ice: Motion
Solar Flux: EUV	
Solar Flux: X-Ray	
Solar Imagery: X-Ray	

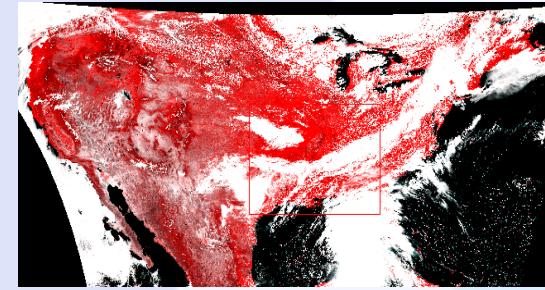
# USGS-NOAA validation synergy

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



# Search, Inventory and Ordering

Search for Landsat 8 data for comparison with GOES-16 ABI data for severe hail event in S. Dakota (June 2017).



Once inventory of images provided, users can view browse images and...

LPCs USGS Land Product Characterization System

Land Product Characterization System (LPCS)

Home 1 New System Message Save Criteria Load Favorite Manage Criteria Item Basket (1) kgallo@usgs.gov RSS Feedback Help Page Expires In 1:58:10 C

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.

Show Result Controls

Data Set

L8 OLI/TIRS C1 Higher-Level

To order Surface Reflectance products, click the Order Scene icon for the desired scenes. Go to the Item Basket (top toolbar) or View Item Basket (below result list) to review order. Select Proceed to Checkout then Submit Order to initiate the processing for Surface Reflectance products. For more information on these data products, see <https://landsat.usgs.gov/landsat-surface-reflectance-high-level-data-products>.

Displaying 1 - 2 of 2

ID:LC08\_L1TP\_030029\_20170628\_20170714\_01\_T1  
Acquisition Date:28-JUN-17  
Path:30  
Row:29

ID:LC08\_L1TP\_029029\_20170621\_20170630\_01\_T1  
Acquisition Date:21-JUN-17  
Path:29  
Row:29

« First < Previous 1 Next > Last »

View Item Basket »

Search Criteria Summary (Show)

DAKOTA

Map Satellite (47° 07' 17" N, 100° 24' 57" W) Options Overlays

MINNESOTA

STANDING ROCK RESERVATION

CHEYENNE RIVER RESERVATION

SOUTH DAKOTA

ROSEBUD OFF-RESERVATION TRUST LAND

ROSEBUD INDIAN RESERVATION

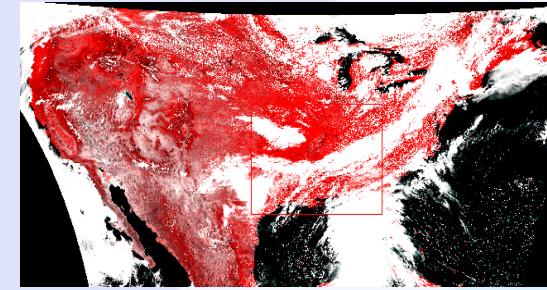
YANKTON RESERVATION

Google

Map data ©2017 Google Imagery ©2017 TerraMetrics | 50 km Terms of Use Report a map error

# Search, Inventory and Ordering

Search for Landsat 8 data for comparison with GOES-16 ABI data for severe hail event in S. Dakota (June 2017).



.... select  
scenes for  
further  
processing.

LPC\$ USGS Land Product Characterization System

Land Product Characterization System (LPCS)

Home 1 New System Message Save Criteria Load Favorite Manage Criteria Item Basket (1) kglo@usgs.gov RSS Feedback Help Page Expires In 1:58:10 C

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Displaying 1 - 2 of 2

ID:LC08\_L1TP\_030029\_20170628\_20170714\_01\_T1 Acquisition Date:28-JUN-17 Path:30 Row:29

1

ID:LC08\_L1TP\_029029\_20170621\_20170630\_01\_T1 Acquisition Date:21-JUN-17 Path:29 Row:29

2

« First < Previous 1 Next > Last »

View Item Basket »

Search Criteria Summary (Show)

DAKOTA WHITE RIVER RESERVE (47° 07' 17" N, 100° 24' 57" W) Options Overlays

Map Satellite

Map showing the location of the severe hail event in South Dakota. A yellow rectangle highlights the area shown in the satellite image above. The map includes state and county boundaries, roads, and various tribal reservations: Standing Rock Reservation, Cheyenne River Reservation, Rosebud Indian Reservation, Yankton Reservation, Lakota Traverse Reservation, and Rosebud Off-Reservation Trust Land. Major cities like Bismarck, Sioux City, and Minneapolis are also labeled.

# Search, Inventory and Ordering

**2017 Highlight.... seamless handoff of data from inventory/ordering to processing system.**

The screenshot shows the LPCS interface with the following details:

- Header:** LPCS USGS Land Product Characterization System
- User Options:** USGS Home, Contact USGS, Search USGS
- Basket Summary:** Item Basket (2) kgallo@usgs.gov, RSS, Feedback, Help
- Note:** Please Note: This page will expire at 12:47:28 PM CDT. Once expired, you will be logged out and your order may be lost.
- Order Details:** Order, Clear All
- Item 1:** LC08\_L1TP\_030029\_20170628\_20170714\_01\_T1
  - ID: LC08\_L1TP\_030029\_20170628\_20170714\_01\_T1
  - Acquisition Date: 28-JUN-17
  - Path: 30
  - Row: 29
  - Product: L8 OLI/TIRS COLLECTIONS LAND SURFACE REFLECTANCE ON-DEMAND
  - Options: None
  - Output Media: DWNLD
- Item 2:** LC08\_L1TP\_029029\_20170621\_20170630\_01\_T1
  - ID: LC08\_L1TP\_029029\_20170621\_20170630\_01\_T1
  - Acquisition Date: 21-JUN-17
  - Path: 29
  - Row: 29
  - Product: L8 OLI/TIRS COLLECTIONS LAND SURFACE REFLECTANCE ON-DEMAND
  - Options: None
  - Output Media: DWNLD
- Bottom Buttons:** Clear Item Basket, Select Processing Options (circled with a blue oval)

# Custom Processing

## Higher Level Products

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

**Climate Data Records**

Surface Reflectance

**Other Landsat Level-2 Products**

Top of Atmosphere Reflectance  
 Brightness Temperature  
 Pixel QA  
 Spectral Indices

**Customize Outputs**

**Customization Options**

Output Format       GeoTiff       ENVI       HDF-EOS2       NetCDF  
 Reproject Products  
 Modify Image Extents  
 Pixel Resizing

**Intercomparison & Statistics**

Plot Output Product Statistics

# Custom Processing

## Define Output Products *Product Customization*

1. Several Output formats
2. Auto-registration of data to map projections
3. User defined area of interest
4. Defined pixel size for all images (30 – 5000 m)
5. Several resampling options

### Customize Outputs

**Customization Options**

- 1 Output Format  GeoTiff  ENVI  HDF-EOS2  NetCDF
- 2 Reproject Products

Projection: Albers Equal Area

Albers Equal Area

-90.0 to 90.0 Universal Transverse Mercator

-180.0 to 180.0 Geographic

-90.0 to 90.0 Sinusoidal

-180.0 to 180.0 Polar Stereographic

-90.0 to 90.0 1st Standard Parallel

-90.0 to 90.0 2nd Standard Parallel

any float (e.g. 0.0) False Easting

any float (e.g. 0.0) False Northing

WGS 84 Datum

- 3 Modify Image Extents

Decimal Degrees  Meters

-180.0 to 180.0 Upper left X coordinate

-90.0 to 90.0 Upper left Y coordinate

-180.0 to 180.0 Lower right X coordinate

-90.0 to 90.0 Lower right Y coordinate

- 4 Pixel Resizing

30.0 to 5000.0 Meters

- 5 Resample Method: Nearest Neighbor

Nearest Neighbor

Bilinear Interpolation

Cubic Convolution

**Intercomparison & Statistics**

Plot Output Product Statistics

# Custom Processing

## Basic Analysis Tools

### 1. Product charts and tables

#### Customize Outputs

**Customization Options**

Output Format  GeoTiff  ENVI  HDF-EOS2  NetCDF

Reproject Products

Projection: Albers Equal Area  
Albers Equal Area  
-90.0 to 90.0 Universal Transverse Mercator  
-180.0 to 180.0 Geographic  
-180.0 to 180.0 Sinusoidal  
-90.0 to 90.0 Polar Stereographic  
-90.0 to 90.0 1st Standard Parallel  
-90.0 to 90.0 2nd Standard Parallel  
any float (e.g. 0.0) False Easting  
any float (e.g. 0.0) False Northing  
WGS 84 Datum

Modify Image Extents

Decimal Degrees  Meters  
-180.0 to 180.0 Upper left X coordinate  
-90.0 to 90.0 Upper left Y coordinate  
-180.0 to 180.0 Lower right X coordinate  
-90.0 to 90.0 Lower right Y coordinate

Pixel Resizing

30.0 to 5000.0 Meters

Resample Method: Nearest Neighbor ▾

1

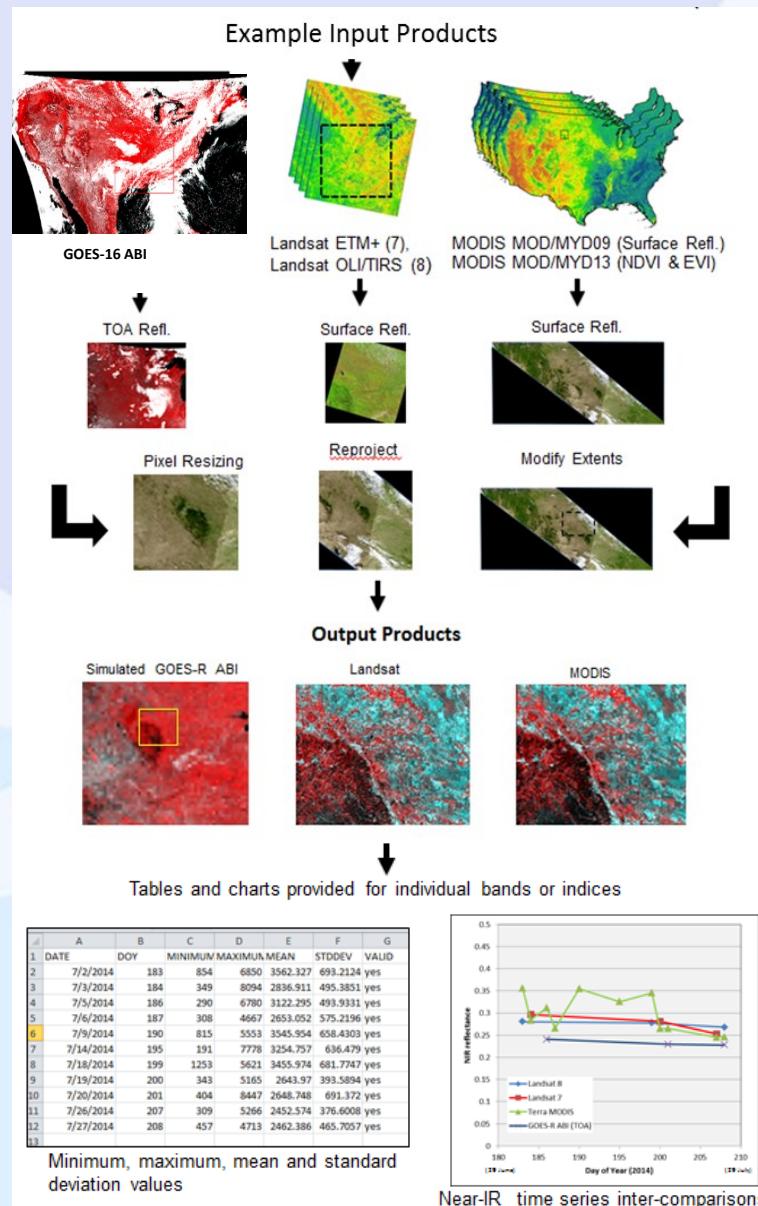
**Intercomparison & Statistics**

Plot Output Product Statistics

# Custom Processing (summary)

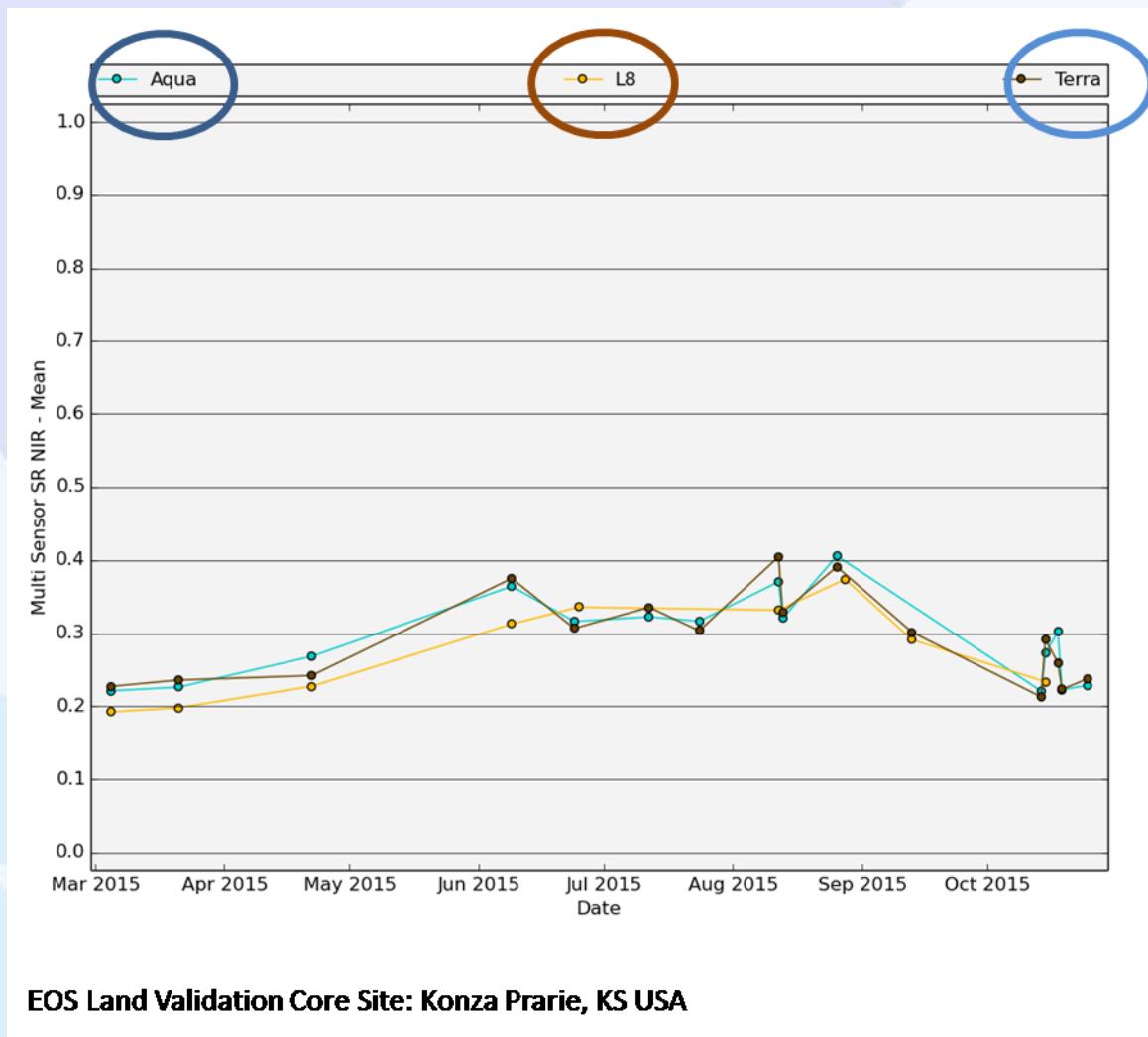
Input products: *resized, remapped*.

Output products: *images, charts, and tables*.



## Analysis Tools

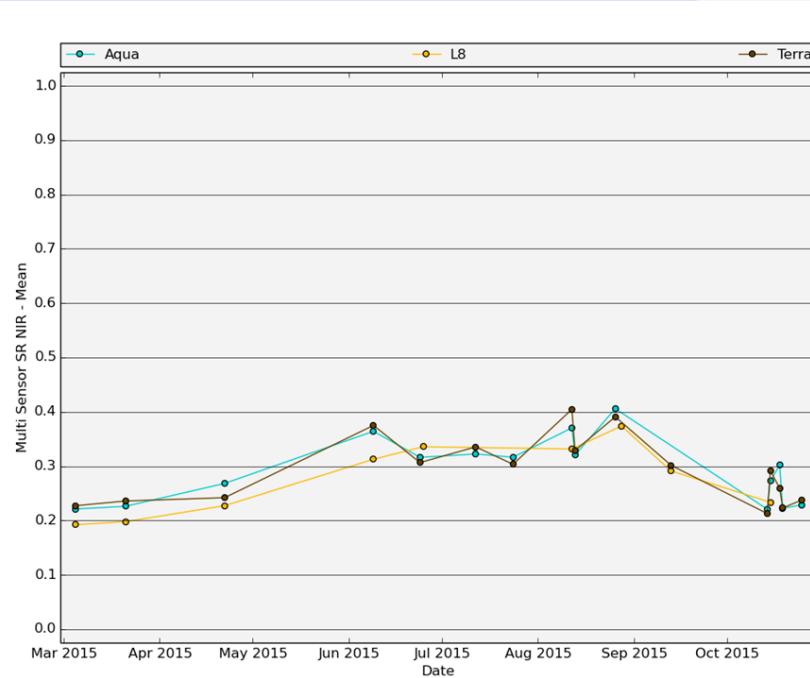
*Output products include several charts, e.g., sensor values vs. time.*



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

## Analysis Tools

Tables provided with additional data for more intensive analyses.

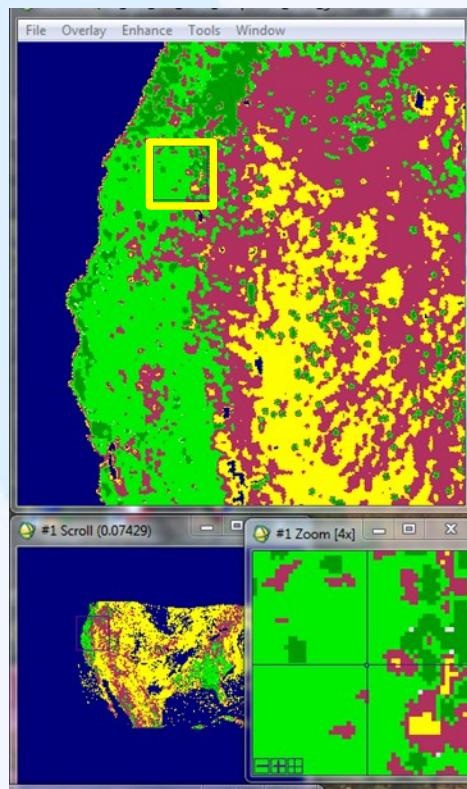


DATE	DOY	MINIMUM	MAXIMUM	MEAN	STDDEV	VALID
3/5/2015	64	197	3348	2211.75	254.2622	yes
3/21/2015	80	86	3435	2260.46	283.6276	yes
4/22/2015	112	101	4456	2682.246	360.7378	yes
6/9/2015	160	516	4847	3641.673	371.7797	yes
6/24/2015	175	1277	4368	3162.141	323.4118	yes
7/12/2015	193	663	4415	3224.323	336.7476	yes
7/24/2015	205	287	5333	3163.501	368.4334	yes
8/12/2015	224	124	6987	3704.659	588.8336	yes
8/13/2015	225	284	5263	3203.423	390.1365	yes
8/26/2015	238	559	6009	4057.752	385.2751	yes
10/14/2015	287	173	3287	2207.415	260.9021	yes
10/15/2015	288	257	4663	2723.466	392.9907	yes
10/18/2015	291	676	4266	3021.147	584.0373	yes
10/19/2015	292	281	3474	2223.977	311.7263	yes
10/25/2015	298	280	3102	2286.152	303.9241	yes

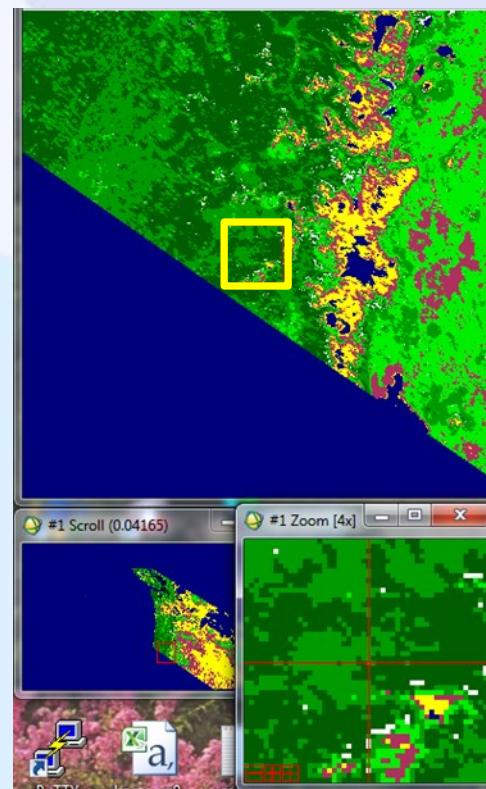
## Analysis Tools

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).

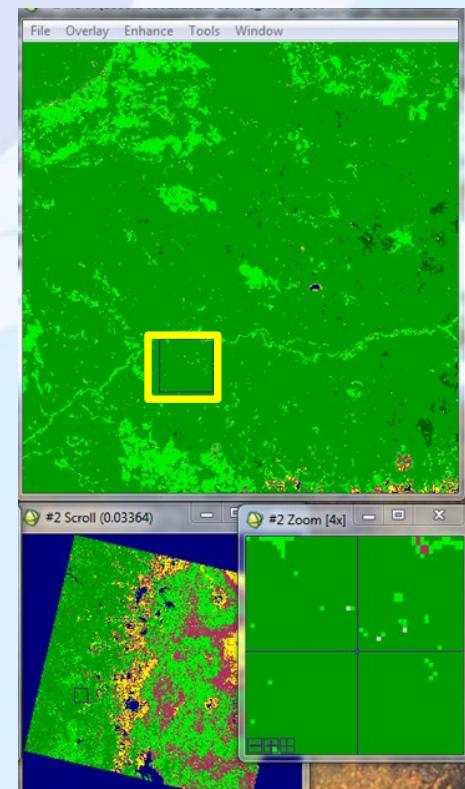
Simulated GOES-R ABI



VIIRS



Landsat 8



# **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

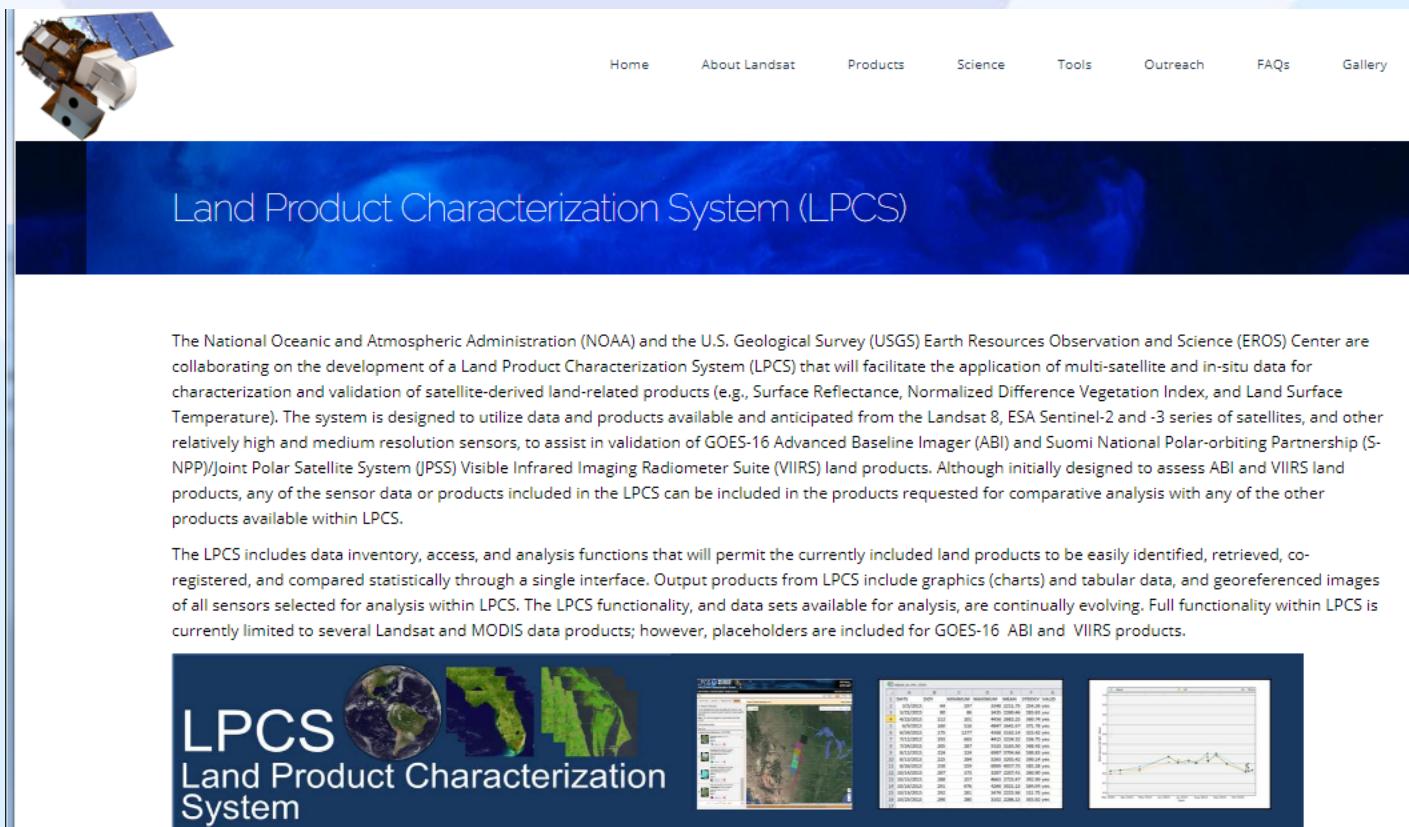
Summary

# LPCS Status and Readiness

<https://landsat.usgs.gov/lpcs>

Public Release: February 2017

Includes a Landing Page and Tutorial



The National Oceanic and Atmospheric Administration (NOAA) and the U.S. Geological Survey (USGS) Earth Resources Observation and Science (EROS) Center are collaborating on the development of a Land Product Characterization System (LPCS) that will facilitate the application of multi-satellite and in-situ data for characterization and validation of satellite-derived land-related products (e.g., Surface Reflectance, Normalized Difference Vegetation Index, and Land Surface Temperature). The system is designed to utilize data and products available and anticipated from the Landsat 8, ESA Sentinel-2 and -3 series of satellites, and other relatively high and medium resolution sensors, to assist in validation of GOES-16 Advanced Baseline Imager (ABI) and Suomi National Polar-orbiting Partnership (S-NPP)/Joint Polar Satellite System (JPSS) Visible Infrared Imaging Radiometer Suite (VIIRS) land products. Although initially designed to assess ABI and VIIRS land products, any of the sensor data or products included in the LPCS can be included in the products requested for comparative analysis with any of the other products available within LPCS.

The LPCS includes data inventory, access, and analysis functions that will permit the currently included land products to be easily identified, retrieved, co-registered, and compared statistically through a single interface. Output products from LPCS include graphics (charts) and tabular data, and georeferenced images of all sensors selected for analysis within LPCS. The LPCS functionality, and data sets available for analysis, are continually evolving. Full functionality within LPCS is currently limited to several Landsat and MODIS data products; however, placeholders are included for GOES-16 ABI and VIIRS products.



The land science community is encouraged to utilize the current LPCS capabilities, and is invited to provide feedback for future enhancements in the development of the LPCS. First-time users are recommended to review the below LPCS Tutorial that provides step-by-step guidance through the data searching criteria, advanced processing options, and output products. The LPCS User Guide provides detailed information related to the system features and functionality.

[Access LPCS](#) - direct access to LPCS.

[LPCS Tutorial](#) - provides step-by-step example of ordering data products through LPCS.

[LPCS User Guide](#) - provides important information about LPCS products and services.

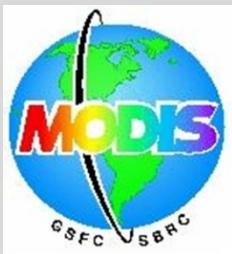
[User Feedback Form](#) - provide input and feedback about searching portals, data products, and services.

[Contact User Services](#) - contact us with questions about LPCS.

## LPCS Status and Readiness

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

### Current



**Landsat 8**



### Under Development



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

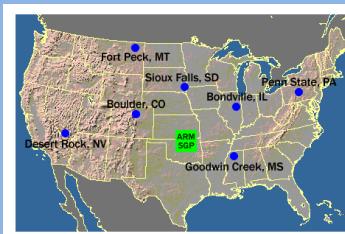


NOAA-NASA Geostationary Operational Environmental Satellites - R Series (GOES-R)

### Future



**Surface Radiation Budget (SURFRAD) Network**

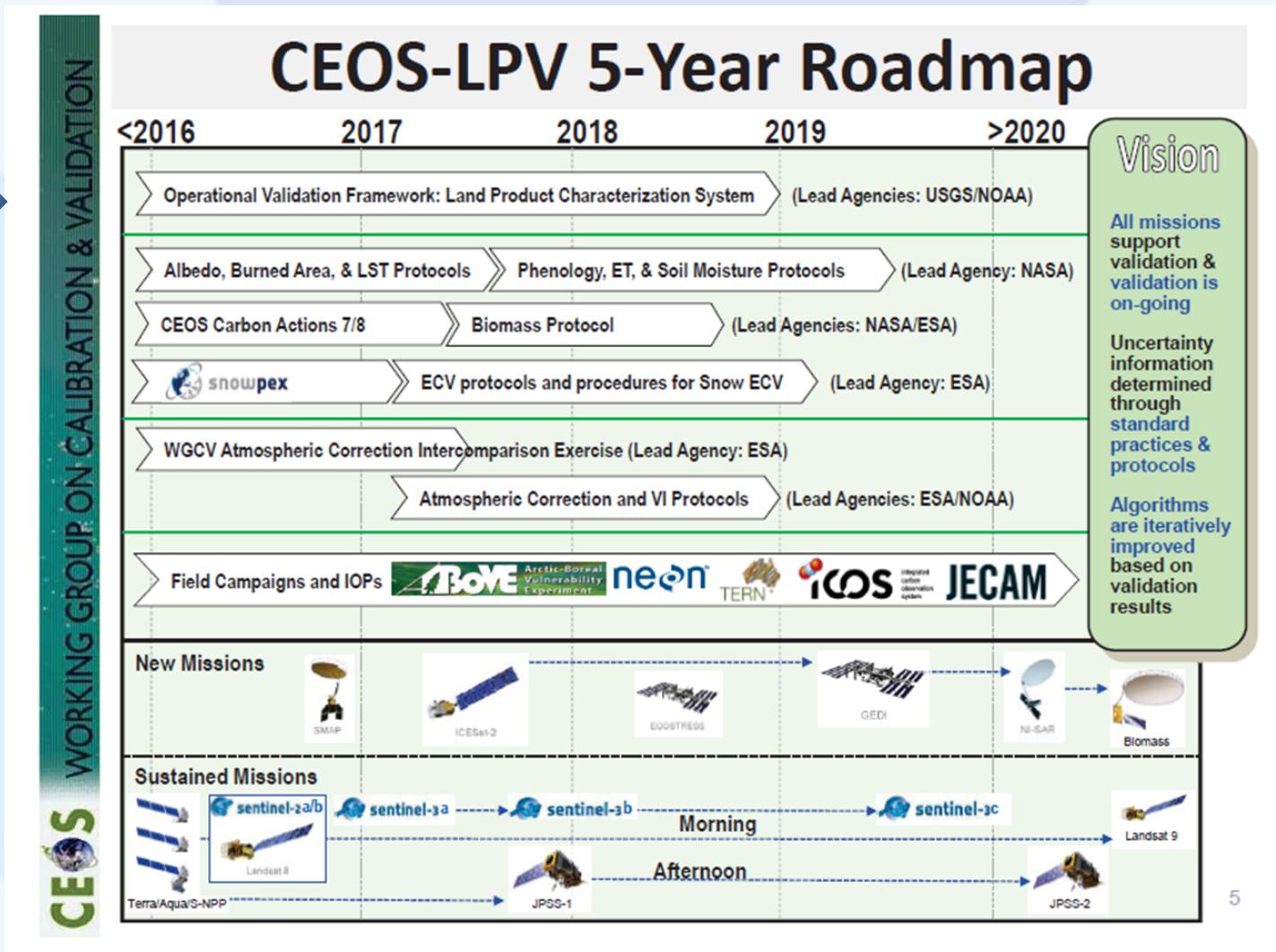


**The EOS Land Validation Core Sites**



# CEOS LPV collaboration

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



# CEOS LPV collaboration

Albedo (MODIS MCD43A3) added to LPCS (limited capabilities) as requested by CEOS-LPV.

The screenshot shows the LP DAAC website interface. At the top, the LP DAAC logo and "LAND PROCESSES DISTRIBUTED ACTIVE ARCHIVE CENTER" are displayed, along with NASA and USGS logos. A navigation bar includes links for Home, About, Dataset Discovery, Citing Our Data, Tools, User Resources, User Services, Site Search, and Login with URS. Below the navigation, a breadcrumb trail shows the path: Home > MODIS > MODIS Products Table > MCD43A3. The main content area features a title "Albedo 16-Day L3 Global 500m" and a sub-section "MCD43A3". A detailed description follows: "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." Below this, a note states: "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." A note also mentions: "Version-5 MODIS BRDF & Albedo products have attained Validation Stage 3." A section titled "Change Points of Interest" lists several bullet points: "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)", and "More: Collection 005 Change Summary for MODIS BRDF/Albedo (MCD43) Algorithms ([PDF](#))". To the right of the text, there is a small image titled "Short Name: MCD43A3" showing a map of Central America with green and purple colors. A descriptive text box below the image states: "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)." At the bottom left, a button says "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's "Tools" section, specifically the "LDOPE Tools" page. The page header includes the LP DAAC logo, NASA logo, and USGS logo. The main content area describes the LDOPE facility and its tools. A sidebar on the right contains sections for "Download" and "Manuals".

**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

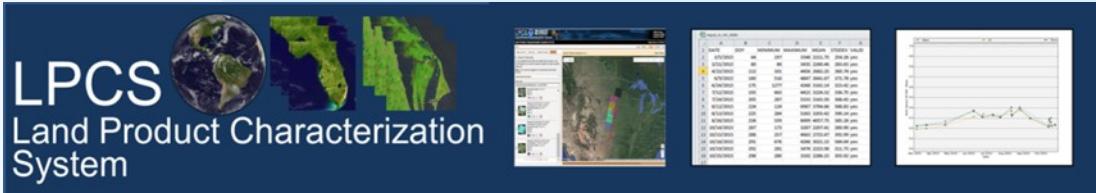
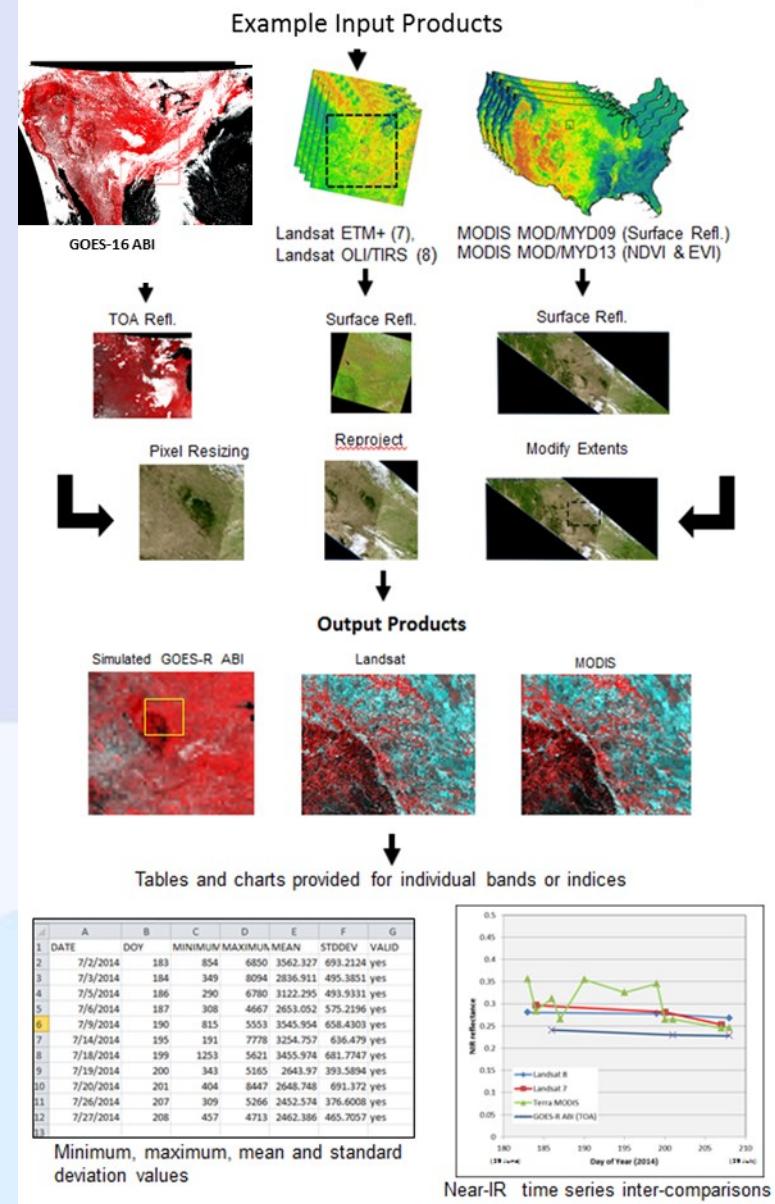
**Manuals**

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

## Summary

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

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



Questions?

