

Free and Open Source Geospatial Software and Data

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Software and Data Licenses

Proprietary <ul style="list-style-type: none">• Limited Distribution• Limited Use• End User License Agreement• Closed Source Code• Vendor support	Shareware <ul style="list-style-type: none">• Unlimited Distribution• Limited Use• End User License Agreement• Closed Source Code
Public Domain <ul style="list-style-type: none">• Unlimited Distribution• Unlimited Use• Closed Source Code• Can be turned into proprietary product if value is added• Rarely has support	Open Source <ul style="list-style-type: none">• Unlimited Distribution• Unlimited Use• Open Source Code• Can be improved but may not be turned into a proprietary product• Community support

Geographical Information Systems



- No Good Definition

- **Geographic information systems (GIS)** or **geospatial information systems** is a set of tools that captures, stores, analyzes, manages, and presents data that are linked to location(s). (Wikipedia)
- A database whose elements have Geographic Information (geo-coded)



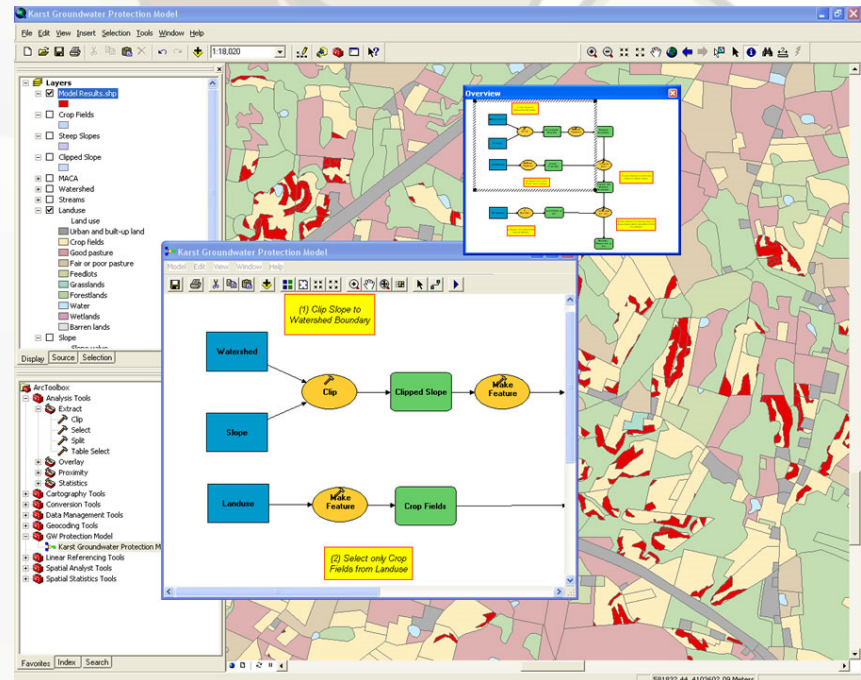
Cost Ratio

“When creating a GIS your computers will cost you 300,000 drachmas, your software licenses 3,000,000 drachmas and your data 30,000,000 drachmas”

Professor Kollia 6th semester GIS course

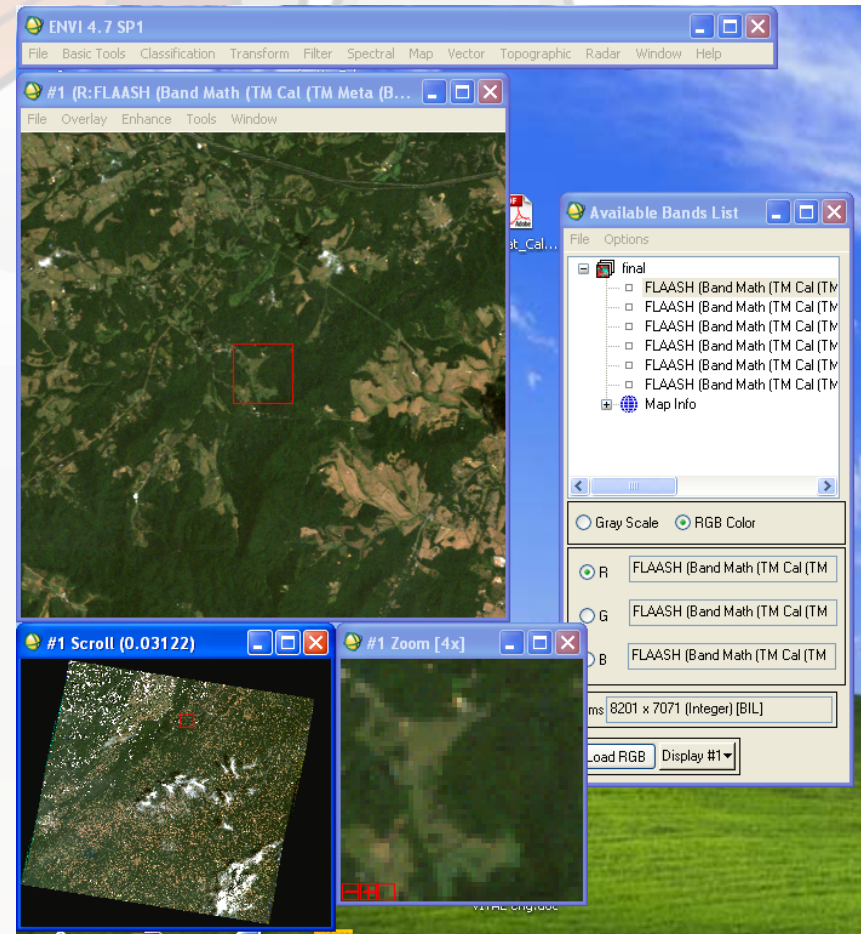
ArcInfo

- Made by ESRI
- Expensive
 - VT pays \$9,200-9,800/yr
- Powerful
- User friendly (6/10)
- Industry Standard
- Mostly GIS
- Available in various OS
- Current Version 9.3



ENVI

- Made by ITTVIS
- Integrated with IDL
- Expensive
 - CNRE pays \$3,000/year
- Powerful
- Not very user friendly (5/10)
- Few GIS functionalities
- Various OS
- Current Version 4.8



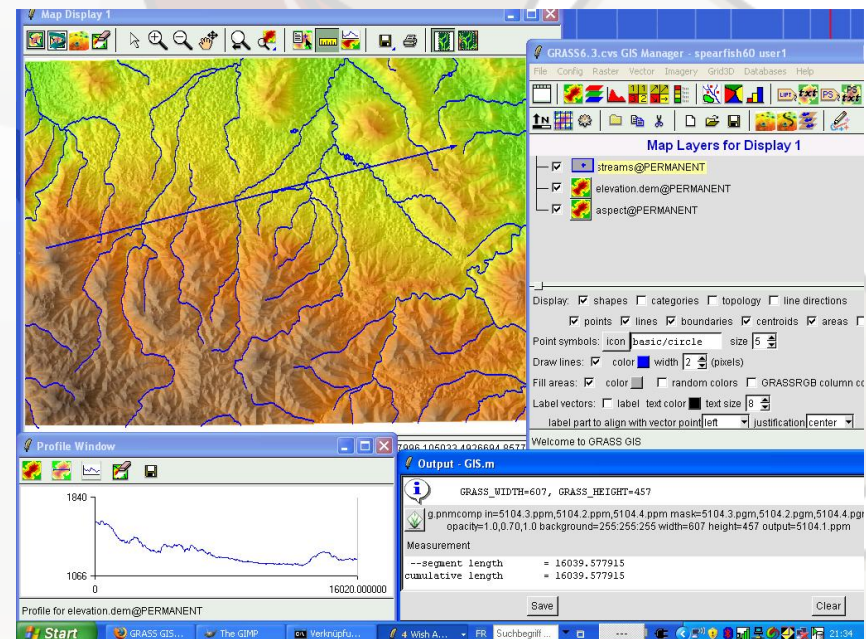


SPRING

- Sistema de Processamento de Informações Georeferenciadas
- Made by the Brazilian Space Agency (INPE)
- Free Software, INPE owns copyright
- Current version 5.1
- Available in Portuguese, English, Spanish and French
- Windows and Linux
- More Remote Sensing than GIS
- Peculiar file structure, idiosyncratic philosophy

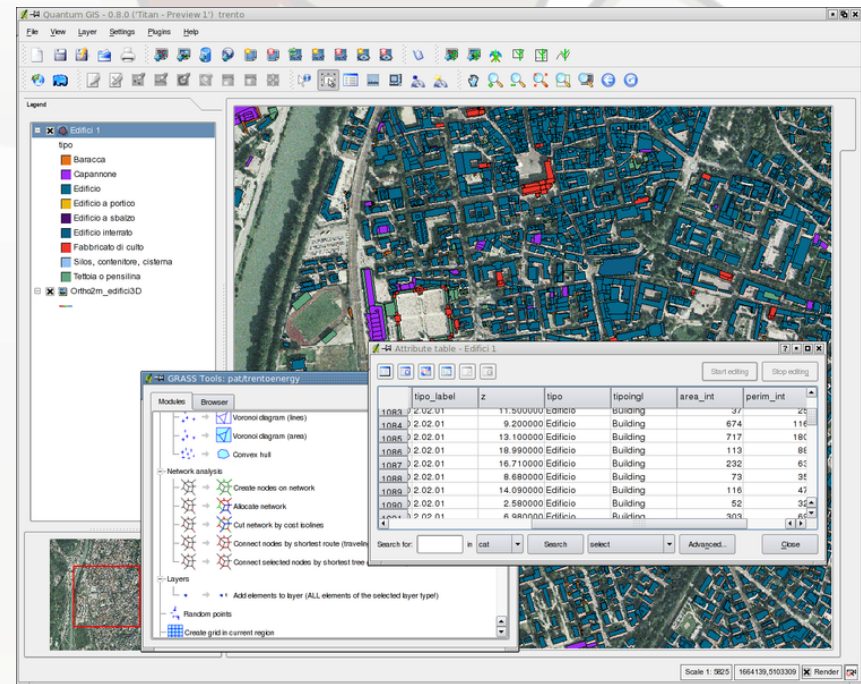
GRASS GIS

- Geographic Resources Analysis Support System
- Originally made for US Army CERL in 1982 for Unix
- Since version 4.2 Open Source
- Current version 6.4, first stable Windows version
- Very Powerful
- Command line based
- Very user unfriendly



Quantum GIS

- Inspired by ArcInfo
- Open Source
- Current Version 1.5
- User friendly
- Not very capable
- Available in many OS



Geospatial Data sources

- Government agencies
 - “[G]overnment of the people, by the people, for the people, shall not perish from the earth”
 - Abraham Lincoln, Gettysburg Address (11/19/1863)
 - “L’État c’est Moi”
 - Apocryphal, attributed to Louis XIV
 - “It is the duty of a good shepherd to shear his sheep, not to skin them”
 - Emperor Tiberius
- Corporate Sources
 - Utilities
 - Private Satellites
- The Public
 - OpenStreetMap

Geospatial Data Limitations

- Proprietary
 - “Raw images may not be published. Processed images may only be published if the original cannot be recovered from it” (SPOT Image License)
- GNU Public License
 - No commercial product can be made from it
- Public Domain
 - Reference to the original creator



Freegis.org

- A database with links to georeferenced data
- Most originate in the US government
 - TIGER
 - Geo Names Server
 - SRTM

USGS Earth Explorer

<http://edcsns17.cr.usgs.gov/EarthExplorer/>

The screenshot shows the USGS Earth Explorer web application running in a Mozilla Firefox browser. The browser's address bar displays the URL <http://edcsns17.cr.usgs.gov/EarthExplorer/>. The page features the USGS logo and a navigation bar with links for Home, Login, Register, Shopping Basket, and Help. A message banner indicates "There are 5 messages. (Updated: 11/1/2010)".

The main content area is divided into three sections:

- 1. Select your dataset(s)**: This section provides a list of datasets categorized by type. The categories include Aerial Photography, AVHRR, Cal/Val Reference Sites, Commercial, Declassified Data, Digital Elevation (with a related link), Digital Line Graphs (with a related link), Digital Maps (with a related link), EO-1, Forest Carbon Sites, Global Land Survey, HCMM, Land Cover, Landsat Archive (with a related link), Landsat Legacy, Landsat MRLC, NASA LPDAAC Collections, and Radar. A note states: "Click on [icon] next to the category name to show a list of datasets." and "Icon means selected data within the Data Sets can be downloaded at no charge." Below the list, a "Selected Datasets" section shows "None Selected".
- 2. Enter your search criteria**: This section contains search fields for "Address/Place Name/ Zip Code Search" (with a "(US/World Feature Search)" link), "From (mm/dd/yyyy):" (set to 01/01/1920), and "To (mm/dd/yyyy):" (set to 12/31/2020). There is a "Search" button and a "Reset" button. A checkbox option "Search these months only." is also present.
- 3. Search >>>**: This section displays a map of the United States with state boundaries and names. The map is overlaid with a grid. A "Map" button is visible, and a "Show Labels" checkbox is checked. Below the map, there is a "Help" link, a "Hide Map" button, a "Clear My Area Selection" button, and an "Add Map to Selection" button. A disclaimer states: "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." Below this, there is a section for "Area Selected" with fields for "Degree/Minute/Second" and "Decimal". The "Latitude" field is set to "1. Latitude: 0" and the "Longitude" field is set to "Longitude: 0".

The browser's taskbar at the bottom shows several open applications: "start", "Multi-Resolution Land...", "EarthExplorer - Mozil...", "LP DAAC :: ASTER an...", "OSGIS.pptx", "Données3.ppt [Comp...", and "VIANNIS (L)". The system clock in the bottom right corner shows "4:41 PM".

NASA WIST

<https://wist.echo.nasa.gov/~wist/api/imswelcome/>

Primary Data Search - Mozilla Firefox

File Edit View History Bookmarks Tools Help

https://wist.echo.nasa.gov/~wist/api/ims.cgi?mode=MAINSRCH&JS=1

WIST | Get Data | LP DAAC :: ASTER a... Primary Data Search

Choose Keywords for One or More Categories

Text Search: Go Help

Pick a discipline/topic (for example: Atmosphere:TRMM), then choose from the list of data sets.
For multiple topics: choose one topic & data sets, then the next topic & data sets.
To select/deselect* more than one data set, use Ctrl-click for PCs; Apple-click for Macintosh.

View Data Set Definition Choose Data Set Keywords

Atmosphere:	Cryosphere:	Land:	Oceans:	Solar/Other:
<input type="radio"/> Aircraft	<input type="radio"/> Aircraft	<input type="radio"/> Aircraft	<input type="radio"/> Aircraft	<input type="radio"/> Aircraft
<input type="radio"/> Aqua AIRS/AMSU-A/HSB	<input type="radio"/> AMSR/AMSR-E	<input type="radio"/> AMI	<input type="radio"/> AMSR/AMSR-E	<input type="radio"/> GLAS/ICESat
<input type="radio"/> AMI	<input type="radio"/> MODIS/Aqua	<input type="radio"/> AMSR/AMSR-E	<input type="radio"/> AVHRR	<input type="radio"/> MODIS/Aqua
<input type="radio"/> AMSR/AMSR-E	<input type="radio"/> MODIS/Terra	<input type="radio"/> ARGON	<input type="radio"/> AVHRR	<input type="radio"/> MODIS/Terra
<input type="radio"/> ASAR	<input type="radio"/> RADAR	<input type="radio"/> ARGON	<input type="radio"/> ESMR	<input type="radio"/> MODIS/Terra
<input type="radio"/> ASTER	<input type="radio"/> ESMR	<input type="radio"/> ASAR	<input type="radio"/> Field/In Situ	<input type="radio"/> SeaWinds
<input type="radio"/> AVHRR	<input type="radio"/> Field/In Situ	<input type="radio"/> ASTER	<input type="radio"/> GHRST	<input type="radio"/> SMMR/Terra
<input type="radio"/> CALIPSO	<input type="radio"/> GLAS/ICESat	<input type="radio"/> AVHRR		<input type="radio"/> SSM/I-SMMIS
<input type="radio"/> CERES/Aqua	<input type="radio"/> Hyperion	<input type="radio"/> Field/In Situ		
<input type="radio"/> CERES/Terra	<input type="radio"/> Landsat 1-5	<input type="radio"/> GLAS/ICESat		
<input type="radio"/> CERES/TRMM	<input type="radio"/> Landsat 7	<input type="radio"/> Landsat 1-5		
<input type="radio"/> ESMR	<input type="radio"/> MISR	<input type="radio"/> Landsat 7		
<input type="radio"/> Field/In Situ				
<input type="radio"/> FSSP				
<input type="radio"/> GLAS/ICESat				
<input type="radio"/> GOES				
<input type="radio"/> GOSAT/ACOS				
<input type="radio"/> HIRDLS/Aura				
<input type="radio"/> HRIR/MRIR/THIR				
<input type="radio"/> Hyperion				
<input type="radio"/> Landsat 1-5				
<input type="radio"/> Landsat 7				
<input type="radio"/> LIGHTNING				
<input type="radio"/> LIMS	<input type="radio"/> Model	<input type="radio"/> MISR	<input type="radio"/> GLAS/ICESat	<input type="radio"/> ACRIM
<input type="radio"/> MERRA	<input type="radio"/> MODIS/Aqua	<input type="radio"/> Model	<input type="radio"/> MODIS/Aqua	<input type="radio"/> Field/In Situ
<input type="radio"/> MISR	<input type="radio"/> MODIS/Terra	<input type="radio"/> AMSR/AMSR-E	<input type="radio"/> MODIS/Terra	<input type="radio"/> Socioeconomic
<input type="radio"/> MLS/Aura	<input type="radio"/> RADAR	<input type="radio"/> ARGON	<input type="radio"/> MODIS/Terra	<input type="radio"/> SORCE
<input type="radio"/> MODEL	<input type="radio"/> SAR	<input type="radio"/> ASAR	<input type="radio"/> SeaWinds	<input type="radio"/> UARS
<input type="radio"/> MODIS/Aqua	<input type="radio"/> SeaWinds	<input type="radio"/> ASTER	<input type="radio"/> SMMR/Terra	
<input type="radio"/> MODIS/Terra	<input type="radio"/> SMMR	<input type="radio"/> AVHRR	<input type="radio"/> SSM/I-SMMIS	
<input type="radio"/> MOPITT	<input type="radio"/> SRA	<input type="radio"/> Field/In Situ		
<input type="radio"/> Nimbus7-ERB	<input type="radio"/> SSM/I-SMMIS	<input type="radio"/> GLAS/ICESat		
<input type="radio"/> NOAA AMSU-A/MSU	<input type="radio"/> TOVS	<input type="radio"/> Landsat 1-5		
<input type="radio"/> OMI/Aura		<input type="radio"/> Landsat 7		
<input type="radio"/> SAGE				
<input type="radio"/> SAR				
<input type="radio"/> SeaWinds				
<input type="radio"/> SMMR				
<input type="radio"/> SRB				
<input type="radio"/> SSBUV				
<input type="radio"/> SSM/I-SMMIS				
<input type="radio"/> TES/Aura				
<input type="radio"/> TOMS				
<input type="radio"/> TOVS				
<input type="radio"/> TRMM				
<input type="radio"/> UARS				

"By Discipline" not responding? Use the [non-javascript version](#).

☒ By Discipline ☐ By Categories/Attributes ☐ By Keywords

Done

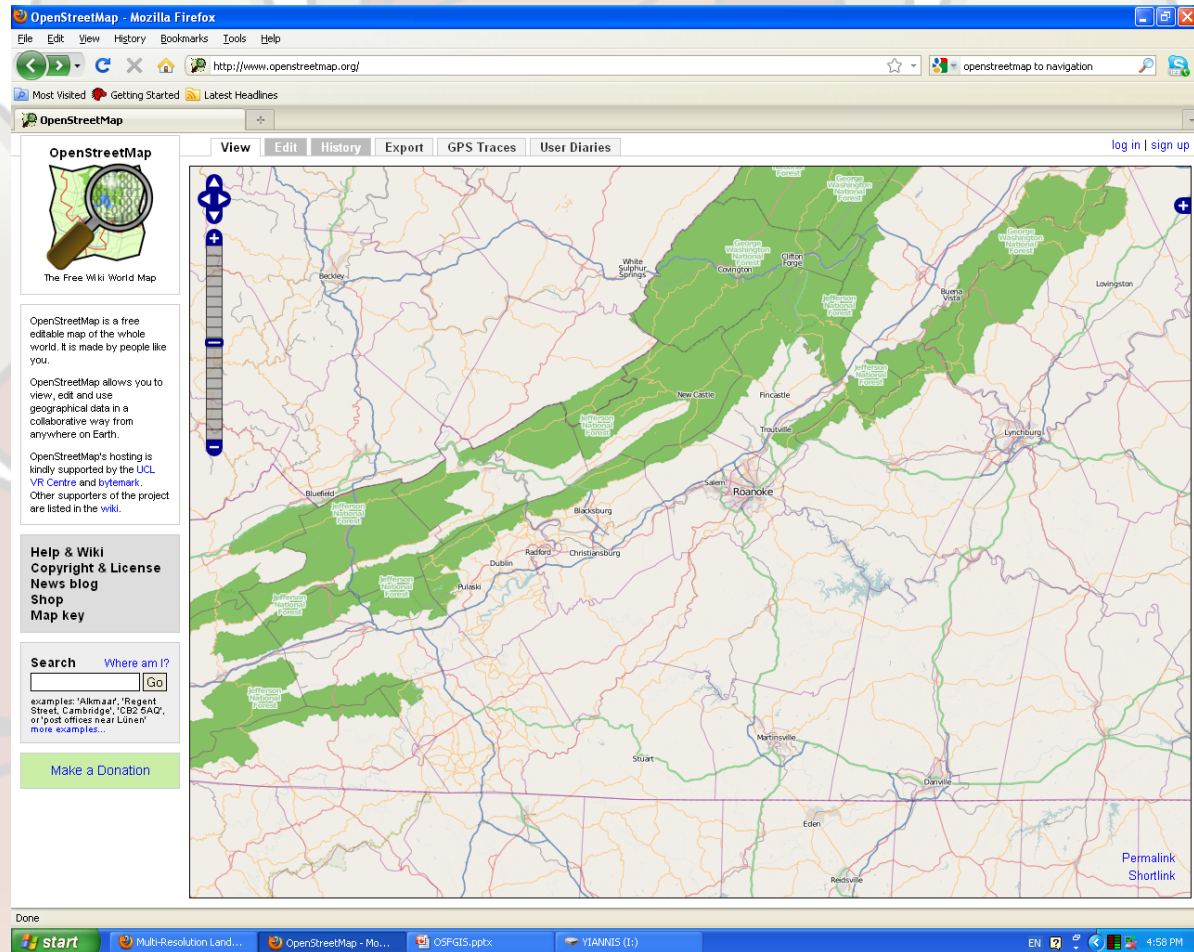
start Multi-Resolution Land... EarthExplorer - Mozil... Primary Data Search ... OSFGIS.pptx YIANNIS (1:) untitled - Paint EN 4:44 PM

European Environmental Agency

<http://www.eea.europa.eu/data-and-maps/data>

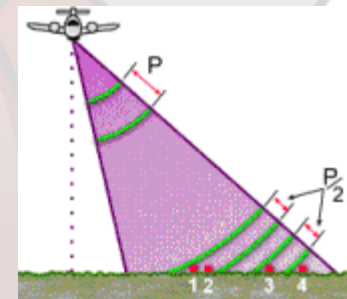
The screenshot displays the EEA Datasets website interface. The browser window title is "Datasets — EEA - Mozilla Firefox". The address bar shows the URL <http://www.eea.europa.eu/data-and-maps/data#c5=all&c11=6&c17=6&c0=5>. The page features a green header with the EEA logo and a search bar. Below the header is a navigation menu with links like "Environmental topics", "Publications", "Multimedia", "Data and maps", "Networks", "Press room", and "About EEA". The main content area is titled "Data and maps" and "Datasets", with a subtitle "Downloadable data about Europe's environment." It includes a search bar, a "Basic search" section with a list of topics (e.g., Air pollution, Biodiversity, Climate change), a "Current search" section showing results for "Natura 2000 data", and a "Geographic coverage" section with checkboxes for EFTA4, EU15, EU25, and EU27. There are also "Quick links" and "Main data sets" sections. The Windows taskbar at the bottom shows the Start button and several open applications, including "Multi-Resolution Land...", "Datasets — EEA - Mo...", "OSGIS.pptx", and "VIANNIS (I)". The system clock indicates 4:52 PM.

Openstreetmap.org



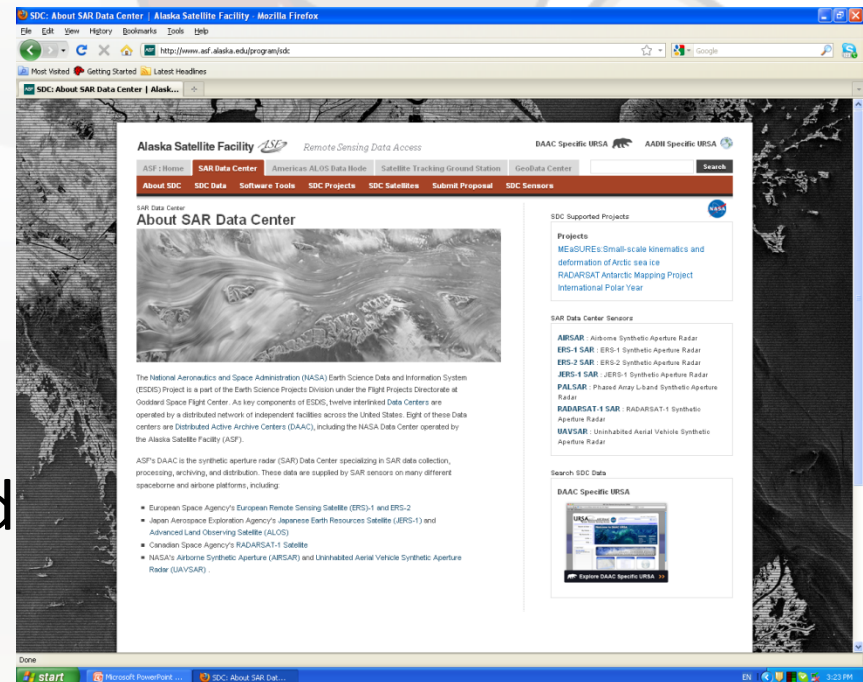
RADAR

- Sideways looking
- Satellite or airborne sensors
- Can image surface roughness and moisture content
- Radar images require special processing
- Helpful when the ground is not visible
 - Clouds
 - Night
- Has its own specialized community



Alaska Satellite Facility

- <http://www.asf.alaska.edu>
- Contains RADAR imagery and software at various processing levels
- Downloading foreign sensor data requires submitting a proposal and is open only to government and educational institutes



Conclusions

- A lot of Open Source and Free Geospatial software is available but it is not very commonly used or user friendly
- Most free Geospatial information originates with the US Government
- Most is in the form of Raster layers
- Difficult to create commercial applications from it