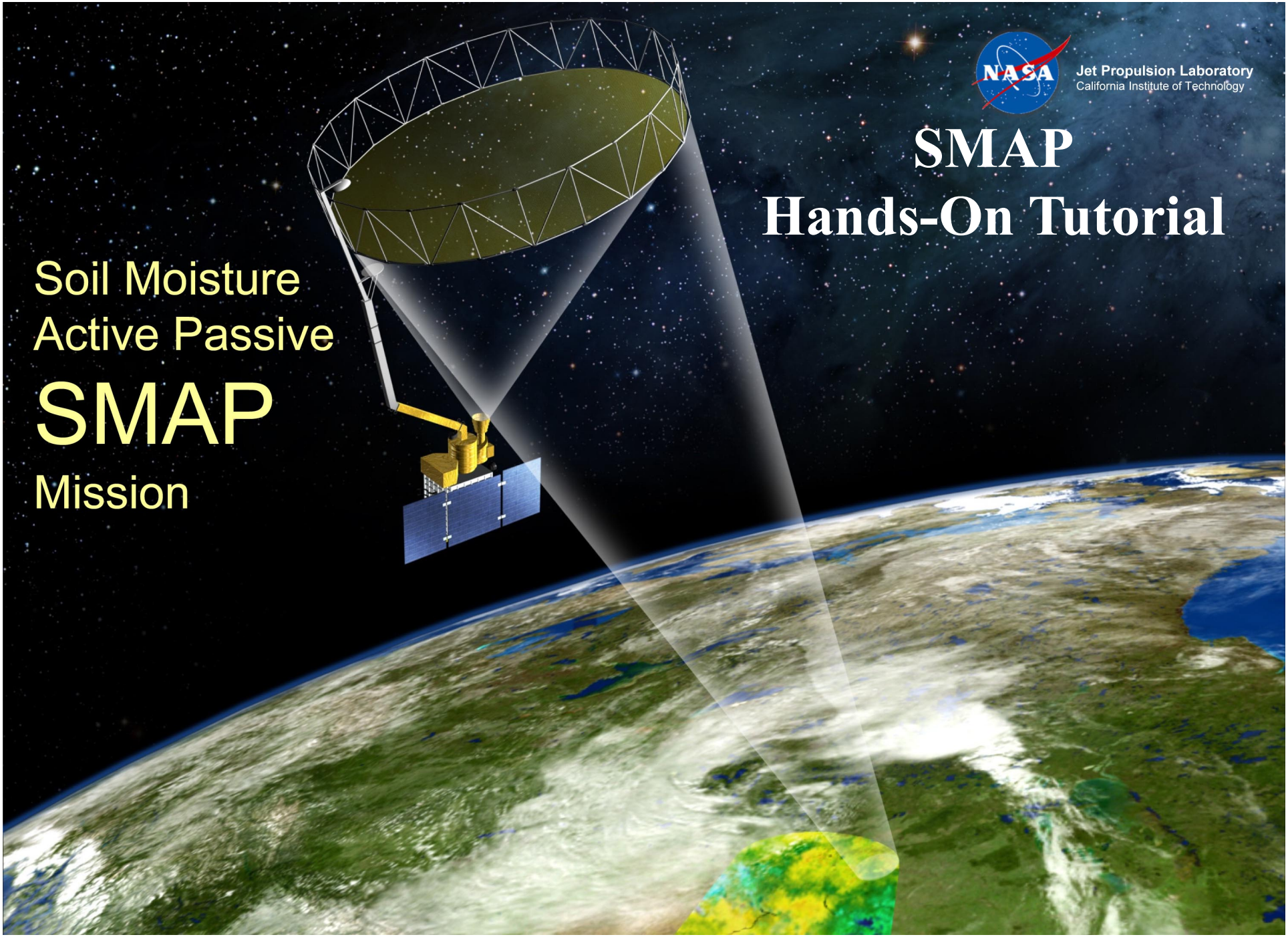
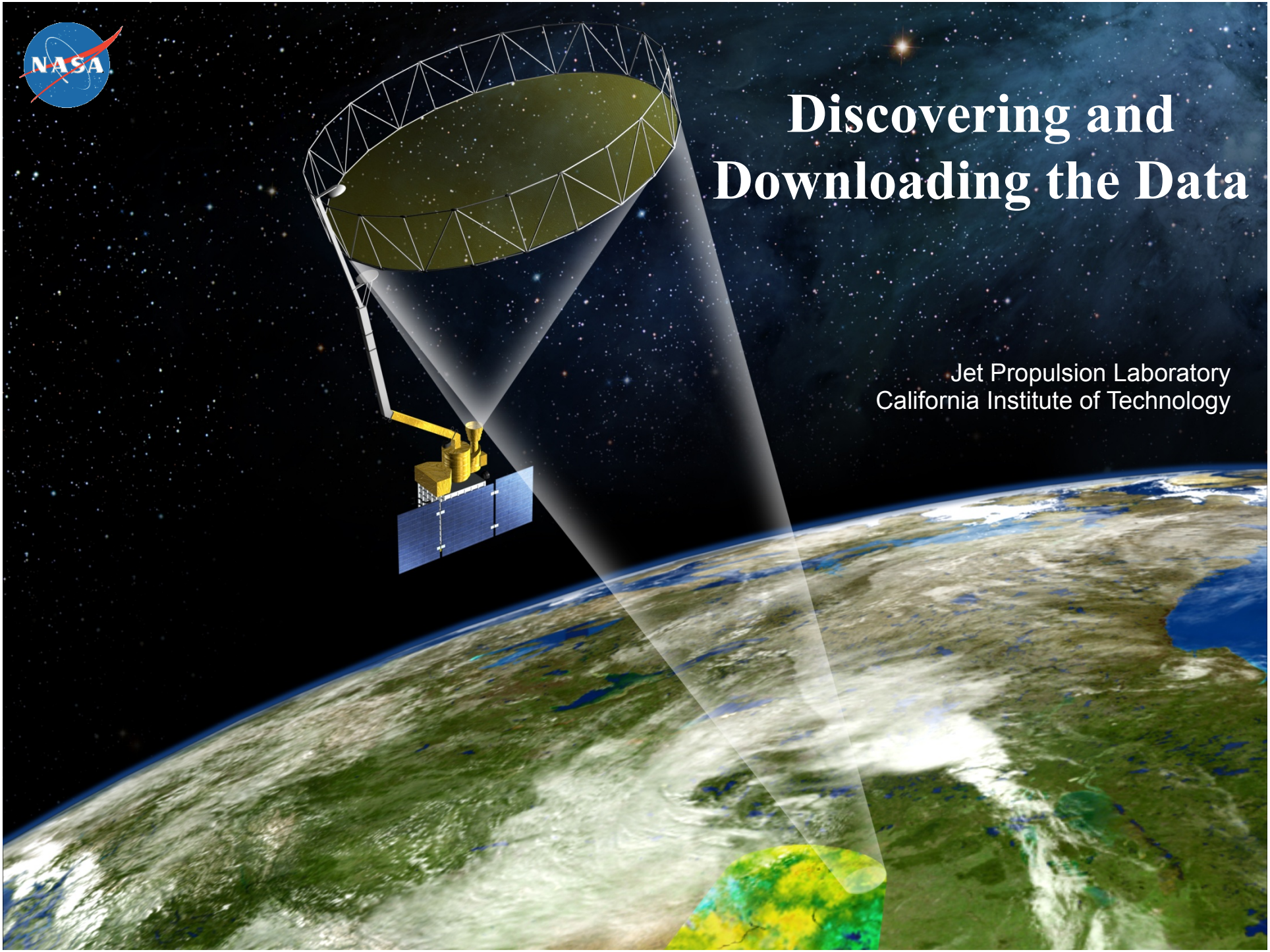


Outline

Jet Propulsion Laboratory
California Institute of Technology

1. Discovering and downloading the data
2. Visualizing the data
3. Analyzing the data


Discovering and
Downloading the Data
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Data Access: FTP

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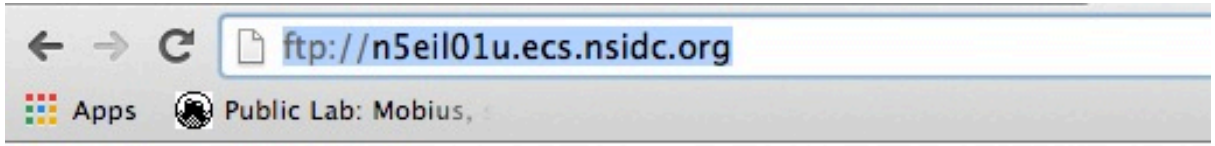
FTP : ftp://n5eil01u.ecs.nsidc.org/
Direct access to the entire archive of data



Index of /

Name	Size	Date Modified
AMSA	0 B	8/22/13, 12:00:00 AM
AQUARIUS	0 B	12/3/13, 12:00:00 AM
BRWS	0 B	8/22/13, 12:00:00 AM
DP0	0 B	8/22/13, 12:00:00 AM
DP1	0 B	11/26/13, 12:00:00 AM
DP2	0 B	8/22/13, 12:00:00 AM
DP3	0 B	1/6/14, 12:00:00 AM
DP4	0 B	1/22/14, 12:00:00 AM
DPRecentInserts_20150419	377 B	4/20/15, 1:05:00 PM
DPRecentInserts_20150420	377 B	4/21/15, 1:05:00 PM
DPRecentInserts_20150421	612 B	4/22/15, 1:05:00 PM
DPRecentInserts_20150422	612 B	4/23/15, 1:05:00 PM
DPRecentInserts_20150423	408 B	4/24/15, 1:05:00 PM
DPRecentInserts_20150424	648 B	4/25/15, 1:05:00 PM

Data Access: Reverb

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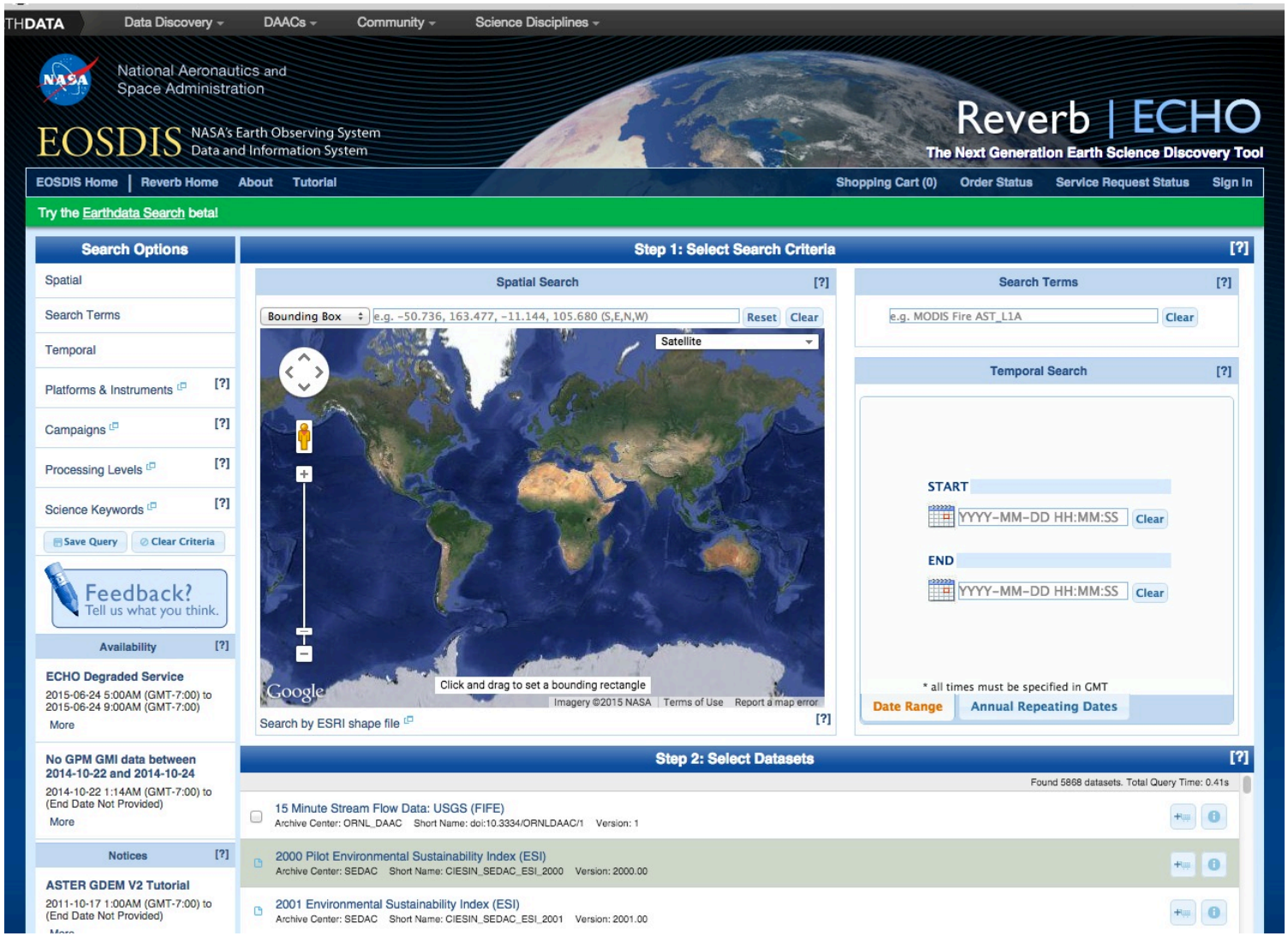
Reverb: http://reverb.echo.nasa.gov/

Reformatting, reprojection, and spatial and parameter subsetting services.



Data Access: Worldview

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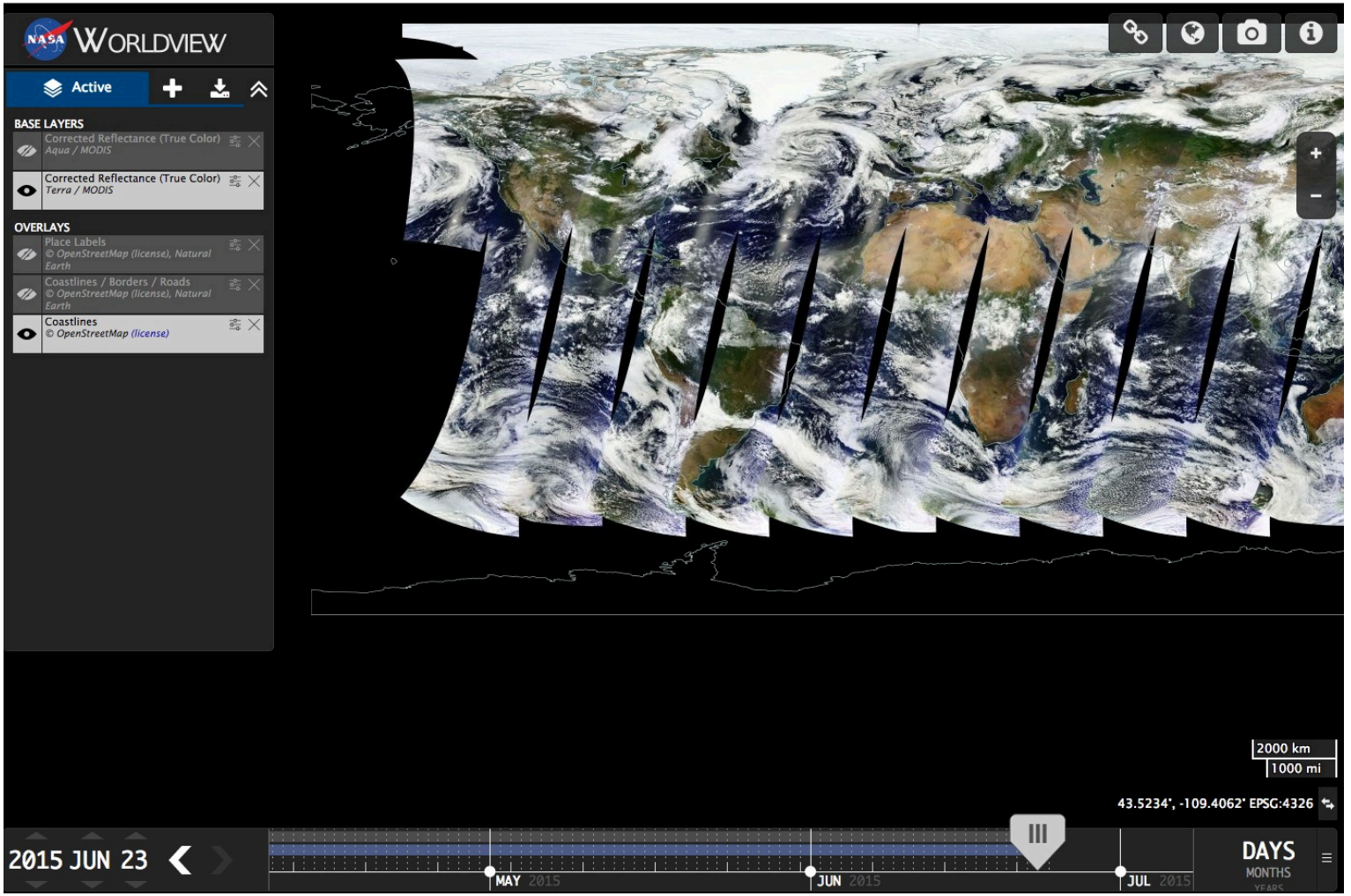
Worldview: https://earthdata.nasa.gov/labs/worldview/

Interactively browse and download full-resolution imagery.



Data Access: Subscription

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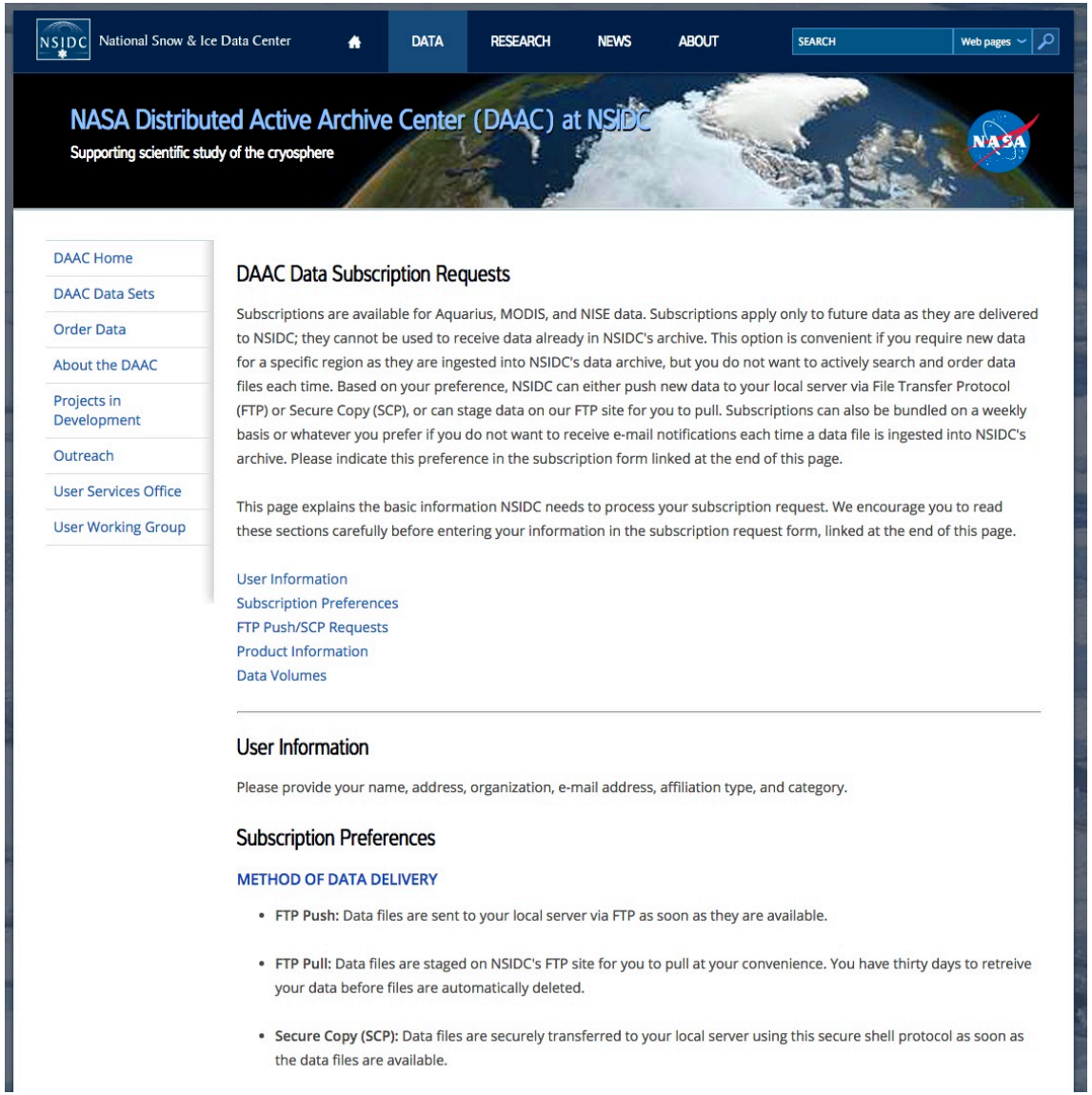
Subscription: http://nsidc.org/daac/subscriptions.html

Automatic delivery of data as it becomes available.



Data Access: NSIDC

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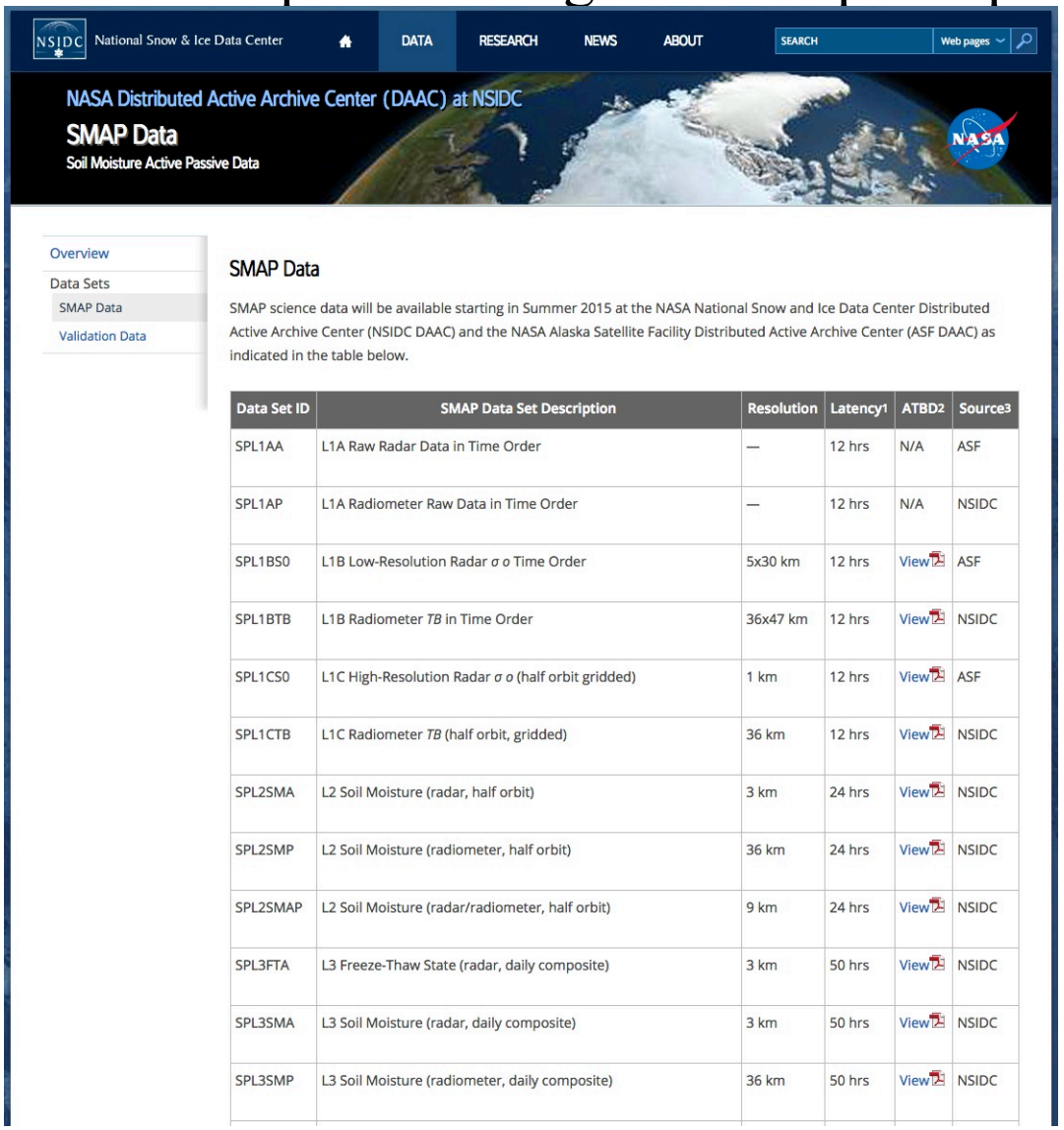
SMAP Web site at NSIDC DAAC: http://nsidc.org/data/smap/smap-data.html

Access to the radiometer data and all L2, L3, and L4 products.
Data access, data set user guide documents, tools, news, published research, quality information, FAQs, and many other resources.



Data Set ID	SMAP Data Set Description	Resolution	Latency[1]	ATBD[2]	Source[3]
SPL1AA	L1A Raw Radar Data in Time Order	—	12 hrs	N/A	ASF
SPL1AP	L1A Radiometer Raw Data in Time Order	—	12 hrs	N/A	NSIDC
SPL1BS0	L1B Low-Resolution Radar σo Time Order	5x30 km	12 hrs	View	ASF
SPL1BTB	L1B Radiometer *TB* in Time Order	36x47 km	12 hrs	View	NSIDC
SPL1CS0	L1C High-Resolution Radar σo (half orbit gridded)	1 km	12 hrs	View	ASF
SPL1CTB	L1C Radiometer *TB* (half orbit, gridded)	36 km	12 hrs	View	NSIDC
SPL2SMA	L2 Soil Moisture (radar, half orbit)	3 km	24 hrs	View	NSIDC
SPL2SMP	L2 Soil Moisture (radiometer, half orbit)	36 km	24 hrs	View	NSIDC
SPL2SMAP	L2 Soil Moisture (radar/radiometer, half orbit)	9 km	24 hrs	View	NSIDC
SPL3FTA	L3 Freeze-Thaw State (radar, daily composite)	3 km	50 hrs	View	NSIDC
SPL3SMA	L3 Soil Moisture (radar, daily composite)	3 km	50 hrs	View	NSIDC
SPL3SMP	L3 Soil Moisture (radiometer, daily composite)	36 km	50 hrs	View	NSIDC

Data Access: ASF

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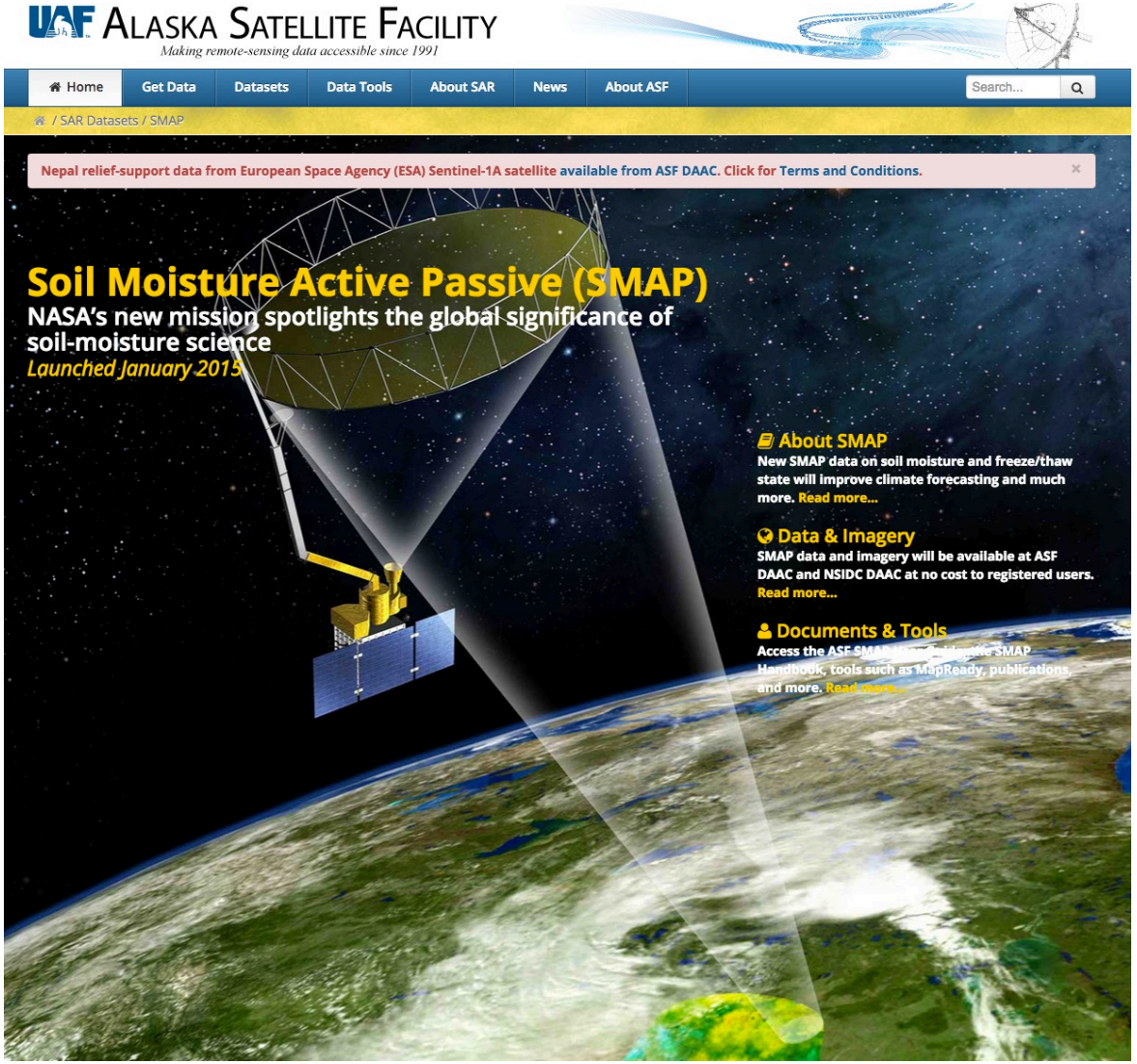
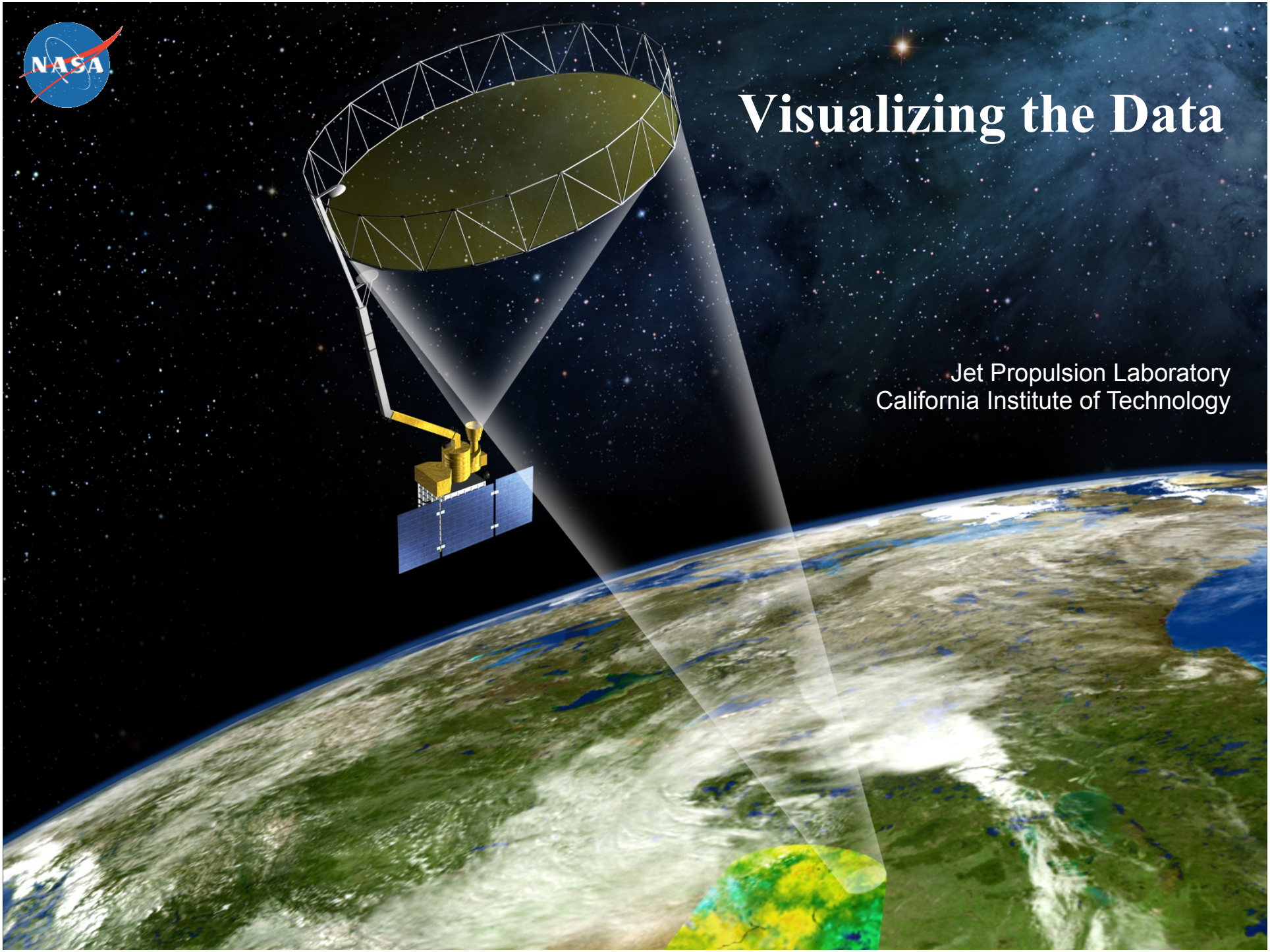
SMAP Web site at ASF DAAC: https://www.asf.alaska.edu/smap/

Access to the radar data only.
Data access, data set user guide documents, tools, news, published research, quality information, FAQs, and many other resources.




Visualizing the Data
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SMAP Data Product Design

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- **All products are in HDF format**
  - Each SMAP HDF file contains the primary data file (e.g. soil moisture, freeze/thaw, radar data) and all files used in the production of that primary dataset. These files include metadata, instrument data, flags and masks, data product, etc.

- **Projection: EASE2 grid**
  - Equal area projection
  - Level 2, 3, 4, and radiometer L1C are in this projection

- **Values**
  - Radiometer data (brightness temperature) is in Kelvin
  - Radar data is in sigma naught
  - Soil moisture is a volumetric measurement expressed as cm^3/cm^3
  - Freeze/thaw is a binary measurement, either frozen or thawed
  - Net ecosystem exchange unit is in grams of carbon/square meter per day

Tools for Reading HD5

http://www.hdfgroup.org/products/hdf5_tools/index.html

SOFTWARE USING HDF5

CONTENTS:

- HDF5 Tools and Software
- HDF5 Tools by Category (view, edit, export, convert, import)
- Table (Summary) of Software Using HDF5
- HDF5 Command-line Tools

HDF5 Tools and Software:

- HDF-Java Products and HDFView: HDFView Java browser for HDF4 and HDF5 and HDF Java wrappers
- HDF5 Command-line Tools: Tools included with the HDF5 distribution
- HDF5DotNet - C++/CLI Wrapper of the HDF5 Library
- H4toH5 Conversion Library and Tools: A library and tools for converting to and from HDF4 and HDF5.
- h5check: A tool to check the validity of an HDF5 file.
- h5edit: A tool for editing an HDF5 file. The current (first) release only supports commands for the creation and deletion of attributes of datasets and groups. More commands will be implemented in the future. This software is sponsored by the JPSS project. NEW
- HDF5 XML Information Page: DTD and tools for using HDF5 with XML.

See the Downloads page to access this tool:

- h5fix_obj_nmsgs: Corrects corrupt object header (rare problem prior to 1.6.6). Search on *Miscounted* here.

HDF5 Tools by Category

Table of (major) HDF5 tools by categories

Table (Summary) of Software Using HDF5:

This table includes not only HDF5 tools, but also other software known to use HDF5.

Sorted by Name [ ]
Sorted by Application Type [ ]

Also see short descriptions for many of the applications listed in the above tables.

HDF5 Command-line Tools

Following is a list of the HDF5 command-line tools that are available on most platforms supported with HDF5. These utilities are automatically built when building HDF5, and come with the pre-compiled binary distribution of HDF5. They can also be downloaded separately.

- gif2h5/h52gif - Converts to/from GIF file and HDF5.
- h5cc, h5fc, h5c++ - Simplifies compiling an HDF5 application. [Also see FAQ]
- h5debug - Debugs an existing HDF5 file at a low level.
- h5diff - Compares two HDF5 files and reports the differences.
- h5dump - Enables the user to examine the contents of an HDF5 file and dump those contents to an ASCII file.
- h5import - Imports ASCII or binary data into HDF5.
- h5jam/h5unjam - Add/Remove text to/from User Block at the beginning of an HDF5 file.
- h5ls - Lists selected information about file objects in the specified format.
- h5perf - Measures Parallel HDF5 performance.
- h5redeploy - Updates HDF5 compiler tools' paths after the HDF5 software has been installed in a new location. See *h5cc.*

HDFView Example: Level 3 SM_AP

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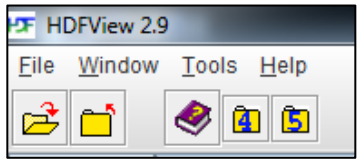
1. Launch HDFView.

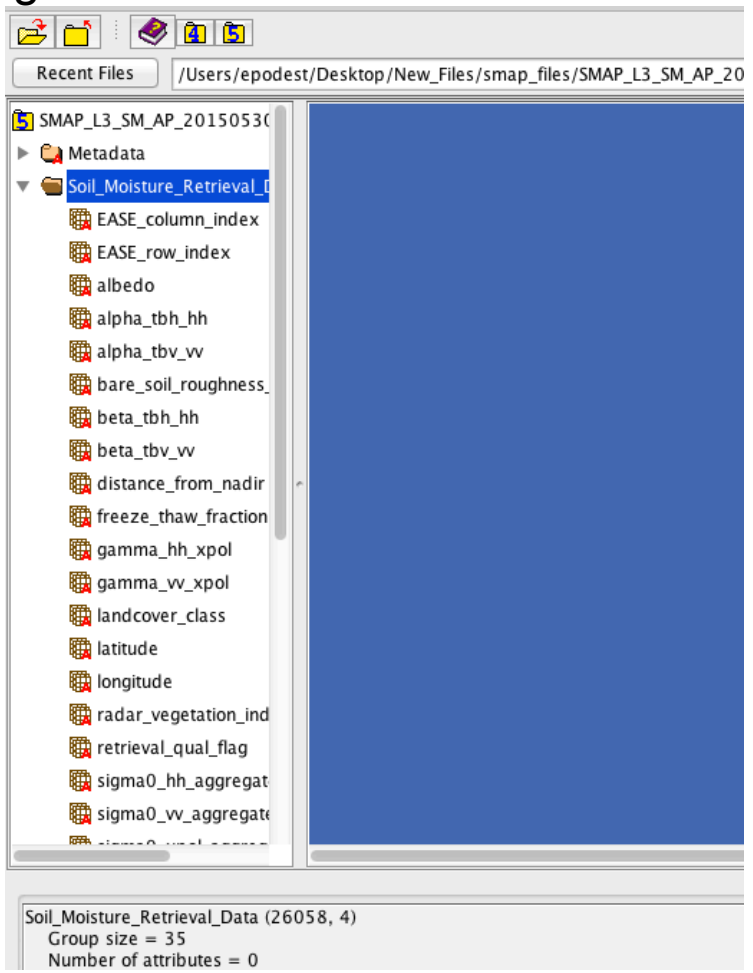


2. Open the SMAP data file, “SMAP_L3_SM_AP_20150530_T11630_001.h5 ”using the File menu or the icon on the toolbar.

-In the HDFView window, the left panel displays the file structure, the right panel displays data, and the bottom panel displays other information, such as metadata.

-In the left panel, Groups are represented by folders and Datasets are represented as icons.

3. Double-click on a Group to display the Datasets contained in that Group.



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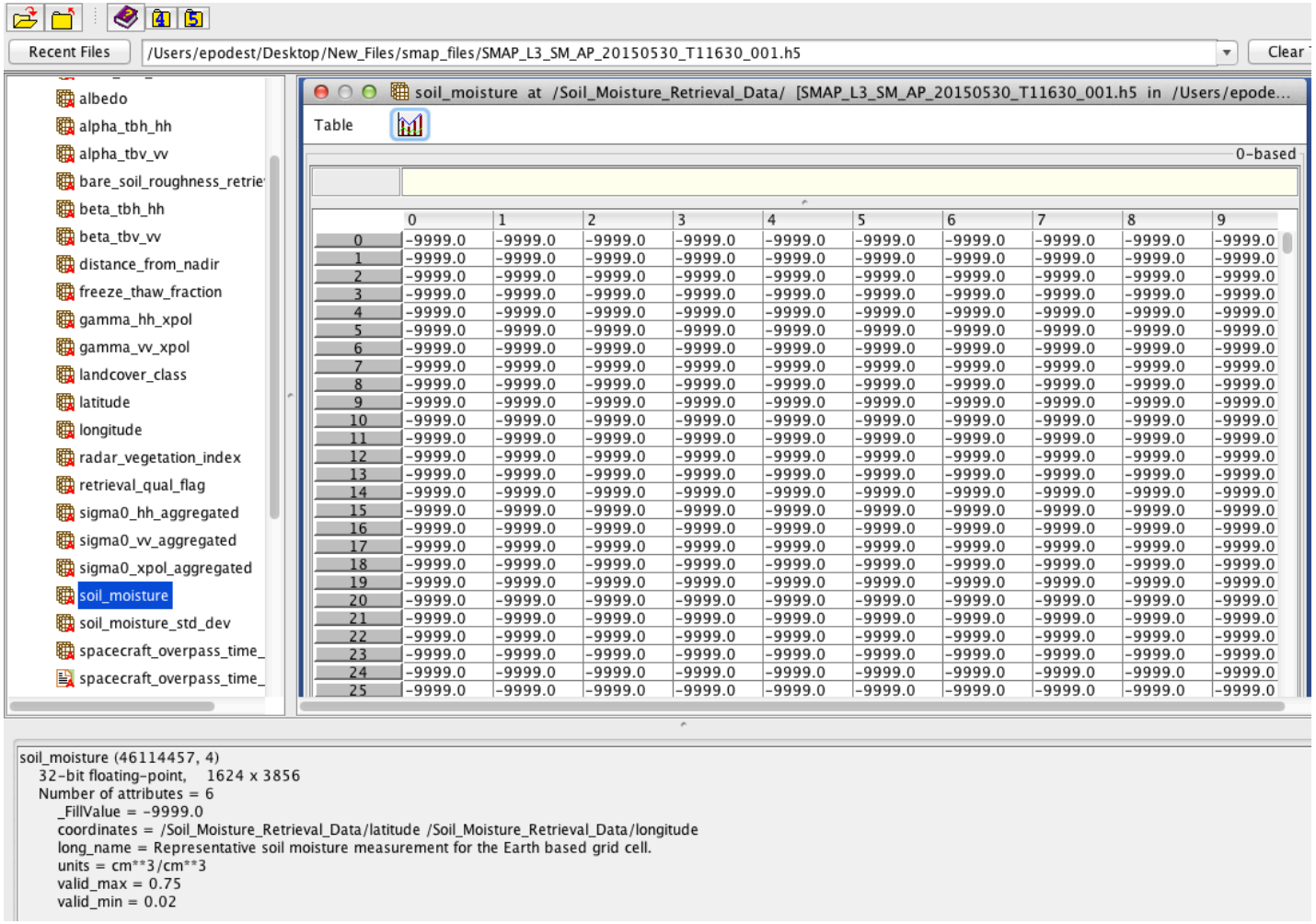
4. Double-click on a Dataset to display the data in the right panel. Metadata for that particular dataset is displayed in the bottom.



HDFView Example: Level 3 SM_AP

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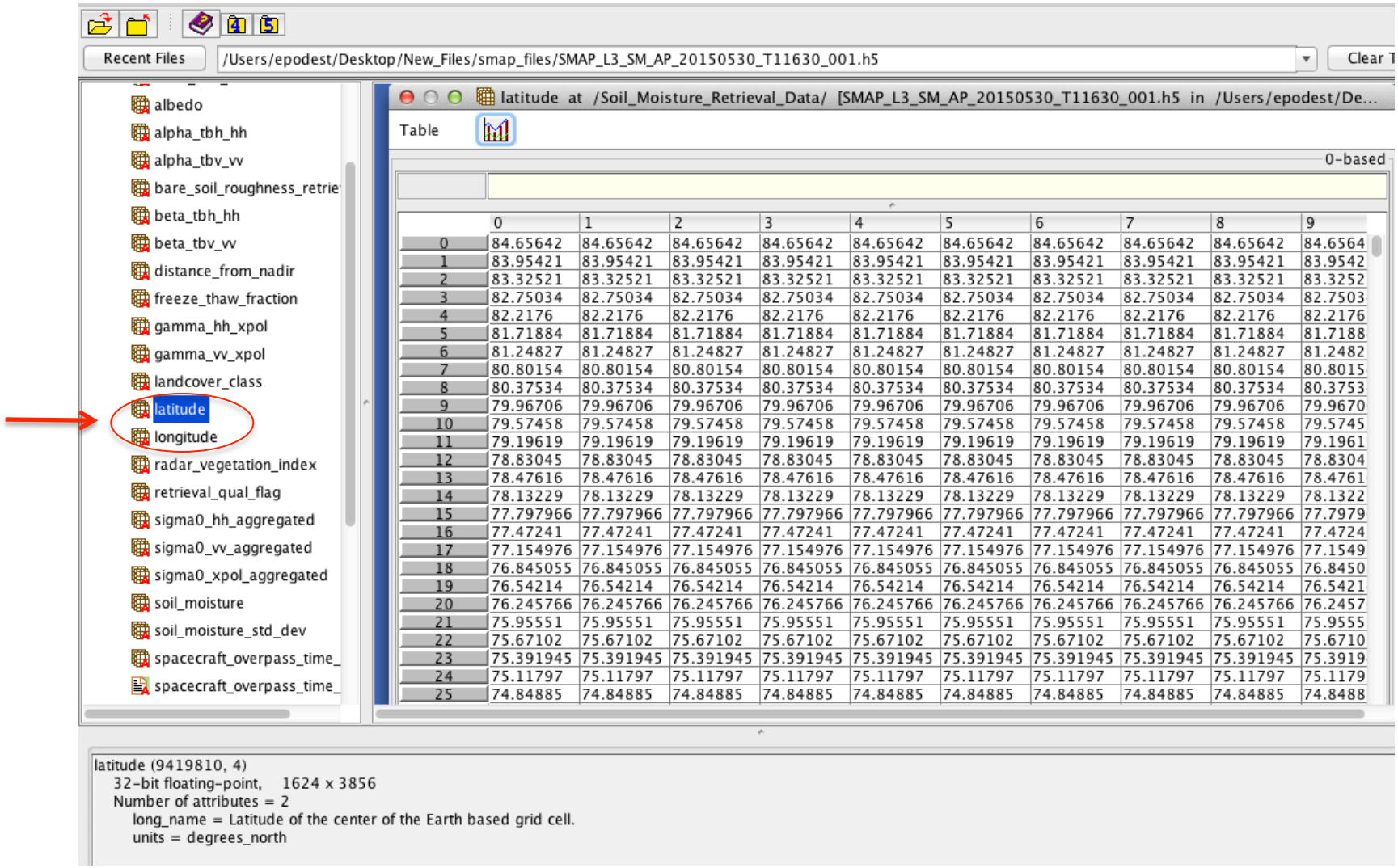
Latitude and longitude for each 9 km soil moisture measurement cell is in the lat/lon dataset



	0	1	2	3	4	5	6	7	8	9
0	84.65642	84.65642	84.65642	84.65642	84.65642	84.65642	84.65642	84.65642	84.65642	84.6564
1	83.95421	83.95421	83.95421	83.95421	83.95421	83.95421	83.95421	83.95421	83.95421	83.9542
2	83.32521	83.32521	83.32521	83.32521	83.32521	83.32521	83.32521	83.32521	83.32521	83.3252
3	82.75034	82.75034	82.75034	82.75034	82.75034	82.75034	82.75034	82.75034	82.75034	82.7503
4	82.2176	82.2176	82.2176	82.2176	82.2176	82.2176	82.2176	82.2176	82.2176	82.2176
5	81.71884	81.71884	81.71884	81.71884	81.71884	81.71884	81.71884	81.71884	81.71884	81.7188
6	81.24827	81.24827	81.24827	81.24827	81.24827	81.24827	81.24827	81.24827	81.24827	81.2482
7	80.80154	80.80154	80.80154	80.80154	80.80154	80.80154	80.80154	80.80154	80.80154	80.8015
8	80.37534	80.37534	80.37534	80.37534	80.37534	80.37534	80.37534	80.37534	80.37534	80.3753
9	79.96706	79.96706	79.96706	79.96706	79.96706	79.96706	79.96706	79.96706	79.96706	79.9670
10	79.57458	79.57458	79.57458	79.57458	79.57458	79.57458	79.57458	79.57458	79.57458	79.5745
11	79.19619	79.19619	79.19619	79.19619	79.19619	79.19619	79.19619	79.19619	79.19619	79.1961
12	78.83045	78.83045	78.83045	78.83045	78.83045	78.83045	78.83045	78.83045	78.83045	78.8304
13	78.47616	78.47616	78.47616	78.47616	78.47616	78.47616	78.47616	78.47616	78.47616	78.4761
14	78.13229	78.13229	78.13229	78.13229	78.13229	78.13229	78.13229	78.13229	78.13229	78.1322
15	77.797966	77.797966	77.797966	77.797966	77.797966	77.797966	77.797966	77.797966	77.797966	77.7979
16	77.47241	77.47241	77.47241	77.47241	77.47241	77.47241	77.47241	77.47241	77.47241	77.4724
17	77.154976	77.154976	77.154976	77.154976	77.154976	77.154976	77.154976	77.154976	77.154976	77.1549
18	76.845055	76.845055	76.845055	76.845055	76.845055	76.845055	76.845055	76.845055	76.845055	76.8450
19	76.54214	76.54214	76.54214	76.54214	76.54214	76.54214	76.54214	76.54214	76.54214	76.5421
20	76.245766	76.245766	76.245766	76.245766	76.245766	76.245766	76.245766	76.245766	76.245766	76.2457
21	75.95551	75.95551	75.95551	75.95551	75.95551	75.95551	75.95551	75.95551	75.95551	75.9555
22	75.67102	75.67102	75.67102	75.67102	75.67102	75.67102	75.67102	75.67102	75.67102	75.6710
23	75.391945	75.391945	75.391945	75.391945	75.391945	75.391945	75.391945	75.391945	75.391945	75.3919
24	75.11797	75.11797	75.11797	75.11797	75.11797	75.11797	75.11797	75.11797	75.11797	75.1179
25	74.84885	74.84885	74.84885	74.84885	74.84885	74.84885	74.84885	74.84885	74.84885	74.8488

HDFView Example: Level 3 SM_AP

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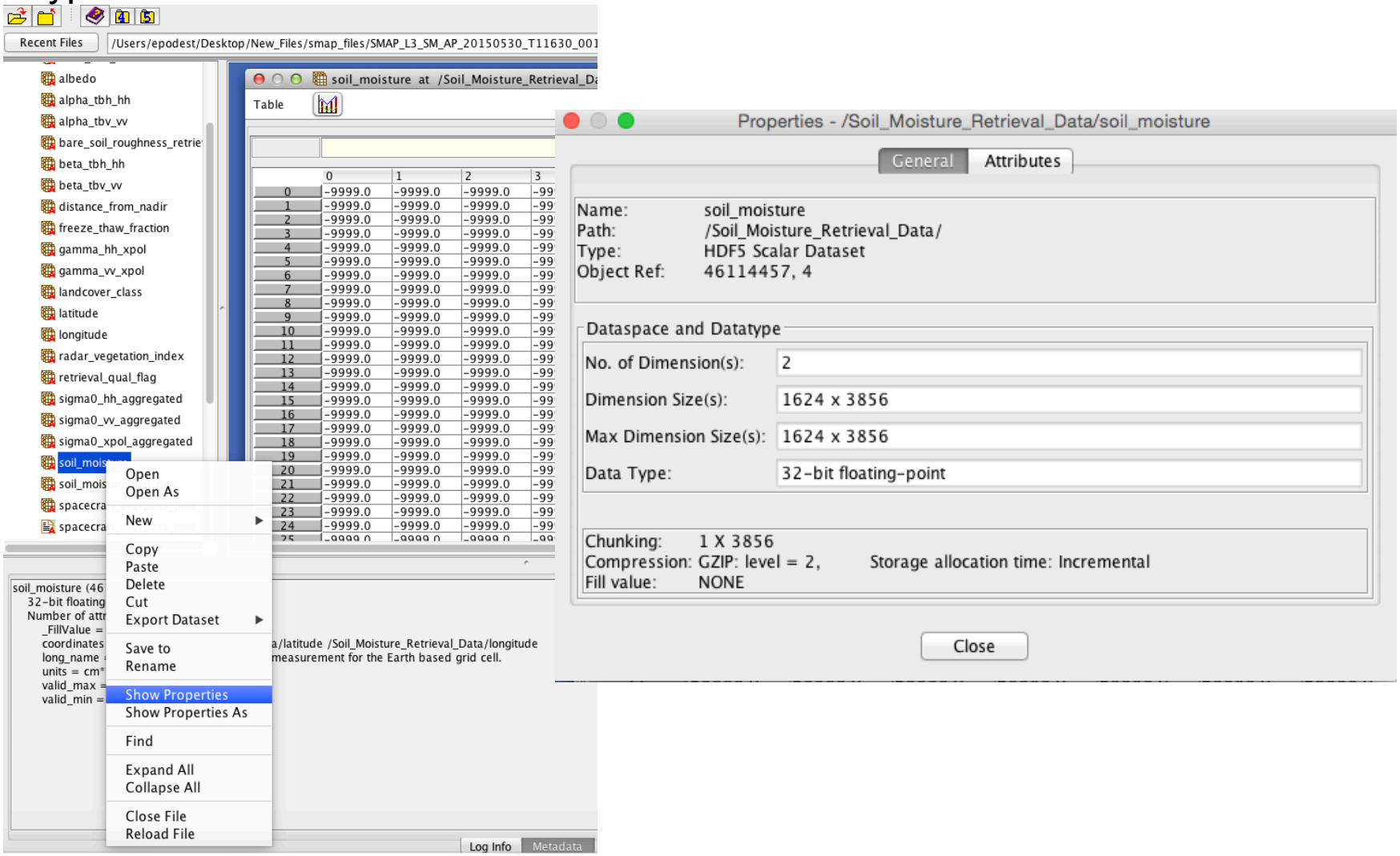
5. Right-click on a Group or Dataset in the left panel to see the different viewing and editing capabilities of HDFView. Select “show properties” to display information such as type and dimensions of the data.



HDFView Example: Level 3 SM_AP

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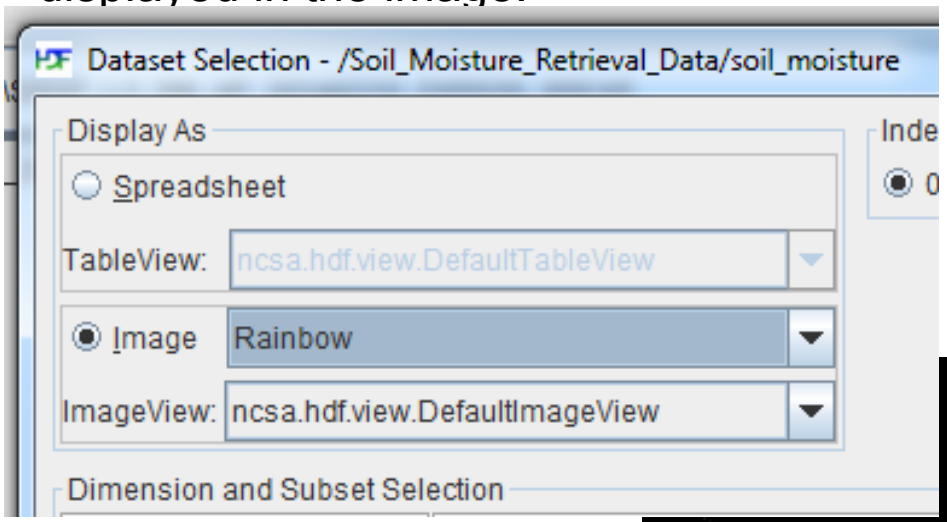
6.Right-click on the “soil_moisture” dataset and select “Open As”. In the dialog box, select “Image” and the “Rainbow” palette. Click ok. The “soil_moisture” dataset will be displayed as an image in the right panel. Due to the large range of values for this dataset (-9999 to 0.75), the image displays only red, black, and white. In order to more clearly visualize the valid soil moisture values, change the value range displayed in the image.



HDFView Example: Level 3 SM_AP

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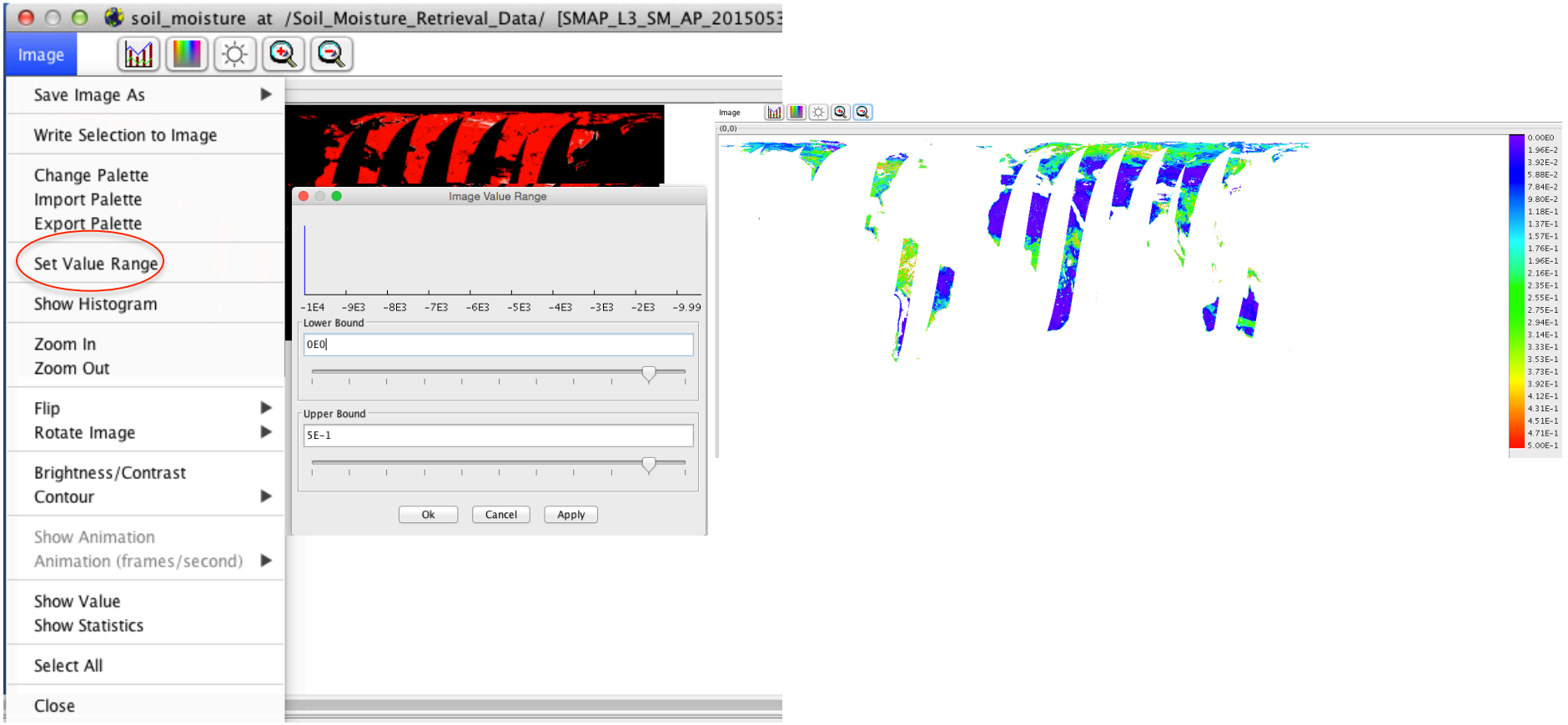
7. In the ImageView window, click on “Image” and then “Set Value Range”. Type “0” in the “Lower Bound” text box and “0.5” in the “Upper Bound” text box and click ok. The software automatically converts these values to scientific notation.



HDFView Example: Level 3 SM_AP

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8. To view the soil moisture data value at a point controlled by your cursor, click on “Image” and then “Show Value”. Data values will now be displayed in the bottom left corner of the ImageView window.