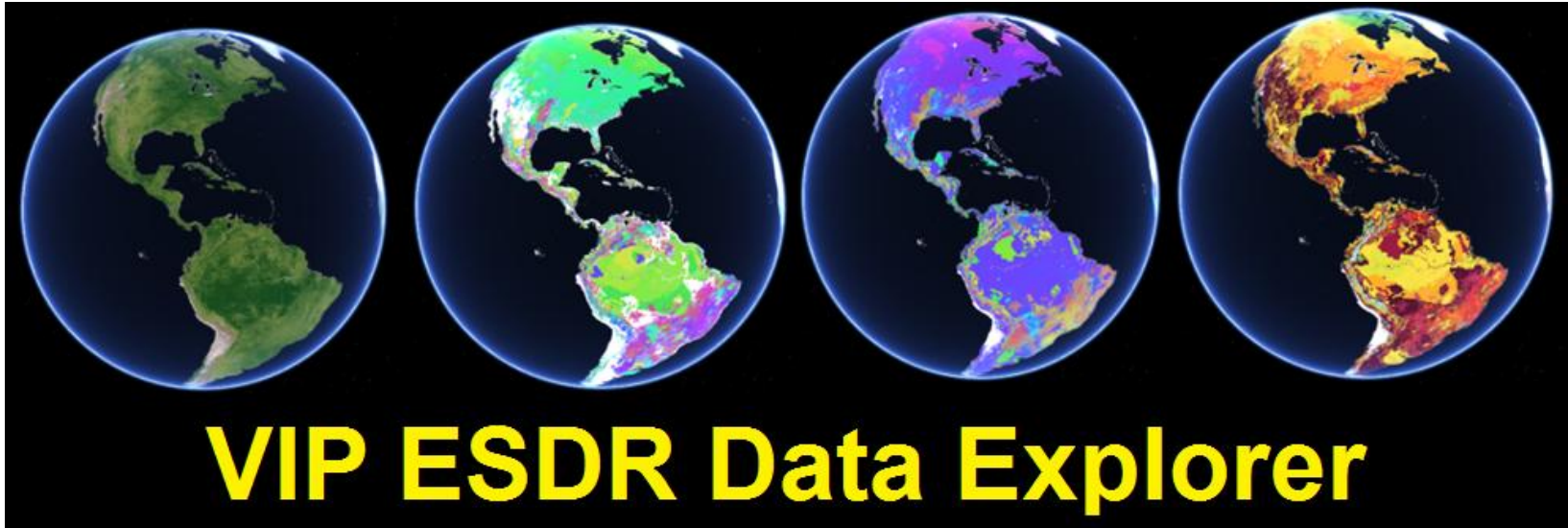


VIP Data Explorer V3

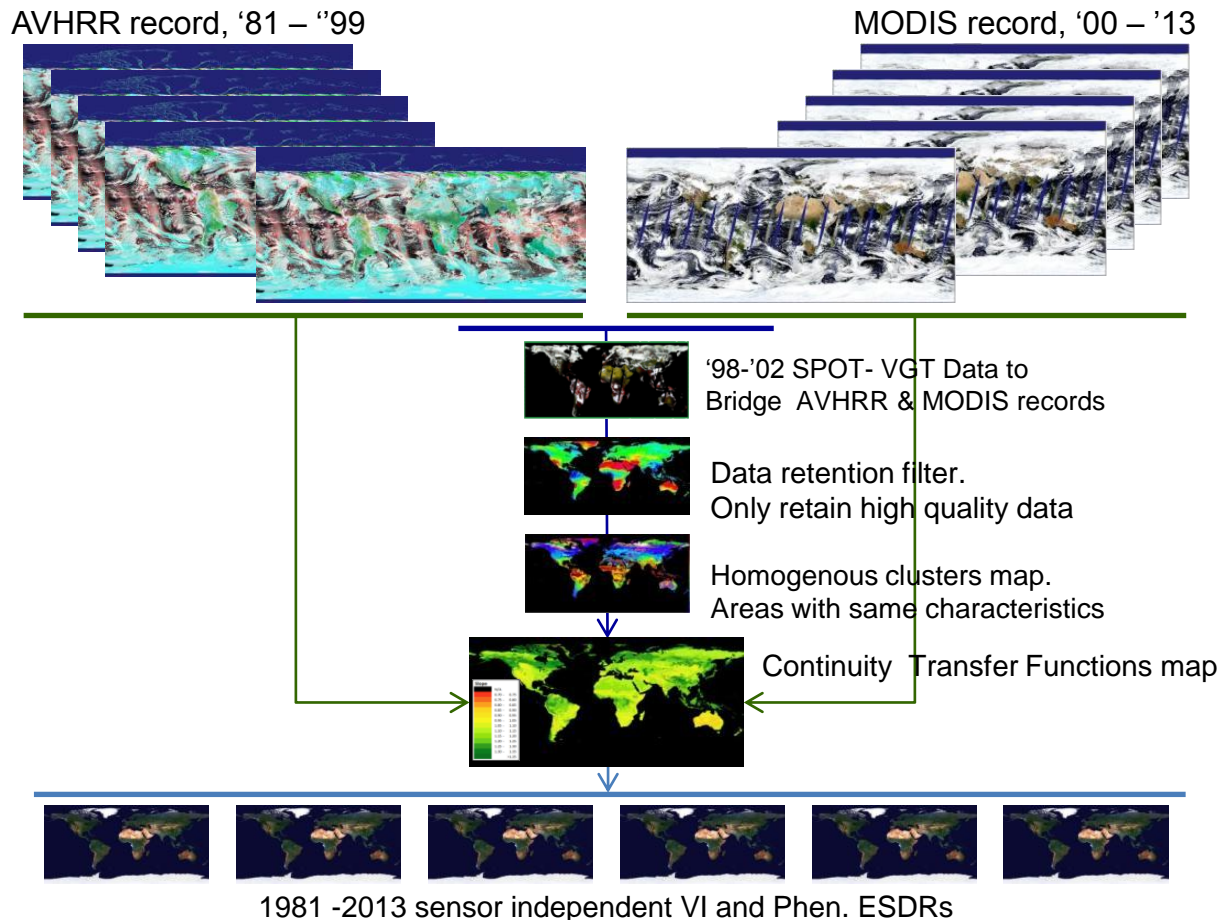


Armando Barreto, Kamel Didan, Mohamed Abd Salam.
The University of Arizona

Jan 24, 2013

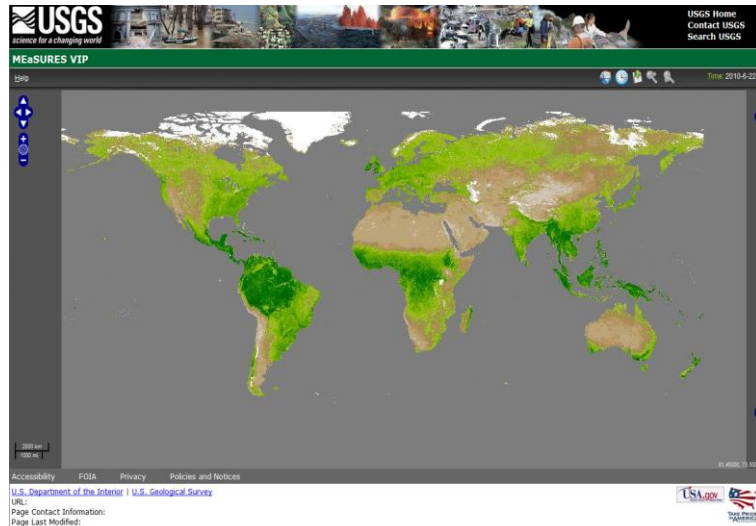


Introduction

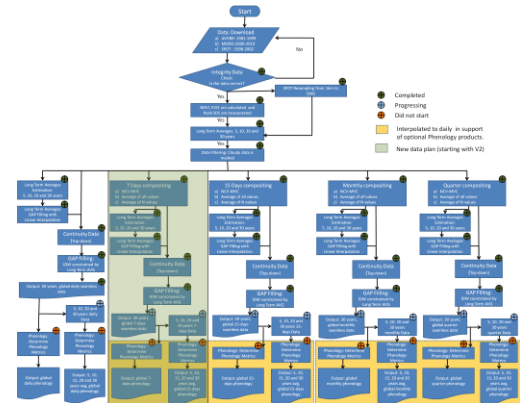


Processing 30 years of daily global surface reflectance data into Earth Science Data Records of Vegetation Index and Land Surface Phenology. Data from AVHRR (N07, N09, N11 and N14) and MODIS (AQUA and TERRA) from the periods 1981-1999 and 2000+ at CMG resolution were processed into a seamless and sensor independent data record using a suite of community science algorithms and methodologies for filtering, across-sensor continuity, and spatial and temporal gap filling.

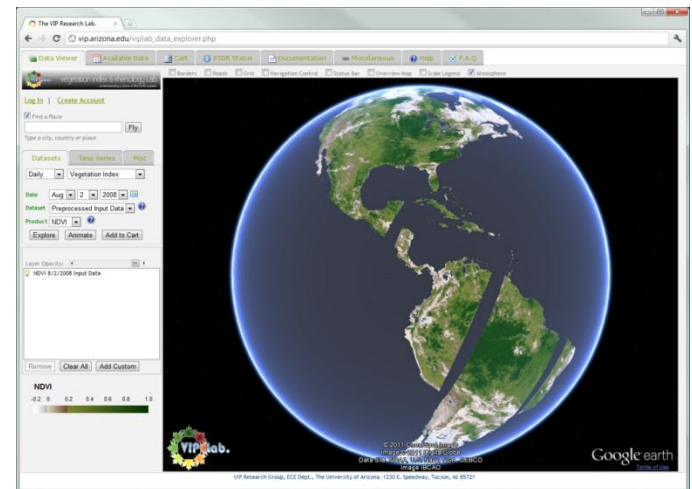
Introduction – Cont.



USGS EOS Team – MEaSUREs VIP Client



VIP Processing Flow Chart



VIP Data Explorer

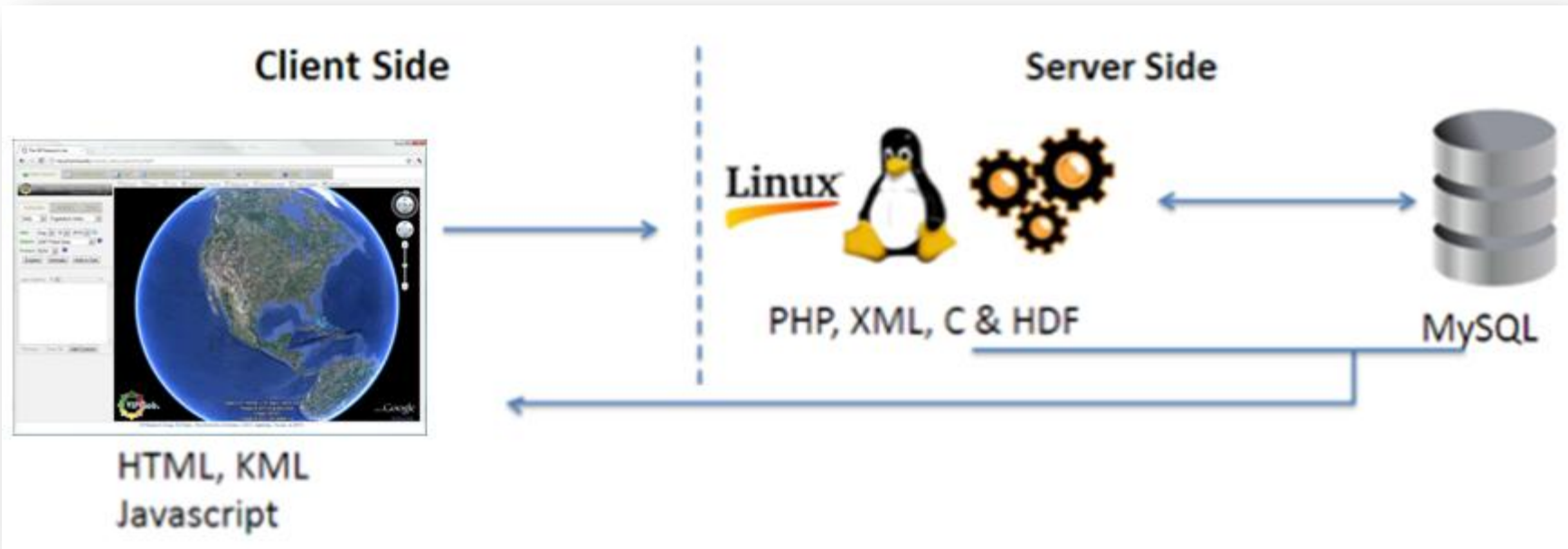
Objective

To provide an easy to use interface for VIP products browsing and data distribution

- Image Viewing
- Data Exploring
- Database search
- Product ordering
- Data download

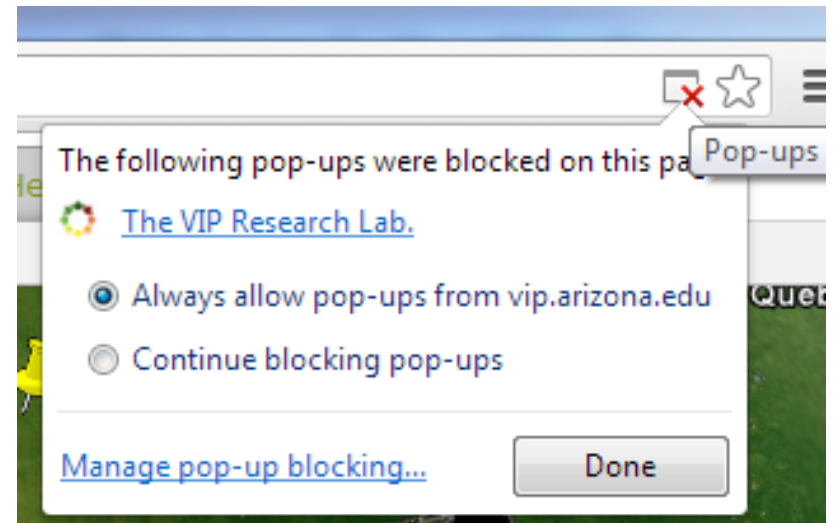
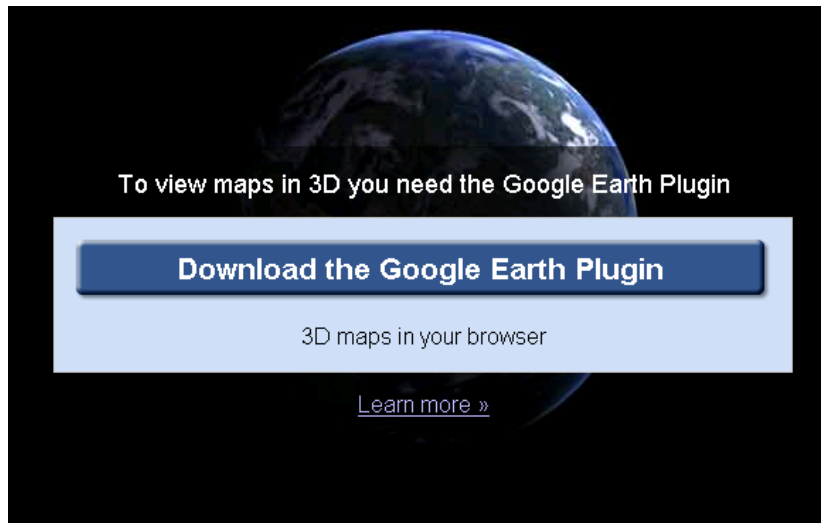
- Documentation
- Status

VIP Data Explorer - Technologies



Quick Tips / Requirements

- Google Earth Plugin Required
- Browsers: Firefox, Chrome, Safari*, IE*
- Allow pop-ups



VIP Data Explorer Interface

The screenshot shows the VIP Data Explorer web application interface. At the top, two boxes labeled "DB and Cart System" and "Status and Documentations" have arrows pointing to the "Available Data" and "ESDR Status" tabs, respectively. The interface includes a navigation menu with tabs for "Data Viewer", "Available Data", "Cart", "ESDR Status", "Documentation", "Miscellaneous", "Help", and "F.A.Q.". Below the menu is a toolbar with options like "Borders", "Roads", "Grid", "Navigation Control", "Status Bar", "Overview Map", "Scale Legend", and "Atmosphere". The main content area features a globe map of North and South America. On the left, there are panels for "Datasets" (with filters for "Daily", "Vegetation Index", "Date", "Dataset", "Product"), "Current Layers" (listing various NDVI and MNR data), and a "Legend or additional info" section with an NDVI color scale from -0.2 to 1.0. On the right, a "GE Standard navigation tools" panel includes a compass, zoom controls, and a "User uploaded data" section. The footer contains the VIP Lab logo, data sources (SIO, NOAA, U.S. Navy, NGA, GEBCO, Image IBCAO, DigitalGlobe, Cnes/Spot Image), and the Google logo. The page title is "The VIP Research Lab." and the URL is "vip.arizona.edu/viplab_data_explorer.php".

DB and Cart System

Status and Documentations

Time series

Additional data

Data Selection

Overlay control

Current Layers

User uploaded data

Legend or additional info

GE Standard navigation tools

The VIP Research Lab. vip.arizona.edu/viplab_data_explorer.php

Data SIO, NOAA, U.S. Navy, NGA, GEBCO
Image IBCAO
Image © 2011 DigitalGlobe
© 2011 Cnes/Spot Image

©2010 Google
Terms of Use

VIP Research Group, ECE Dept., The University of Arizona. 1230 E. Speedway, Tucson, Az 85721

Dataset Options


Find a Place

Tucson, AZ


Type a city, country or place


Datasets **Time Series** **Misc**

ESDR Collection

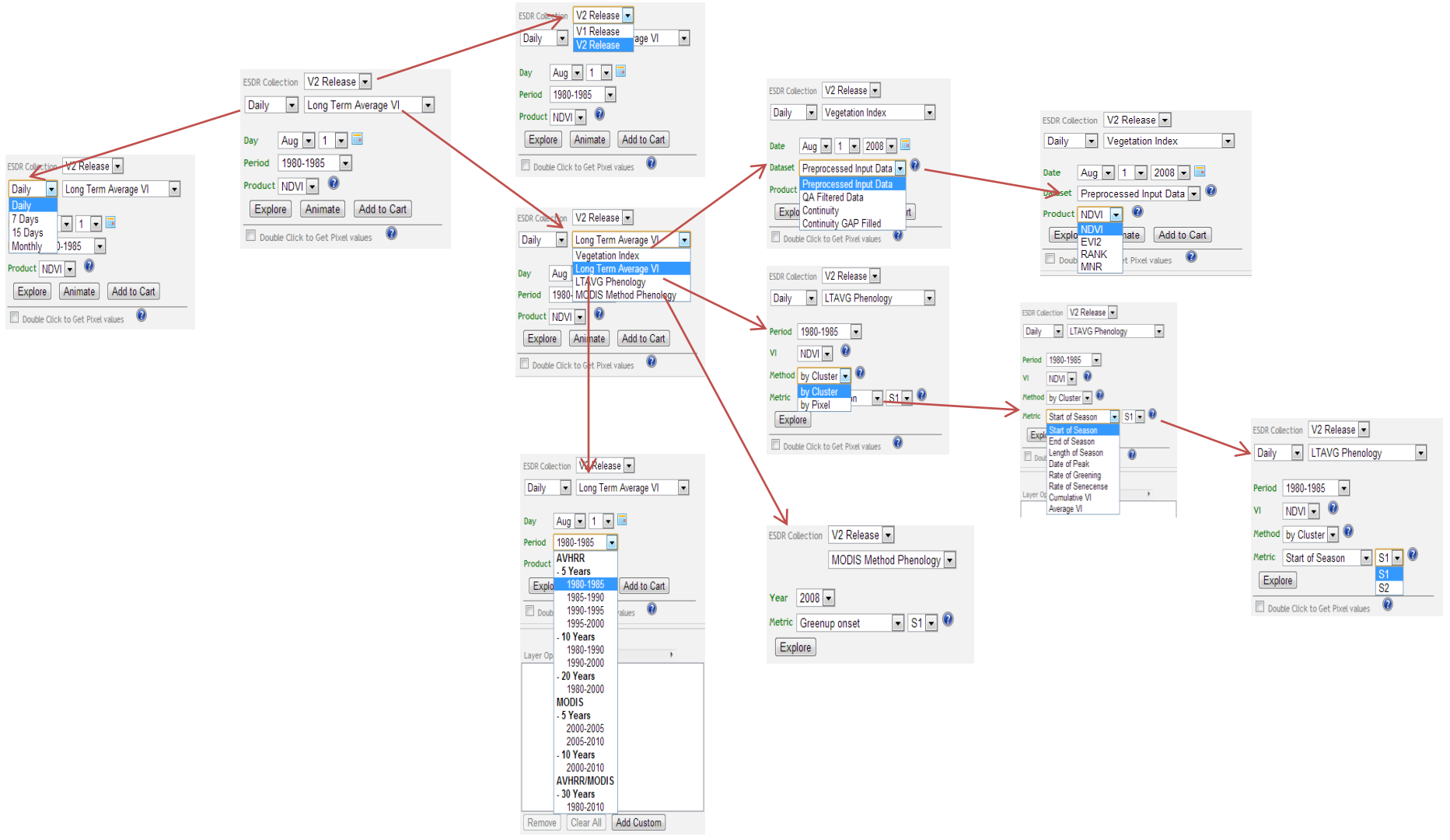
Day 

Period

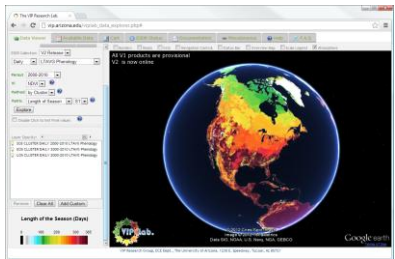
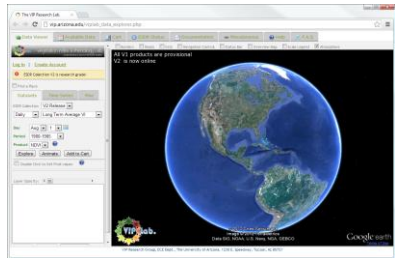
Product 

Double Click to Get Pixel values 

Dataset Options



Data Browsing (images)




Layer Opacity:

- NDVI.v2 8/1 1980-1985 LTAVG
- NDVI.v2 8 1 1980-1985 7DAYS LTAVG**
- NDVI.v2 8/1/2008 7DAYS
- EVI2.v2 8/1/2008 7DAYS
- RANK 8/1/2008 7DAYS
- MNR 8/1/1997 7DAYS
- SOS CLUSTER 7DAYS 1980-1985 LTAVG Phenology

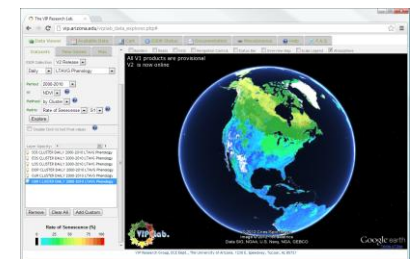
NDVI

-0.2 0 0.2 0.4 0.6 0.8 1.0



Data not available

Data not available because of high sun angle



User Custom Data/Images

The VIP Research Lab. - Google Chrome

vip.arizona.edu/viplab_explorer_customLayer.php?id=custom&z=4

User Custom Layer

Images must be on Geographic Projection and Extent must be specified in decimal degrees.
For KML and KMZ files, extent is not required

Add New Layer

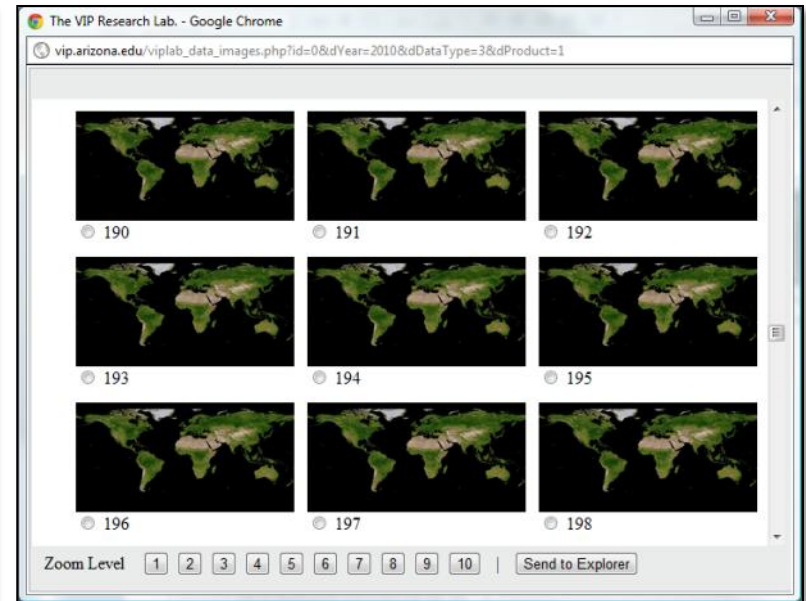
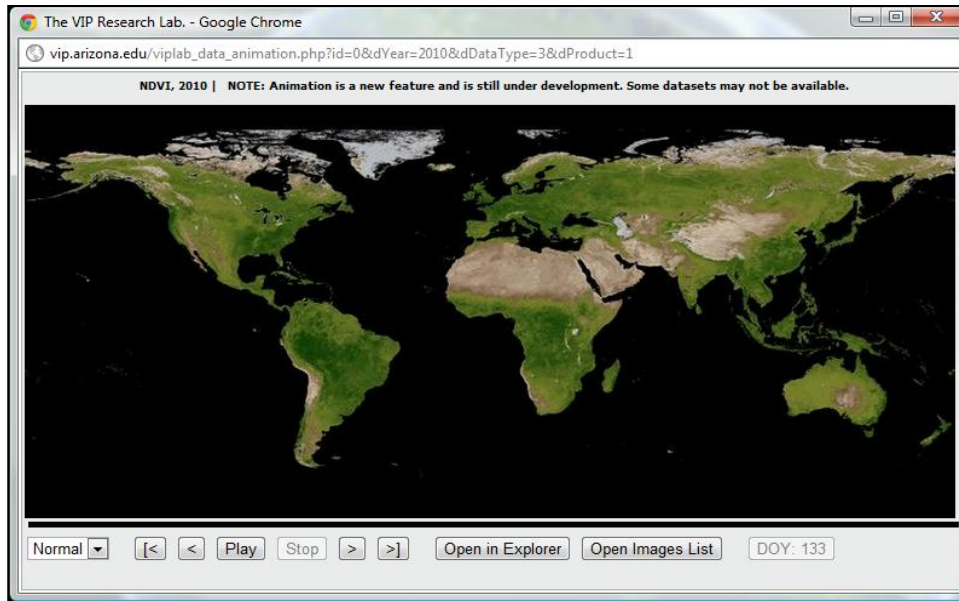
Label:

Extent: North South East West

File: AVHRR_9293_Cluster.jpg (.jpg, .png, .kml, .kmz)

Users have the option of uploading their own images/data to be spatially compared with any of our datasets, permitting fast visual evaluation and contrasting. The current version supports only PNG, JPG images, and KML/KMZ files.

Quick Data Browsing



Online multi-temporal data visualization could be time consuming when using the GE globe, to overcome this weakness we're providing direct access to all the images in our database with annual animation in a non GE environment.

Time Series

The image displays two overlapping browser windows of the VIP Research Lab's data explorer. The top window shows the main interface with a satellite map of the United States. The bottom window is a zoomed-in view of the sidebar controls.

Browser Address Bar: vip.arizona.edu/viplab_data_explorer.php#

Navigation Menu: Data Viewer, Available Data, Cart, ESDR Status, Documentation, Miscellaneous, Help, F.A.Q.

Map Interface: Borders, Roads, Grid, Navigation Control, Status Bar, Overview Map, Scale Legend, Atmosphere.

TimeSeries VI Panel:

- Display existing locations and click the Pushpin to browse the Time Series for that location
- Show Locations Refresh
- TimeSeries 0.5Deg GRID:** Zoom In to show more locations, Display GRID Locations
- On Demand TimeSeries Processing:**
 - Zoom in to the Required Location
 - Click Add New TS Location button below
 - Select the desired locationAdd New TS Location

Layer Opacity: TimeSeries Locations

Legend: Not Ready (red flag), Available (yellow flag)

Map Text: All V1 products are provisional V2 is now online

Map Coordinates: lat=40, lon=-104.0

Footer: VIP lab. © 2012 Cnes/Spot Image, Data SIO, NOAA, U.S. Navy, NGA, GEBCO, Image/U.S. Geological Survey, Google earth, Terms of Use


Address: VIP Research Group, ECE Dept., The University of Arizona, 1230 E. Speedway, Tucson, Az 85721

Time Series – Cont.

Datasets | **Time Series** | Misc

TimeSeries VI

Display existing locations and click the Pushpin to browse the Time Series for that location



TimeSeries 0.5Deg GRID:
Zoom In to show more locations

On Demand TimeSeries Processing:

- 1) Zoom in to the Required Location
- 2) Click Add New TS Location button below
- 3) Select the desired location


TimeSeries VI

Add New TimeSeries Location:

- Click the Globe to add a Location

The VIP Research Lab. - Google Chrome

vip.arizona.edu/viplab_data_AddTimeSeries.php?lat=40.00373458862305&lon=-85.7835693359375&email=abarreto@

 **vegetation index & phenology Lab.**
Understanding a piece of the Earth system

New TimeSeries Location


Label:

Latitude:

Longitude:


Window: base on 5,6km pixel size

Email:



The VIP Research Lab. - Google Chrome

vip.arizona.edu/viplab_data_AddTimeSeries.php

 **vegetation index & phenology Lab.**
Understanding a piece of the Earth system

Your Data was successfully submitted!

Lat=40.003734588623
Lon=-85.783569335938

You will receive an email when your TimeSeries are ready.

Time Series - Cont



Database Search

The screenshot displays the VIP Research Lab data explorer interface. The main window shows search results for the MODIS TERRA sensor, displaying a list of files with columns for DOY, Year, and FileName. A secondary window shows the Data Set Characteristics for a specific dataset, including Processing Level, Frequency, Temporal Coverage, Area, File Size, Projection, Data Format, Dimensions, Resolution, and Science Data Sets (SDS HDF Layers). A third window shows Layer Specifications for the dataset, including Science Dataset, UNITS, BIT TYPE, FILL, VALID RANGE, and MULTIPLY BY SCALE FACTOR.

Data Set Characteristics

Processing Level	Preprocessed Input Data
Frequency	Daily
Temporal Coverage	YEAR: 2000, DOY: 183
Area	Global
File Size	
Projection	Latitude/Longitude
Data Format	HDF-EOS
Dimensions	3600 x 7200 rows/columns
Resolution	0.05 degrees (5600 meters)
Science Data Sets (SDS HDF Layers)	9

Layer Specifications

Science Dataset	UNITS	BIT TYPE	FILL	VALID RANGE	MULTIPLY BY SCALE FACTOR
RED	Reflectance	16-bit signed integer	-28672	-100 - 16000	0.0001
NIR	Reflectance	16-bit signed integer	-28672	-100 - 16000	0.0001
VZA	Degree	16-bit signed integer	-10000	-9000 - 9000	0.01

A direct database querying tool facilitates the search and order, shows the metadata, along with images. Selected data are added to the cart for ordering/downloading.

Data Ordering

VIP

The screenshot shows a web browser window with the address bar displaying `vip.arizona.edu/vipdata/ORDERS/VIP20120000179/`. The page content includes a message about the order expiration, a yellow box with a command line instruction, and a table of files.

Your Data Order VIP20120000179 will expire on _____

To download all files at once, at your command line interface type: `wget -rc http://vip.arizona.edu/vipdata/ORDERS/VIP20120000179/` [Help](#)

Name	Size	Product	ESDR Release
VIP30P4.A213.LTAVG.2000_2005.002.2012150220005.hdf	201 MB	LTAVG, Monthly, Continuity Data	V2
VIP30P4.A213.LTAVG.2000_2010.002.2012150220005.hdf	200 MB	LTAVG, Monthly, Continuity Data	V2
VIP30P4.A213.LTAVG.2005_2010.002.2012150220005.hdf	200 MB	LTAVG, Monthly, Continuity Data	V2
VIP30P2.A2000274.002.2012150220005.hdf	97 MB	Monthly, Preprocessed Filtered Data	V2
VIP30P2.A2000305.002.2012150220005.hdf	85 MB	Monthly, Preprocessed Filtered Data	V2
VIP30P2.A2000335.002.2012150220005.hdf	82 MB	Monthly, Preprocessed Filtered Data	V2
VIP30P2.A2001001.002.2012150220005.hdf	83 MB	Monthly, Preprocessed Filtered Data	V2
VIP30P2.A2001032.002.2012150220005.hdf	94 MB	Monthly, Preprocessed Filtered Data	V2
VIP30P2.A2001060.002.2012150220005.hdf	102 MB	Monthly, Preprocessed Filtered Data	V2

9 Files, Total Size: 1.12 GB

User Credentials

The VIP Research Lab. - Google Chrome

vip.arizona.edu/viplab_explorer_uaccount.php?e=abarreto@email.arizona.edu

On Demand TimeSeries Processing: 122

#	Label	Latitude	Longitude	Status	Date	IP
1	N15	35.2097740	-111.6174698	Ready	2011-07-25 18:48:33	150.135.217.231
2	N14	35.2034035	-111.5973969	Ready	2011-07-25 18:49:47	150.135.217.231
3	N13	35.2009506	-111.6019363	Ready	2011-07-25 18:51:00	150.135.217.231
4	Sakha	64.5134048	137.0268860	Ready	2011-08-12 19:40:55	68.230.49.224
5	Sipaliwini	4.2525454	-57.8839836	Ready	2011-08-11 22:43:48	68.230.49.224
6	Serra Acarai Mountains	1.0734817	-57.3295097	Ready	2011-08-11 22:44:05	68.230.49.224
7	Serra de Curupira	0.6338034	-67.1268845	Ready	2011-08-11 22:44:19	68.230.49.224
8	Manaus	-0.8865904	-61.6963196	Ready	2011-08-11 22:44:30	68.230.49.224
9	Santarem	-0.7924246	-54.2206841	Ready	2011-08-11 22:44:40	68.230.49.224
10	Barra do Corda	-5.2628150	-44.7203941	Ready	2011-08-11 22:44:49	68.230.49.224
11	Conceicao do Araguaia	-7.8158913	-49.2707863	Ready	2011-08-11 22:44:59	68.230.49.224
12	Diamantina	-18.2681351	-43.2523880	Ready	2011-08-11 22:45:07	68.230.49.224
13	Canto do Buriti	-8.0287724	-42.3553810	Ready	2011-08-11 22:45:16	68.230.49.224
14	Pando	-11.4649296	-67.7333755	Ready	2011-08-11 22:45:25	68.230.49.224
15	Peixoto de Azevedo	-10.3120794	-54.9486084	Ready	2011-08-11 22:45:33	68.230.49.224
16	Bettiveme	64.2197647	120.4455643	Ready	2011-08-12 19:41:08	68.230.49.224
17	Noyabrsk	62.6110535	76.6322479	Ready	2011-08-12 19:41:20	68.230.49.224
18	Amur	54.0488892	124.4465332	Ready	2011-08-12 19:41:36	68.230.49.224
19	Kemerovo	54.4373360	88.0421906	Ready	2011-08-12 19:41:47	68.230.49.224
20	Krasnoyarsk	59.3190498	102.7885513	Ready	2011-08-12 19:41:58	68.230.49.224



Miscellaneous Tab

The image shows a software interface with three tabs: "Datasets", "Time Series", and "Misc". The "Misc" tab is selected. Below the tabs, there is a section titled "SPOT Dataset" containing a "Date" field with dropdowns for "Aug", "1", and "2000", and a "Product" dropdown set to "NDVI". Below these are "Explore" and "Animate" buttons. A section titled "Ancillary" contains a list of links: "Water/Land Mask", "Water/Land Mask from 250m", "Elevation 8KM", "Precipitation", "Temperature", "AVHRR Land Cover 92-93", "MODIS Land Cover", "AVHRR 92-93 Cluster", "MODIS 2003 Cluster", and "MODIS Tiles".

Datasets **Time Series** **Misc**

SPOT Dataset

Date Aug 1 2000

Product NDVI

Explore Animate

Ancillary

- [Water/Land Mask](#)
- [Water/Land Mask from 250m](#)
- [Elevation 8KM](#)
- [Precipitation](#)
- [Temperature](#)
- [AVHRR Land Cover 92-93](#)
- [MODIS Land Cover](#)
- [AVHRR 92-93 Cluster](#)
- [MODIS 2003 Cluster](#)
- MODIS Tiles

Documentation

The VIP Research Lab. vip.arizona.edu/viplab_data_explorer.php#

Data Viewer Available Data Cart ESDR Status Documentation Miscellaneous Help F.A.Q.

V3 Products are now being planned.

*The V3 reprocessing will combine all learned lessons and feedback from our user base. V3 will be an application grade product with known error and uncertainty. Plans is to have V3 ready by Jan/Feb.

All V2 Products are now available.

* Research grade data artifacts. The V2 data is now available.

All V1 Products are now available.

* Provisional data have been released. We're releasing these values.

* V2 data, to be released soon.

* Contact our Lab, with any questions.

Missing Days:

Frequent Asked Questions

* I need further assistance, where or what I should look for? If none of the information provided seems to answer your question, please contact us.

* I noticed errors, things that make no sense or data that doesn't seem right. Here are two key answers that you should know in development and may still contain some errors. Products in a global context (i.e., meant for products like winter snow/ice cover, cloudy sky, etc.) algorithms are applied automatically after the data is processed with these algorithms once applied to the final product. Please report these problems and we will find a way to fix them.

* When inspecting the phenology of a time series, I notice a bug. With the rollover of our V2 we noticed a bug that may still exist in the algorithm/data. As with the V1, this makes no sense.

* Why there are so many product levels, and what they are. Here is the short answer, for all purposes use the rank layer if you wish. The other product levels are for development (from input to ESDRs generation). That informs you of the data you are starting at any level, literally. For more info consult our production plan, which is available on the website.

* How many files can I order at once? Is there a limit? Yes, but the only hard limit is actually imposed by the individual file size. As our arrangements let us know via email (measurements@vip.arizona.edu).

* I may need special attention, what then? If you need more files, more data, or any other special arrangement, please contact us.

* Any other means for data order? Our resources only permit online data transfer via our website.

* I notice a problem with the data, what then? Please report these problems and we will find a way to fix them.

The VIP Research Lab. vip.arizona.edu/viplab_data_explorer.php#

Data Viewer Available Data Cart ESDR Status Documentation Miscellaneous Help F.A.Q.

System Status

- System Status Updates

Utilities

- VIP's Calculator
- Lat/Long to Row/Column Conversion
- MODIS Land Tile Calculator
- Julian Days Table
- MODIS Sinusoidal Grid Map
- MODIS Interactive Map

Links

- LP DAAC Land Processes Distributed Active Archive Center
- MODIS Data Pool
- USGS Global Visualization Viewer
- SPOT-VEGETATION Page
- NCDC National Climatic Data Center
- ESA European Space Agency
- Oak Ridge National Laboratory DAAC

Versions History

Data Explorer 3.0

- Improved display of V2 data
- More online tools for cluster creation
- Improved access to Phenology metrics via the Time Series tool
- Online TS data smoothing - being tested and should become available soon
- And more...

Data Explorer 2.0

- Supports both V1 and V2 VIP ESDRs
- Improved metadata attached to all HDF files
- Improved documentation
- Improved time series and V2 time series
- Access to Phenology metrics along the Time Series

Data Explorer 1.2

- supports both V1 and V2 VIP ESDRs
- Support for Data reformatting (GeoTIFF and Binary) - By request and depending on resources
- Formal metadata attached to all HDF files - By request and depending on resources
- Improved documentation
- Improved time series (multiple pixels, preset shapes) - By request and depending on resources
- Online TS data smoothing - should be available soon
- Phenology metrics extraction from time series - should be available soon
- Long term averages display on time series - should be available soon
- And more...

Data Explorer 1.0: First Data Explorer version capable of browsing the full VIP ESDR record.

Data Explorer 1.1 (Current) Enhanced interface and new functions added

- Users account creation
- On demand Vegetation Index TimeSeries extraction
- Added: Data Search, Cart System, Data Orders submission and Data Download
- Faster image loading and display

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V3 Features

- VIP V3 Dataset
- Pixel Retrieval Information
- Transects
- Data sub setting and reformatting
- Phenology metrics/VI charts

Pixel Information

Datasets | Time Series | Misc

ESDR Collection: V2 Release

Daily | Vegetation Index

Date: Aug 1 2008

Dataset: Preprocessed Input Data

Product: NDVI

Explore | Animate | Add to Cart

Double Click to Get Pixel values

Layer Opacity:

- NDVI.v2 8/1 1980-1985 LTAVG
- EVI2.v2 8/1/2008 Input Data
- RANK 8/1/2008 Input Data

Remove | Clear All | Add Custom

The VIP Research Lab. - Google Chrome

vip.arizona.edu/vipdata/webtools/queryHDF.php?o1=1&o2=1&pv=2&lat=41.3730926513

DataExplorer - SDS Pixel Values

Lat: 41.373092651367, Lon: -111.33697509766 (CMG Row: 973, Col: 1373)
Dataset: DAILY INPUT_DATA (V2)
Date: 8/1/2008 (DOY=214)

5377 : 0) CMG 0.05 Deg Daily NDVI
3610 : 1) CMG 0.05 Deg Daily EVI2
8200 : 2) CMG 0.05 Deg Daily VI Quality
0 : 3) CMG 0.05 Deg Daily Pixel Reliability
963 : 4) CMG 0.05 Deg Daily RED reflectance
3203 : 5) CMG 0.05 Deg Daily NIR reflectance
490 : 6) CMG 0.05 Deg Daily BLUE reflectance
1744 : 7) CMG 0.05 Deg Daily MIR reflectance
2970 : 8) CMG 0.05 Deg Daily Solar Zenith Angle
2987 : 9) CMG 0.05 Deg Daily View Zenith Angle
3757 : 10) CMG 0.05 Deg Daily Relative Azimuth Angle

QA Description like [VIPLABQA] for sds #2
[CMG 0.05 Deg Daily VI Quality]

```
15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
| | | | | | | | | | | | | | |
0 0 1 0 0 0 0 0 0 0 0 0 1 0 0 0 = [8200]
```

- cloud state = 0 [clear]
- cloud shadow? No
- aerosol quantity = 1 [low]
- aerosol estimated? No
- snow/ice? No
- snow/ice estimated? No
- gapfill status = 0 [not gap filled]
- sun zenith angle > 75? No
- sun zenith angle > 85? No
- view angle > 30? No
- land water flag = 1 [land]
-> RankPixel = 0 [Excellent]

Transect Tool

ESDR Collection V2 Release

Log In | Create Account

ESDR Collection V2 is research grade!

Find a Place

Datasets Time Series Misc

ESDR Collection V2 Release

Daily Vegetation Index

Date Aug 1 2008

Dataset Preprocessed Input Data

Product NDVI

Explore Animate Add to Cart

Double Click to Get Pixel values

Transect Window Selection

Transect Tool:
At least two points are required!

Click NEXT point #4 or 'Get Transect'

New Get Transect Close

Layer Opacity: NDVI.v2 8/1/2008 Input Data :Transect

Remove Clear All Add Custom

Borders Roads Grid Navigation Control Status Bar Overview Map Scale Legend Atmosphere

All V1 products are provisional. V2 is now online

Pt #1 Pt #2 Pt #3

The VIP Research Lab. - Google Chrome

vip.arizona.edu/vipdata/webtools/transect.php?o1=1&o2=1&pv=2&lat=35.16754913330078&lon=-99.60375213623047&lv=36.85787,-119.56841|38.88571,-106.72540|35.1

DataExplorer - Transects

1063x1209,1022x1465,1097x1608
Dataset: DAILY INPUT_DATA (V2)
Date: 8/1/2008 (DOY=214)

P1 P2 P3

Window Selection

The image shows a screenshot of a web application interface for window selection. The interface is divided into two main panels, each with a sidebar on the left and a map on the right. The top panel shows the initial state, and the bottom panel shows the state after a window selection window is open.

Top Panel:

- Browser:** The address bar shows `vip.arizona.edu/viplab_data_view18.php#`.
- Navigation:** Includes buttons for `Data Viewer`, `Available Data`, `Cart`, `ESDR Status`, `Documentation`, `Miscellaneous`, `Help`, and `F.A.Q`.
- Map:** A satellite map of the United States with a large blue rectangular window overlaid on the central part of the country. A text overlay on the map reads: "All V1 products are provisional. V2 is now online."
- ESDR Collection:** Set to `V2 Release`.
- Time Series:** Set to `Daily`.
- Vegetation Index:** Set to `Vegetation Index`.
- Date:** Set to `Aug 1 2008`.
- Dataset:** Set to `Preprocessed Input Data`.
- Product:** Set to `NDVI`.
- Buttons:** `Explore`, `Animate`, and `Add to Cart`.
- Window Selection:** A button labeled `Window Selection` is highlighted with a red box.

Bottom Panel:

- Window Selection Dialog:** A dialog box titled `Window Selection:` is open, with a red border. It contains the text: "Two points (opposite corners) are needed!" and "Click FIRST window's corner on map." Below the text are `New` and `Close` buttons.
- Map:** The same satellite map is shown, but the blue window is now slightly smaller and positioned differently, indicating it has been moved or resized.
- ESDR Collection:** Set to `V2 Release`.
- Time Series:** Set to `Daily`.
- Vegetation Index:** Set to `Vegetation Index`.
- Date:** Set to `Aug 1 2008`.
- Dataset:** Set to `Preprocessed Input Data`.
- Product:** Set to `NDVI`.
- Buttons:** `Explore`, `Animate`, and `Add to Cart`.
- Window Selection:** A button labeled `Window Selection` is highlighted with a red box.

Footer:

- Logos:** `VIP Lab.` and `Google`.
- Copyright:** © 2010 Google, © 2013 TerraMetrics.
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- Contact:** VIP Research Group, ECE Dept., The University of Arizona, 1230 E. Speedway, Tucson, Az 85721.

Future

Improve services

Seek funding

Seek user support

Transition to the 'LP-DAAC'

Live DEMO



vegetation index & phenology Lab.

...Understanding a piece of the Earth system