Providing access to multiple sensor subsets for field sites

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Introduction

To address science questions related to carbon cycle and ecosystems, researchers have to identify, download, understand and assemble remotely sensed and other spatial data from disparate sources.   For scientists working at spatial scales of less than 100 x 100 km, assembling the data is particularly challenging because of the huge amounts of data that have to be downloaded relative to the small spatial scale of the analysis. Also, researchers have to understand file formats, data structure, and data access mechanisms across the various types of data. Valuable resources that could be spent productively on research are spent in assembling the data. To address this issue, ORNL DAAC is developing a system that will provide multiple sensor subsets (data bundles).

The ORNL DAAC is currently exploring the following data products to be subsetted and delivered as part of the data bundle.

- ALOS PALSAR
- Daymet (Weather and climate records)
- EO-1 Hyperion
- Landsat
- NPP-VIIRS (when available)
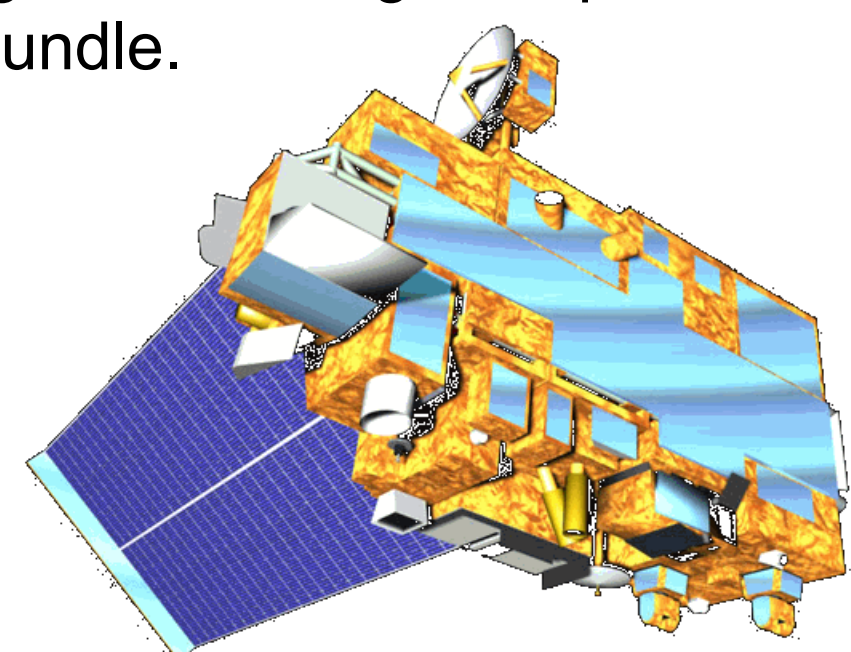
Field Sites

The subsets will be provided for a small number (<50) of field sites. Field sites selected for this scoping study of the usability of the multi-sensor subsets have been selected based on the following criteria:

- Data Availability
- Site characteristics such as landcover, location
- Temporal coverage of the field site
- Interest in the community on combining field site data with the multi sensor subsets
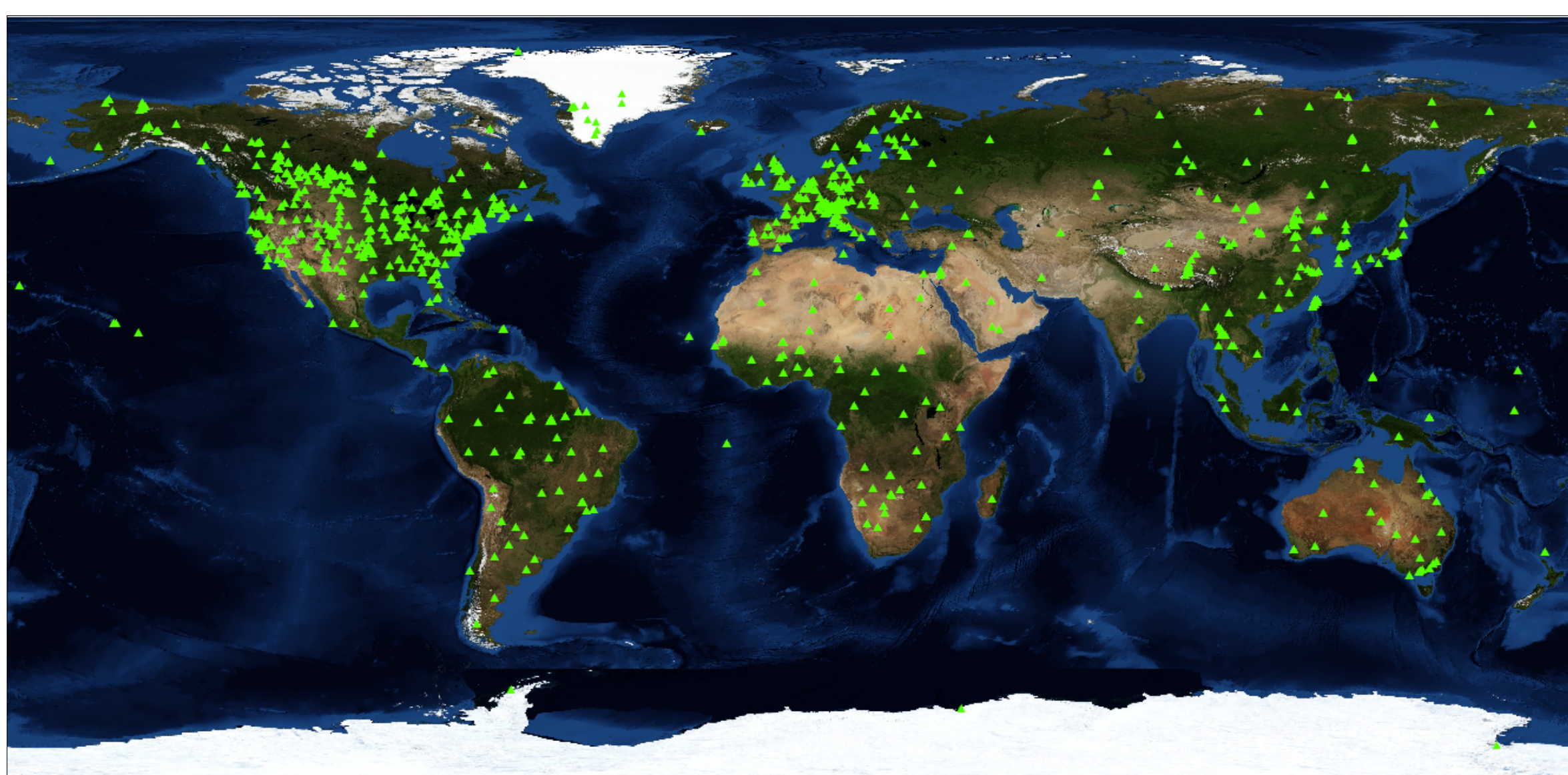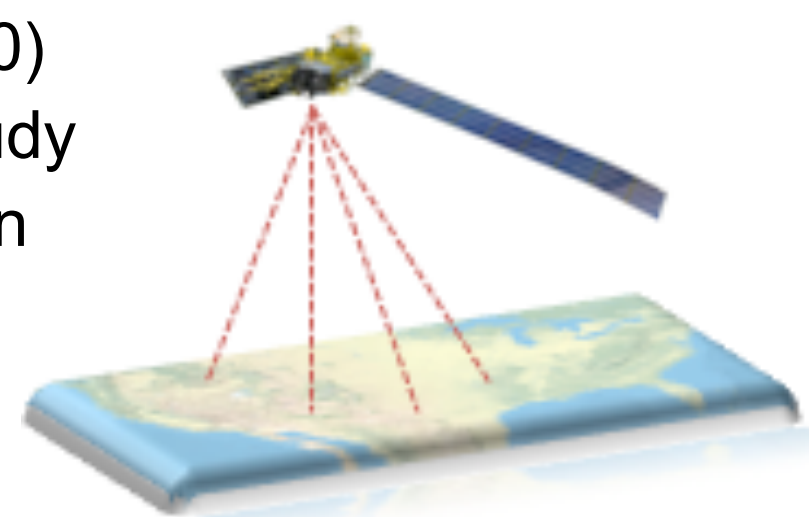
ORNL DAAC has compiled a list of field sites covering all major land-based monitoring network. This includes sites from FLUXNET, AERONET, LTER, NEON, and ARM. The field sites included in the study are a subset of sites in this list of over 2000 sites. ORNL DAAC's plan is to understand the community's interest in these sensor subsets and if there is enough interest, the number of sites included in the multi-sensor subsets will be expanded.

## Visualization of sensor subsets

ORNL DAAC has developed several web based visualization of remote sensing data. These visualization tools can be leveraged for visualization of the sensor subsets. Open Geospatial Consortium Standards (OGC), and other custom web based tools developed at ORNL DAAC enable users to browse, visualize, and download geospatial data in various user-selected spatial/temporal extents, formats, and projections and visualize data in a time series and composite grid graphs.

Advantages of visualizing sensor data web based tools:

- Visualize data online without special software
- Quick look at data
- Useful in classroom education
- Share the data graphs
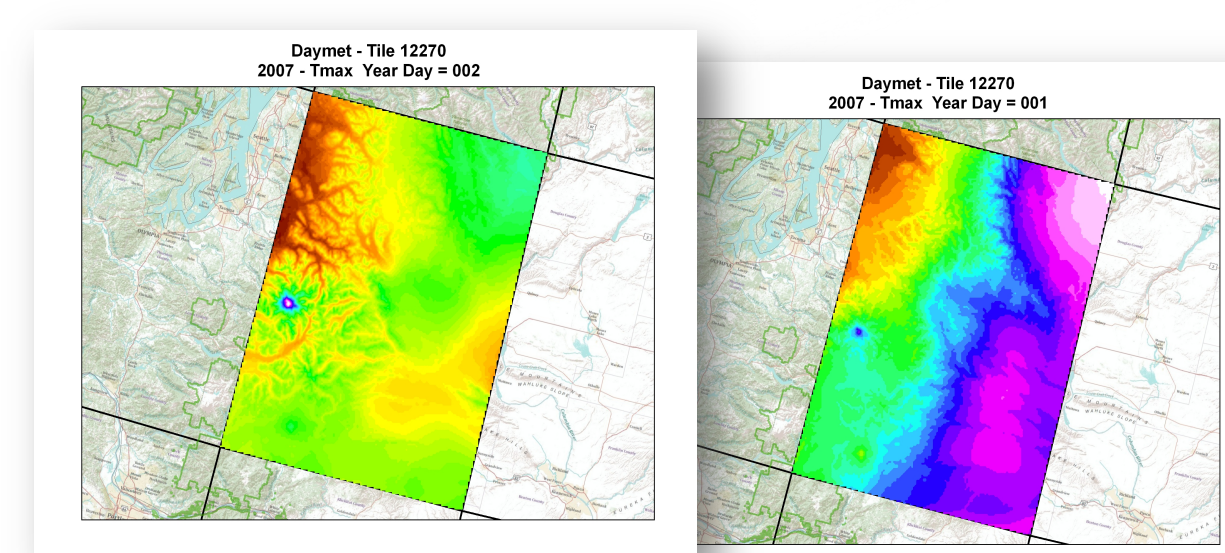- Understand data before actual data download
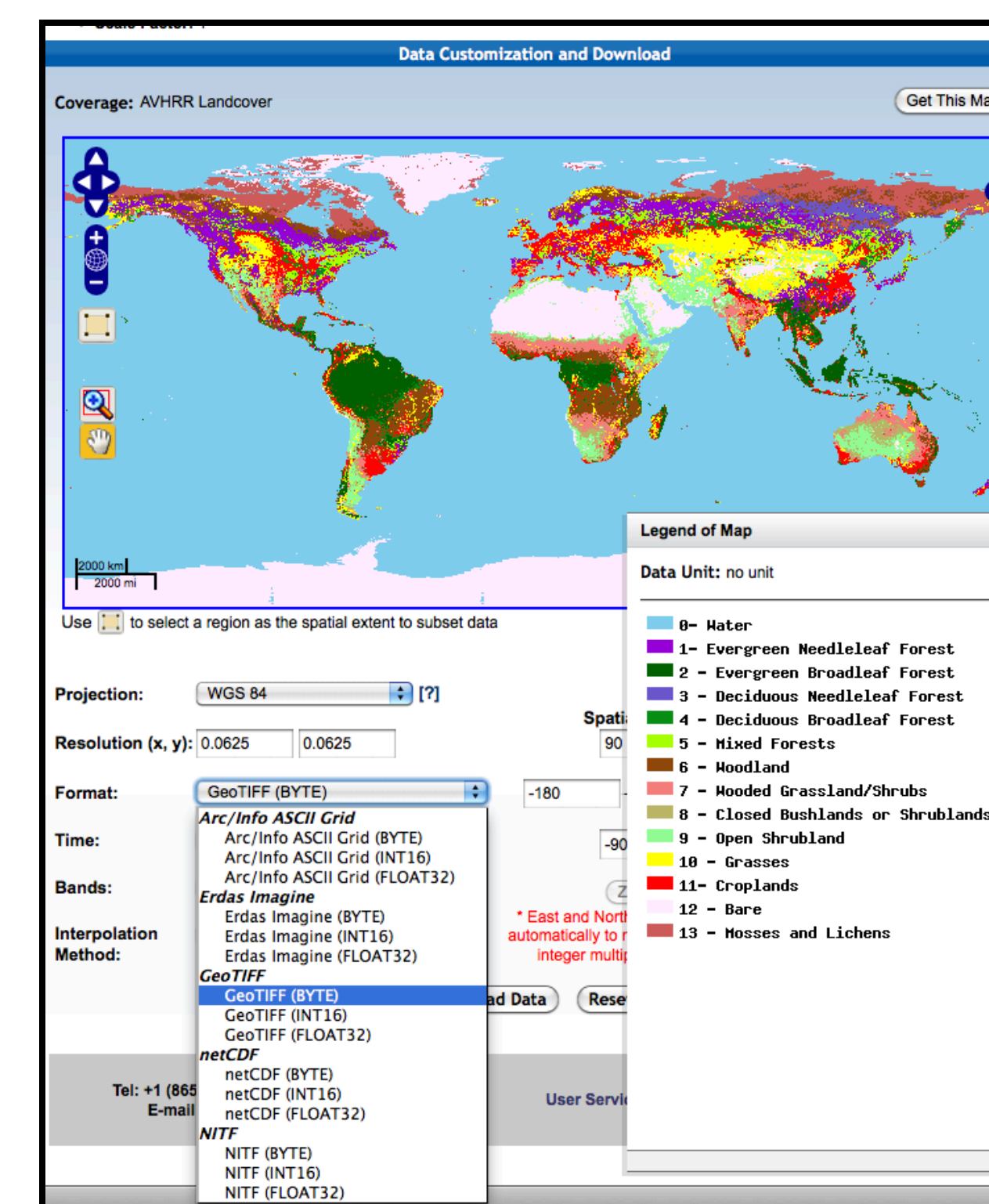
Visualize and download data through OGC Services
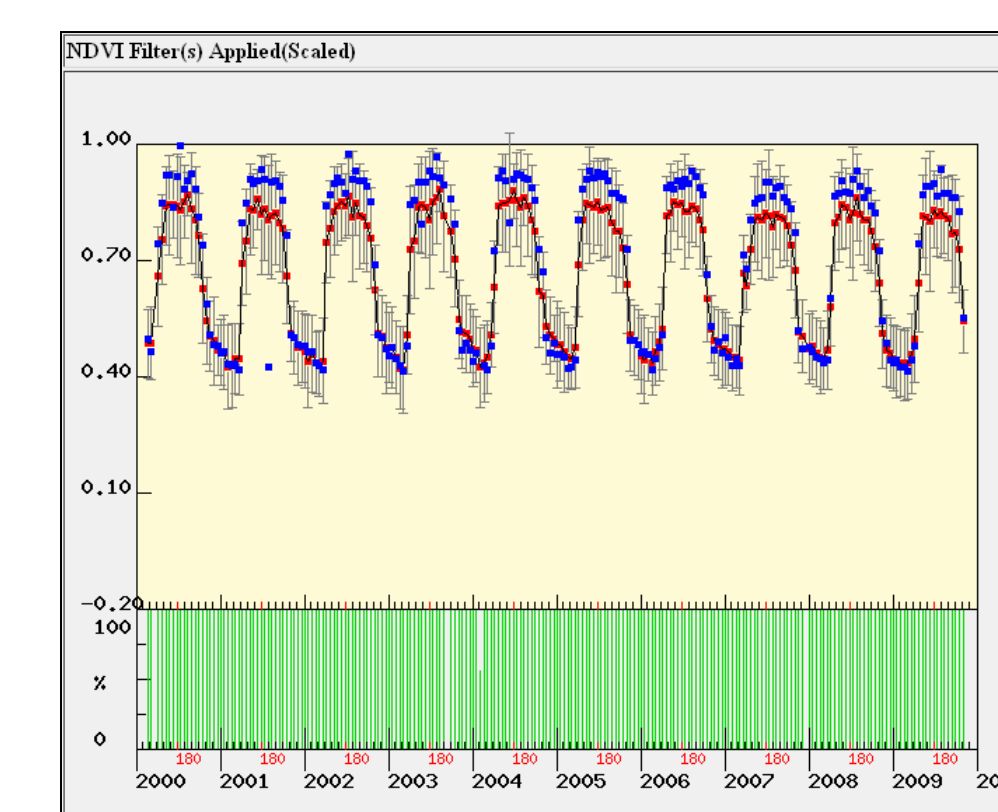
Example screen shots of ORNL DAAC Visualization of MODIS remote sensing data

DAYMET

Daymet is a model that generates daily surfaces of temperature, precipitation, humidity, and radiation at 1km x 1km spatial resolution over large regions of complex terrain. No other weather/climate data at this temporal and spatial resolution exists. Daymet data will be useful in modeling and understanding vegetation dynamics. Available in Winter 2011/2012

Hyperion
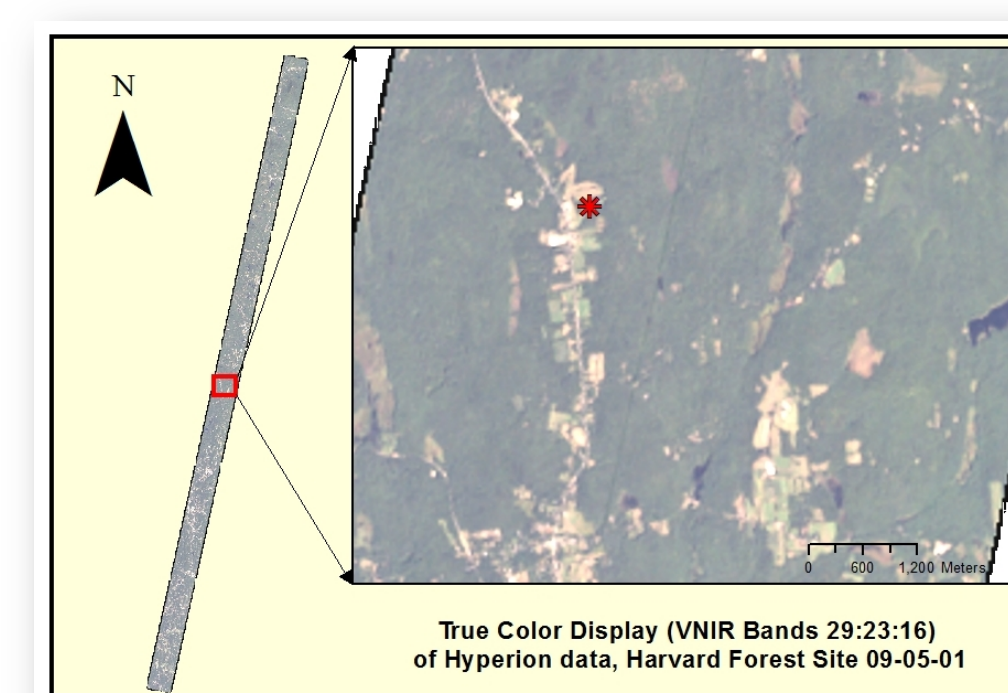
The Hyperion capabilities provide resolution of surface properties into hundreds of spectral bands. Through these spectral bands, complex land eco-systems can be imaged and accurately classified. The Hyperion provides a high resolution hyperspectral imager capable of resolving 220 spectral bands with a 30-meter resolution. The instrument can image a 7.5 km by 100 km land area per image, and provide detailed spectral mapping with high radiometric accuracy.

Synthetic Aperture RADAR Subsets

Subsets of PALSAR (Phased Array type L-band Synthetic Aperture Radar) sensor data from the Advanced Land Observing Satellite (ALOS) are currently provided for selected field sites in GeoTIFF format at the ORNL DAAC. Visualizations of the ALOS- PALSAR subsets are available through SDAT. Backscattering coefficient and HH, HV polarizations of the data are available for visualization. Example usage of SAR data provided at http://daac.ornl.gov/LAND_VAL/sar.shtml
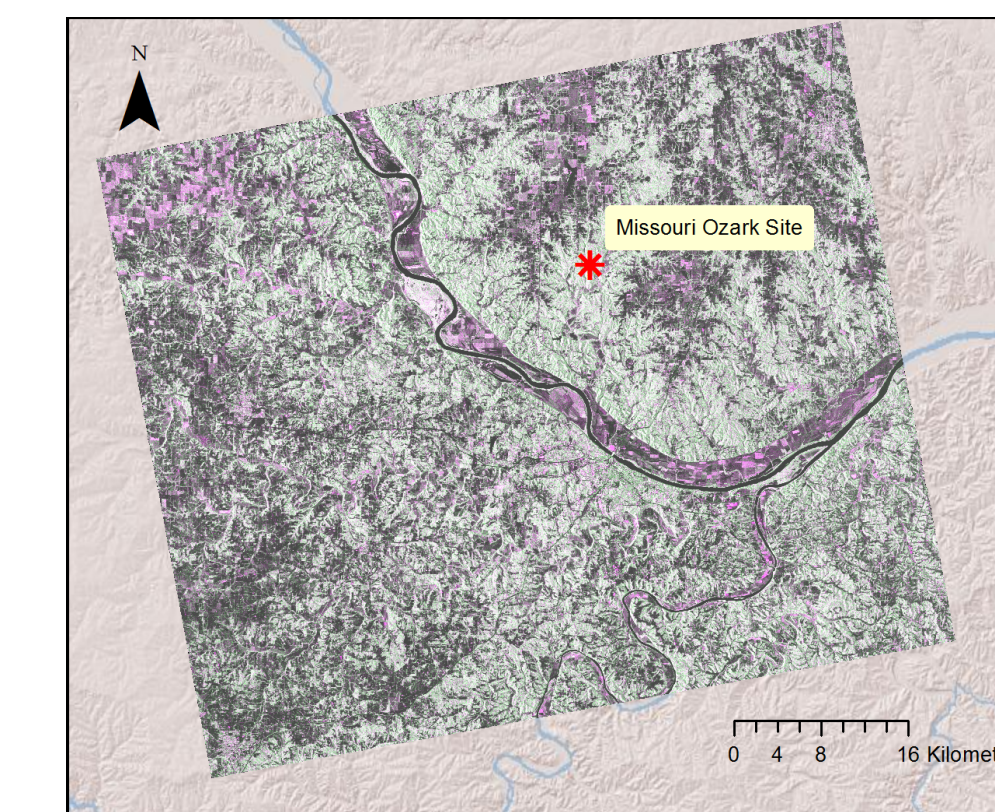
Example Applications

Remote sensing data and visualization provided by the ORNL DAAC tools can be used in understanding phenology and in data intensive studies.

Time series visualization of remote sensing data can be combined with data from field sites for inter-comparison and validation exercises.
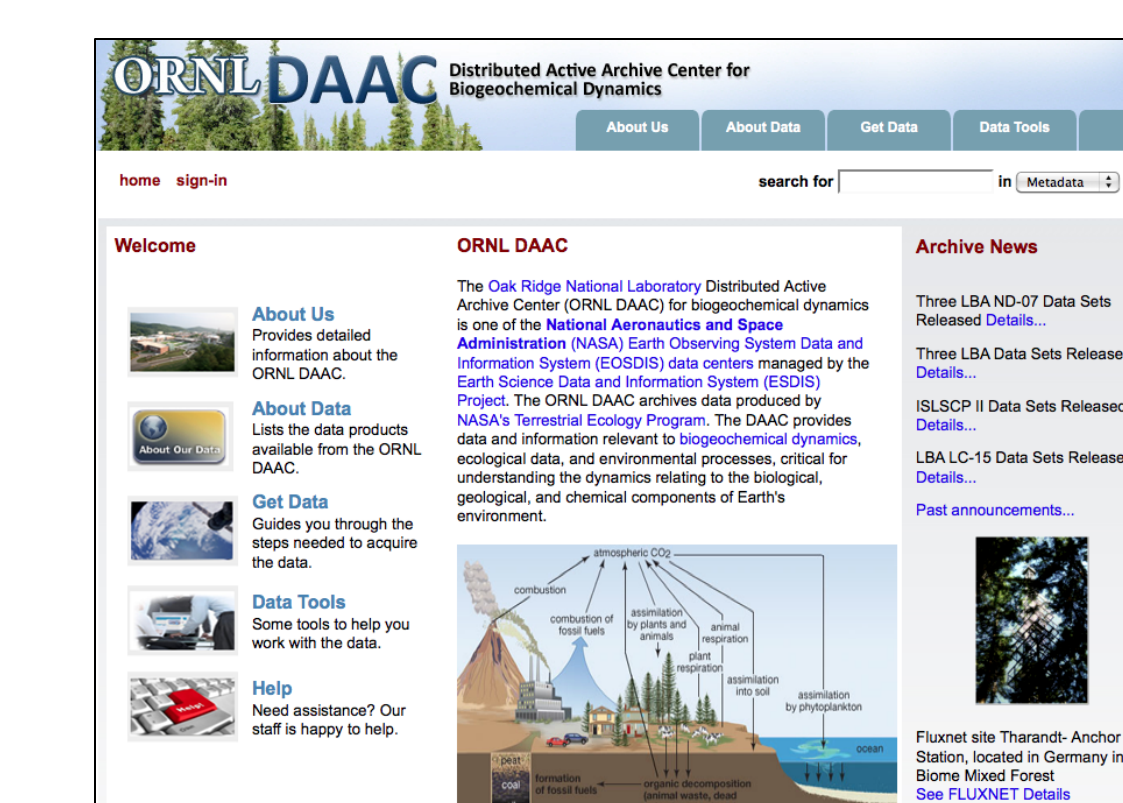
The ORNL DAAC visualization tools are easy to use and have been used in graduate and undergraduate classroom education to illustrate the use of remote sensing data for scientific research.
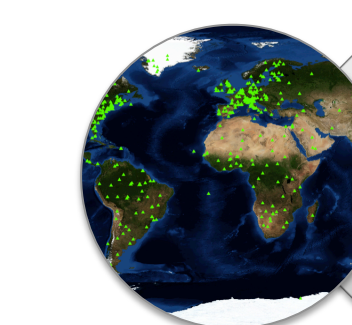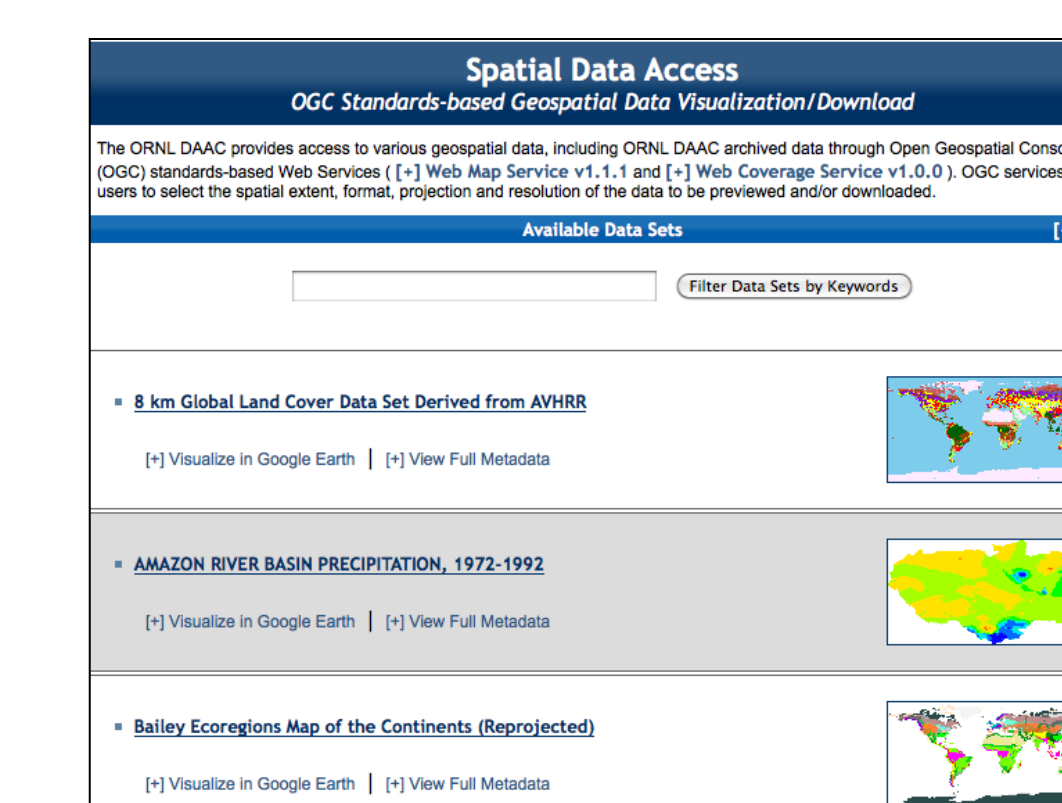
OGC tools are provided in a format that allows data and visualization mashups. Visualization provided through an OGC server can be accessed on any web accessible system.

Relevant Links

http://daac.ornl.gov

http://webmap.ornl.gov/wcsdown

http://daac.ornl.gov/MODIS

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