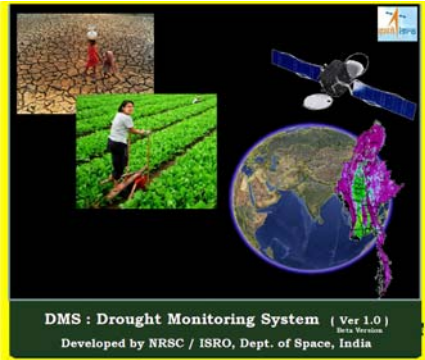



**nrsc** Drought Monitoring System for Myanmar

**Introduction to QGIS with special emphasis on drought mechanism**


Nay Pyi Taw



**DMS : Drought Monitoring System ( Ver 1.0 )**  
Beta Version  
Developed by NRSC / ISRO, Dept. of Space, India

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**Introduction to Quantum GIS**



<http://www.qgis.org>  
<http://www.osgeo.org>

## Agenda

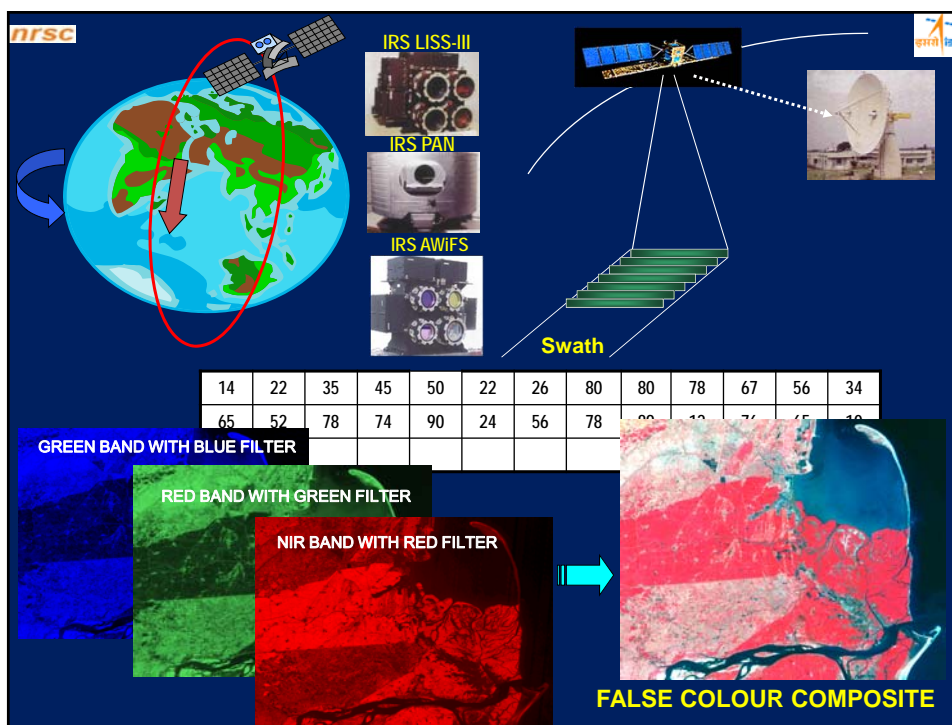
- ✓ Overview of GIS
- ✓ Introduction to Quantum GIS
- ✓ Vector Data
- ✓ Raster Data
- ✓ Plugins
- ✓ Fields and Attribution
- ✓ Creating Data
- ✓ Map Layout
- ✓ Modeling

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**AGENDA**


- ❖ QGIS FRONT END
- ❖ TOOLS, PLUGINS, TOOL BOX, MODELS
- ❖ DATATYPES, RASTER, VECTOR, ATTRIBUTES
- ❖ COORDINATES, SYSTEMS, PROJECTIONS
- ❖ RASTER ANALYSIS
  - ✓ DISPLAY, ENHANCE, MIN/MAX , LUT NDVI,
  - ✓ VALUES , IDENTIFY, MULTILAYER, GRPHICS, PROFILES
  - ✓ CLIPPING, ZONAL STATS, FILLDATA, MOSAIC/MERGE,
  - ✓ MODIS DATA – PROJ, GEO CONVERSION WARP, RASTER CALCULATOR, MERGE
  - ✓ MULTI BAND DATA – VISUALISATION – AWIFS DATA
- ❖ VECTOR ANALYSIS
  - ✓ DISPLAY, SYMBOLS, LABELS PROPERTIES, FILTERS, QUERY, MULTI LAYER QUERY
  - ✓ STATS EG, INTERSECTION, UNION, DISSOLVE USING MY DATA
- ❖ MODELS FOR NDVI, NDWI, MOSAIC, ETC. PLUGINS WITH OGC SERVICES
- ❖ MAP COMPOSITION

**nrsc** **Your data and sessions for hands on**

- 1. Raster Data Analysis
- 2. Vector data analysis
- 3. Support Data
- 4. Modis Data Analysis
- 5. Plugins-ogc-urls-quickmap
- 6. photo tagging and information autom...
- 7. Map composition
- 8. Modeling
- 9. MODIS processed data for Myanmar
- QGIS LECTURE-RAJA SHEKHAR-NRSC-IS...
- QGIS-OSGeo4W-2.8.1-1-Setup-x86\_64



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✓ **Digital Image**

- Spatial component
- Spectral Component
- Radiometric Component
- Temporal Component

*"Value of Pixel" at a "Point of interest" at a "Point of Time"*

**Digital Image processing**, form of information processing which applies signal processing techniques on higher dimensional signals (image)

**Broad Classification Digital Image Processing techniques**

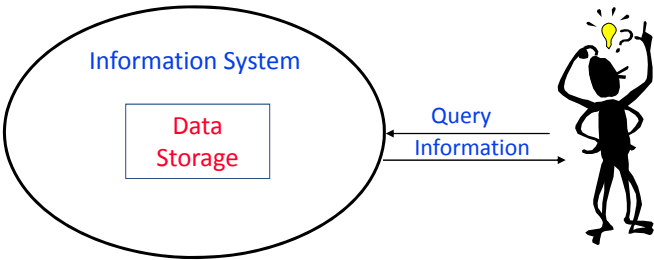
- Image Restoration / Preprocessing – **Correct Position**
- Image Enhancements – **Correct Value**
- Information Extraction / Pattern Recognition – **Correct Identification**
- Representing in alternate/more efficient form - **Correct implementation**

Decode


Encode

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## What is an Information System?



Information systems can be very simple, such as a telephone directory.

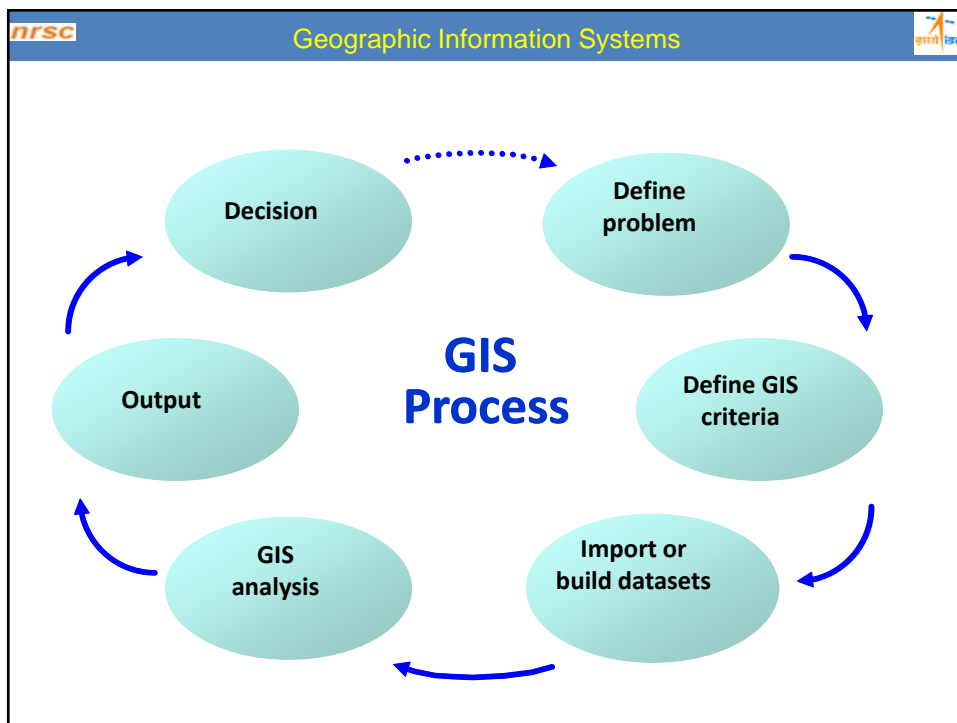


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GIS

## 1. Overview of GIS

- Geographic Information System
- Wikipedia definition - it is a system designed to capture, store, manipulate, analyze, manage, and present all types of geographically referenced data.
- It is used in many applications: Small municipalities, forestry, military, commercial businesses, etc., etc.,
- What do you do with it?



## GIS

- Easily measure distances
- Easily measure areas
- Find overlap between features
- Analysis / Query / Proximity / Decision making
- Everything is related by location
- And Attributes

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## What can you do with a GIS?

- The possibilities are unlimited...
  - Environmental impact assessment
  - Resource management
  - Land use planning
  - Tax Mapping
  - Water and Sanitation Mapping
  - Transportation routing
  - and more ...

**The Data**

➤ **“Layering Technology”** Data is organized by **layers, coverages or themes** (synonymous concepts), with each layer representing a common feature.

➤ **Geographic location is the organizing principal.**

➤ GIS works mainly with two data models – **Raster & Vector**

**A. Raster Model**

- ✓ Represents area covered by grid with (usually) equal-sized, square cells
- ✓ Each grid or cell has one unique value representing the attribute or feature.
- ✓ Usually satellite or areal imagery is represented in Raster data format.
- ✓ Pixel or grid resolution is the limit for feature identification.
- ✓ Data formats like GeoTIFF, img, pix, hdf are used.

**A. Vector Model**

- ✓ Represents area covered with geographic features.
  - **points or dots (nodes)**: trees, poles, fire plugs, airports, cities
  - **lines (arcs)**: streams, streets, sewers,
  - **areas (polygons)**: land parcels, cities, counties, forest, rock type
- ✓ Attributes are in tables. More complex operations can be performed.
- ✓ Data formats can be shp, gml, kml or from RDBMS like postgres, oracle etc.

Maps		Attribute Database										
		<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Map Data</th> <th>Attribute Data</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">Soils</td> <td> <ul style="list-style-type: none"> <li>• type</li> <li>• texture</li> <li>• pH</li> <li>• erosion potential</li> </ul> </td> </tr> <tr> <td style="text-align: center;">Land-cover</td> <td> <ul style="list-style-type: none"> <li>• dominant species</li> <li>• size</li> <li>• density</li> </ul> </td> </tr> <tr> <td style="text-align: center;">Hydrography</td> <td> <ul style="list-style-type: none"> <li>• lakes</li> <li>• streams</li> <li>• watersheds</li> <li>• gauging stations</li> </ul> </td> </tr> <tr> <td style="text-align: center;">Topography</td> <td> <ul style="list-style-type: none"> <li>• elevation</li> <li>• slope</li> <li>• aspect</li> </ul> </td> </tr> </tbody> </table>	Map Data	Attribute Data	Soils	<ul style="list-style-type: none"> <li>• type</li> <li>• texture</li> <li>• pH</li> <li>• erosion potential</li> </ul>	Land-cover	<ul style="list-style-type: none"> <li>• dominant species</li> <li>• size</li> <li>• density</li> </ul>	Hydrography	<ul style="list-style-type: none"> <li>• lakes</li> <li>• streams</li> <li>• watersheds</li> <li>• gauging stations</li> </ul>	Topography	<ul style="list-style-type: none"> <li>• elevation</li> <li>• slope</li> <li>• aspect</li> </ul>
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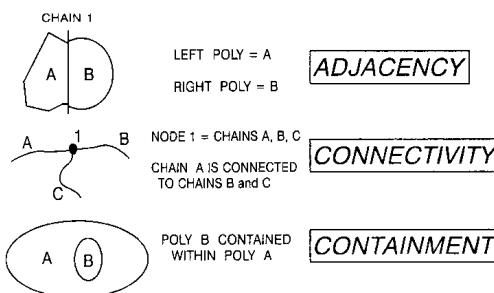
## Spatial Concepts

❖ **Topology** - generally, spatial relationships between geometric elements

✓ Mathematical property that makes spatial relationships explicit and establishes connectivity between the features on a map

✓ Relationships:

- **Adjacency (contiguity)**
- **Connectivity (network)**
- **Proximity (distance)**
- **Containment**



✓ Spatial relationship between geographic features—is **fundamental to ensuring data quality**.

✓ Topology enables advanced **spatial analysis**

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## Outputs from a GIS

- Maps
  - Printed
- Digital (PDF, JPEG )
- Spreadsheets
- Databases
- Files
  - Shapefiles / postgres
  - KML / GML

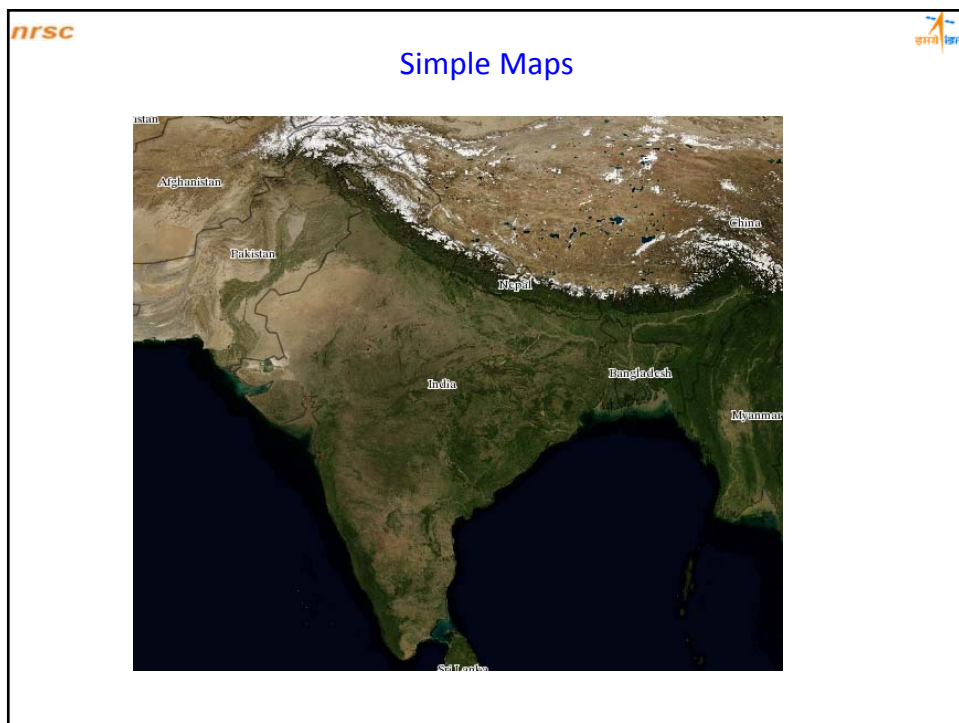
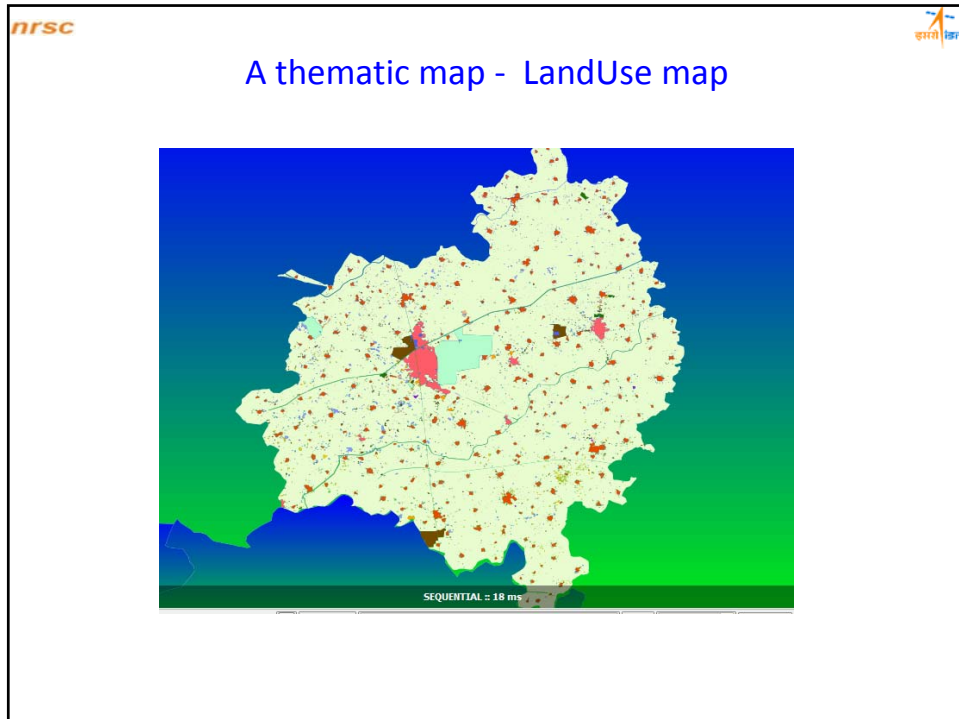
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The figure consists of four panels illustrating different GIS outputs:

- Map Composition:** A map showing various land use categories with a legend. The legend includes:
  - Intensive Agriculture
  - Agro Horticulture I (Banana, Mango, etc.)
  - Agro Horticulture II (Banana, Mango, etc.)
  - Agro Forestry I
  - Horticulture
  - Social Forestry
  - Silviculture
  - Management
  - Fuel, Fodder plantation
  - Gap filling with forest species
- Overlays / Vector data:** A map showing vector data overlays, including labels for 'Dongola', 'Dumbarton', 'Culpatation', 'Harrad', and 'Harrad'.
- Raster Data:** A satellite image showing a landscape with a grid overlay, labeled 'Raster Data'.
- Identify / Query:** A screenshot of a GIS software interface showing a map of Sri Lanka with a red polygon. The 'Identify Results' window displays a table of attributes for the selected feature.

Feature	Value
NAME_1	Sri Lanka
NAME_2	Sri Lanka
NAME_3	Sri Lanka
NAME_4	Sri Lanka
NAME_5	Sri Lanka
NAME_6	Sri Lanka
NAME_7	Sri Lanka
NAME_8	Sri Lanka
NAME_9	Sri Lanka
NAME_10	Sri Lanka
NAME_11	Sri Lanka
NAME_12	Sri Lanka
NAME_13	Sri Lanka
NAME_14	Sri Lanka
NAME_15	Sri Lanka
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NAME_92	Sri Lanka
NAME_93	Sri Lanka
NAME_94	Sri Lanka
NAME_95	Sri Lanka
NAME_96	Sri Lanka
NAME_97	Sri Lanka
NAME_98	Sri Lanka
NAME_99	Sri Lanka
NAME_100	Sri Lanka





## Fundamental Libraries GDAL, OGR


GDAL is a translator library for raster geospatial data formats...It also comes with a variety of useful commandline utilities for data translation and processing.




The OGR Simple Features Library is a C++ open source library (and commandline tools) providing read (and sometimes write) access to a variety of vector file formats including ESRI Shapefiles, S-57, SDTS, PostGIS, Oracle Spatial, and Mapinfo mid/mif and TAB formats.

## 2. Introduction to Quantum GIS

- Open Source – It comes with the right to download, run, copy, alter, and redistribute the software.
- With source code users have the option
  - Suggest improvements
  - Make improvements themselves
  - Hire a professional to make the changes
  - Save software from abandonment

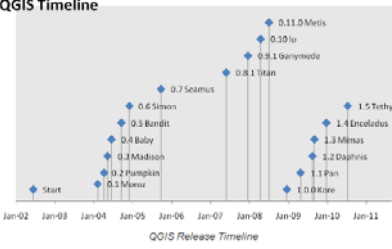


# QGIS



- The QGIS project began in February, 2002
- Produced by a Development team
  - Gary Sherman, Founder
- The first release was in July of that year
- The first version supported only PostGIS and had no map navigation tools or layer control.

**QGIS Timeline**




QGIS Release Timeline

## QGIS is GPL

About Quantum GIS
?
X

About
What's New
Providers
Developers
Contributors
Translators
Donors



### Quantum GIS (QGIS)

You are using QGIS version 1.7.4-Wroclaw built against code revision 411aff6.  
 GDAL/OGR Version: 1.8.1.  
 PostgreSQL Client Version: 8.3.10.  
 Spatialite Version: 2.4.0.  
 QWT Version: 5.2.1.

This copy of QGIS writes debugging output.  
 This binary was compiled against Qt 4.7.1, and is currently running against Qt 4.7.1

Quantum GIS is licensed under the GNU General Public License  
<http://www.gnu.org/licenses>

QGIS Home Page
Join our user mailing list

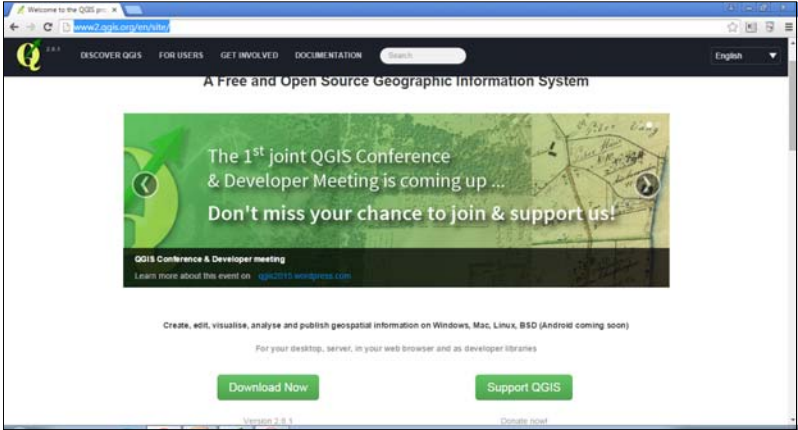
Close

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सर्वोपयोगी

# Installing Quantum

- <http://www.qgis.org>



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सर्वोपयोगी

# Windows

- Windows Installer Method
  - Standalone Installer (recommended for new users)
  - Installs Quantum (Currently 2.16), 2.14 has some issues
    - Also installs Current Release of GRASS / SAGA GIS
    - Also installs python latest version that runs inside of QGIS
- Updates uninstall and reinstall the software and save your settings. Must be done manually in previous version. To certain extent support is available in the new version

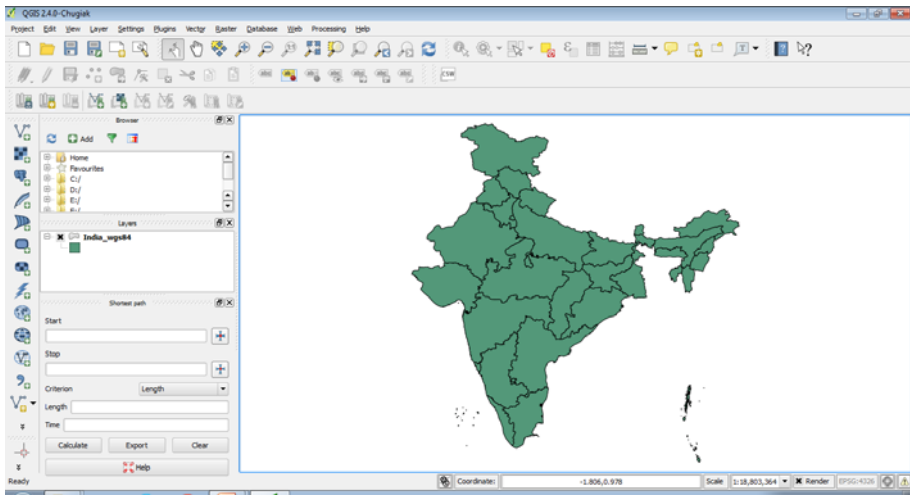
nrsc

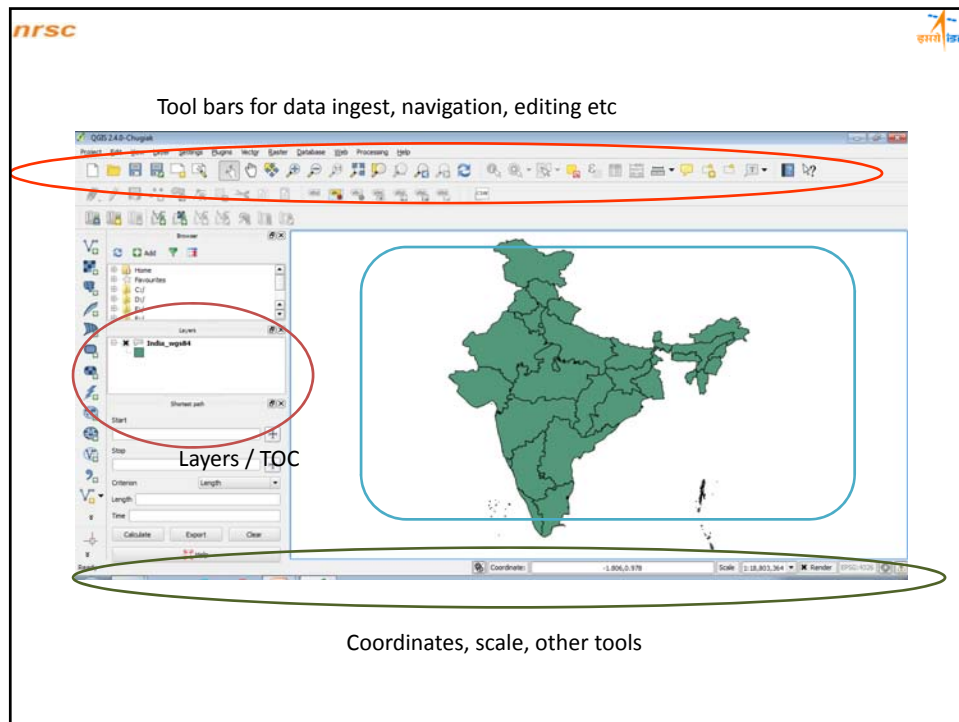
Windows Installer cont'

- Standalone Method
  - Geographic Data Abstraction Library
  - Installs libraries for SID and ECW
  - SID and ECW are proprietary formats that have special agreements to be used with GDAL
  - <http://www.gdal.org/>

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### 3. Quantum GIS Interface






## Basic Buttons

- Hover mouse over them they will pop up a text message telling the user their purpose.

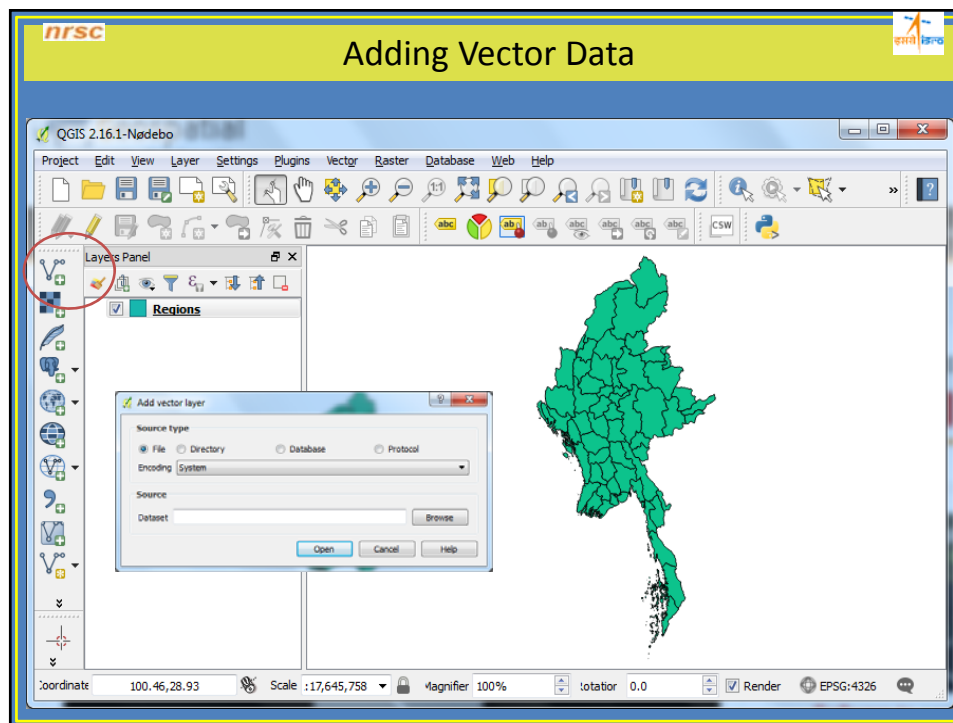


<ul style="list-style-type: none"> <li>• Pan</li> <li>• Zoom In</li> <li>• Zoom Out</li> <li>• Pixel Resolution</li> <li>• Zoom to Extent</li> <li>• Zoom to Selection</li> <li>• Zoom to Layer</li> <li>• Zoom to Last Extent</li> <li>• Zoom to Previous Extent</li> <li>• Refresh</li> </ul>	 <ul style="list-style-type: none"> <li>• Add vector Layer</li> <li>• Add Raster Layer</li> <li>• PostGIS Layer</li> <li>• Spatialite Layer</li> <li>• WMS Layer</li> <li>• New Shapefile Layer</li> <li>• Remove Layer</li> <li>• Oracle Raster Layer</li> <li>• WFS Layer</li> </ul>
---	---

## Attributes, Selection, Measurements



- Identify
- Select
- Deselect
- Attribute Table
- Measure
- Maptips
- Add BookMark
- Show Bookmark
- Annotation



**Visualizing vector data and attributes**

Layers Panel context menu options:

- Zoom to Layer
- Show in overview
- Remove
- Duplicate
- Set Layer Scale Visibility
- Set Layer CRS
- Set Project CRS from Layer
- Open Attribute Table
- Toggle Editing
- Save As...
- Save As Layer Definition File...
- Filter...
- Show Feature Count
- Properties
- Rename
- Copy Style

Identify Results:

Feature

- Regions
  - NAME\_0
    - (Derived)
    - (clicked coordinate X)
    - (clicked coordinate Y)
    - Area
    - Closest vertex X

ID_0	ID_1	NAME_0	ID_2	NAME_1	ID_3	NAME_2	NAME_2	NAME_2	NAME_2	NAME_2	NAME_2
1	140	Hyderabad	140	Hyderabad	22134	Hyderabad	Hyderabad	Hyderabad	Hyderabad	Hyderabad	Hyderabad
2	140	Hyderabad	140	Hyderabad	22135	Hyderabad	Hyderabad	Hyderabad	Hyderabad	Hyderabad	Hyderabad
3	140	Hyderabad	140	Hyderabad	22136	Hyderabad	Hyderabad	Hyderabad	Hyderabad	Hyderabad	Hyderabad
4	140	Hyderabad	140	Hyderabad	22137	Hyderabad	Hyderabad	Hyderabad	Hyderabad	Hyderabad	Hyderabad
5	140	Hyderabad	140	Hyderabad	22138	Hyderabad	Hyderabad	Hyderabad	Hyderabad	Hyderabad	Hyderabad
6	140	Hyderabad	140	Hyderabad	22139	Hyderabad	Hyderabad	Hyderabad	Hyderabad	Hyderabad	Hyderabad
7	140	Hyderabad	140	Hyderabad	22140	Hyderabad	Hyderabad	Hyderabad	Hyderabad	Hyderabad	Hyderabad
8	140	Hyderabad	140	Hyderabad	22141	Hyderabad	Hyderabad	Hyderabad	Hyderabad	Hyderabad	Hyderabad
9	140	Hyderabad	140	Hyderabad	22142	Hyderabad	Hyderabad	Hyderabad	Hyderabad	Hyderabad	Hyderabad
10	140	Hyderabad	140	Hyderabad	22143	Hyderabad	Hyderabad	Hyderabad	Hyderabad	Hyderabad	Hyderabad
11	140	Hyderabad	140	Hyderabad	22144	Hyderabad	Hyderabad	Hyderabad	Hyderabad	Hyderabad	Hyderabad
12	140	Hyderabad	140	Hyderabad	22145	Hyderabad	Hyderabad	Hyderabad	Hyderabad	Hyderabad	Hyderabad
13	140	Hyderabad	140	Hyderabad	22146	Hyderabad	Hyderabad	Hyderabad	Hyderabad	Hyderabad	Hyderabad
14	140	Hyderabad	140	Hyderabad	22147	Hyderabad	Hyderabad	Hyderabad	Hyderabad	Hyderabad	Hyderabad
15	140	Hyderabad	140	Hyderabad	22148	Hyderabad	Hyderabad	Hyderabad	Hyderabad	Hyderabad	Hyderabad
16	140	Hyderabad	140	Hyderabad	22149	Hyderabad	Hyderabad	Hyderabad	Hyderabad	Hyderabad	Hyderabad

**Working with Layer Properties ...**

Layer Properties - Regions | Style

Column: NAME\_2

Symbol: [Change...]

Color ramp: [Sequential] [Bivariate]

Legend: [Bivariate]

Layer rendering:

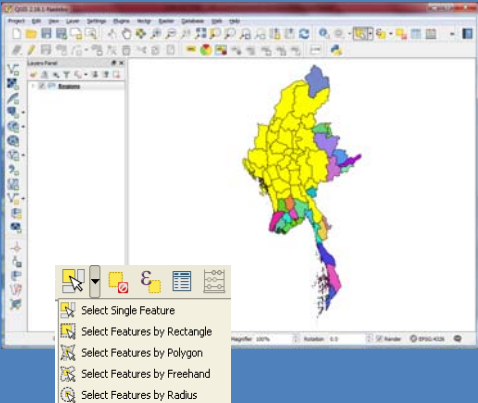
- Layer transparency: 0
- Layer blending mode: Normal

Rotation: 0.0

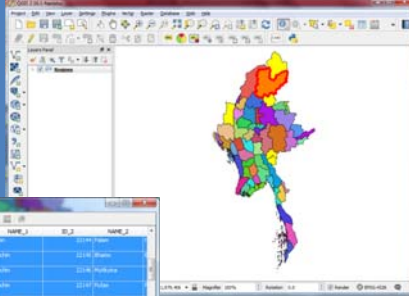
Render: [X] EPSG:4326



## Feature Selection

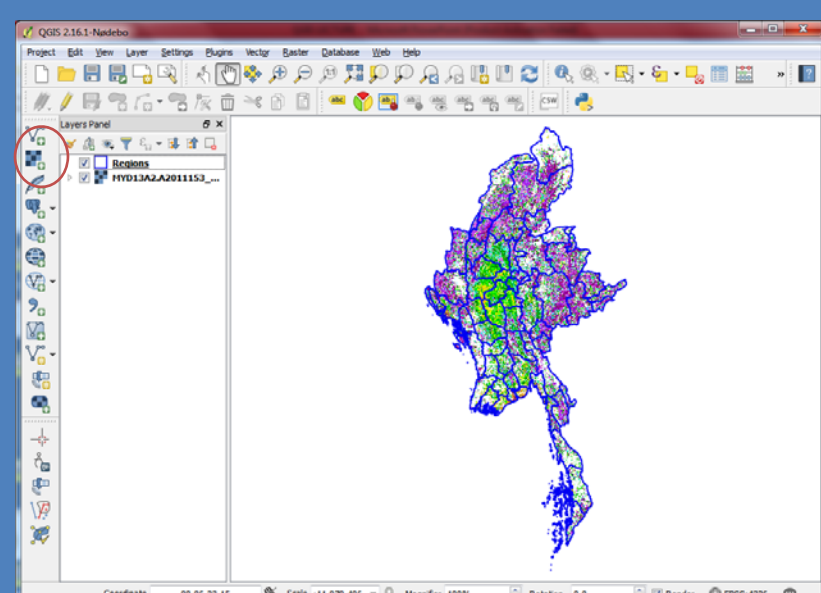


- Manual
- Attribute based
- Location Based



ID	NAME_0	ID_1	NAME_1	ID_2	NAME_2
11	HYD 0000	0000	0000	0000	0000
12	HYD 0000	0000	0000	0000	0000
13	HYD 0000	0000	0000	0000	0000
14	HYD 0000	0000	0000	0000	0000
15	HYD 0000	0000	0000	0000	0000
16	HYD 0000	0000	0000	0000	0000
17	HYD 0000	0000	0000	0000	0000
18	HYD 0000	0000	0000	0000	0000
19	HYD 0000	0000	0000	0000	0000
20	HYD 0000	0000	0000	0000	0000
21	HYD 0000	0000	0000	0000	0000
22	HYD 0000	0000	0000	0000	0000
23	HYD 0000	0000	0000	0000	0000
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29	HYD 0000	0000	0000	0000	0000
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36	HYD 0000	0000	0000	0000	0000
37	HYD 0000	0000	0000	0000	0000
38	HYD 0000	0000	0000	0000	0000
39	HYD 0000	0000	0000	0000	0000
40	HYD 0000	0000	0000	0000	0000
41	HYD 0000	0000	0000	0000	0000
42	HYD 0000	0000	0000	0000	0000
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45	HYD 0000	0000	0000	0000	0000
46	HYD 0000	0000	0000	0000	0000
47	HYD 0000	0000	0000	0000	0000
48	HYD 0000	0000	0000	0000	0000
49	HYD 0000	0000	0000	0000	0000
50	HYD 0000	0000	0000	0000	0000
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52	HYD 0000	0000	0000	0000	0000
53	HYD 0000	0000	0000	0000	0000
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95	HYD 0000	0000	0000	0000	0000
96	HYD 0000	0000	0000	0000	0000
97	HYD 0000	0000	0000	0000	0000
98	HYD 0000	0000	0000	0000	0000
99	HYD 0000	0000	0000	0000	0000
100	HYD 0000	0000	0000	0000	0000

## Adding Raster Data



Coordinate: 90.96,23.15    Scale: 1:11,979,406    Magnifier: 100%    Rotation: 0.0    Render    EPSG:4326

## Linking External Tables

**Select vector layers to add...**

Layer ID	Layer name	Number of features	Geometry type
0	Rainfall Deviation	25	None
1	Sheet2	26	None

**Layer Properties - LKA\_adm1 | Joins**

Join layer	Join field	Target field	Memory cache
Rainfall Deviation	Districts	NAME_1	<input checked="" type="checkbox"/>

Load Style ... Save As Default Restore Default Style Save Style

OK Cancel Apply Help

**Add vector join**

Join layer: **Rainfall Deviation**

Join field: **Districts**

Target field: **NAME\_1**

☒ Cache join layer in virtual memory

☐ Create attribute index on join field

OK Cancel

**Attribute table - LKA\_adm1 : Features total: 25, filtered: 25, selected: 0**

leviator	Rainfall Deviation_Actual RF	Rainfall Deviation_Norma	Rainfall Deviation_% Deviation
0	1	251	223
1	2	199	200
2	3	151	201
3	4	162	205
4	5	175	212
5	6	195	236
6	7	265	289
7	8	300	241
8	9	115	255
9	10	245	265
10	11	213	245
11	12	300	287
12	13	350	213
13	14	145	201
14	15	256	265
15	16	354	248
16	17	245	298

Show All Features

## Map Composition and Publishing

**Paper and quality**

Presets: **A4 (210x297 mm)**

**MAP**

Composer Edit View Layout Alias Settings

MYANMAR NDVI MAP 2011

Legend: Regions

Scale bar: 0 250 500 750 1000 km

Page: 1 of 1

**Command history**

- Scalebar segment size mode
- Scale bar added
- Change item position
- Change item position
- Change item position
- Change item size
- Change item size
- Change item size

**Item properties**

**Attribute table**

Main properties

Source: **Layer features**

Layer: **Regions**

Refresh table data

Attributes...

Feature filtering

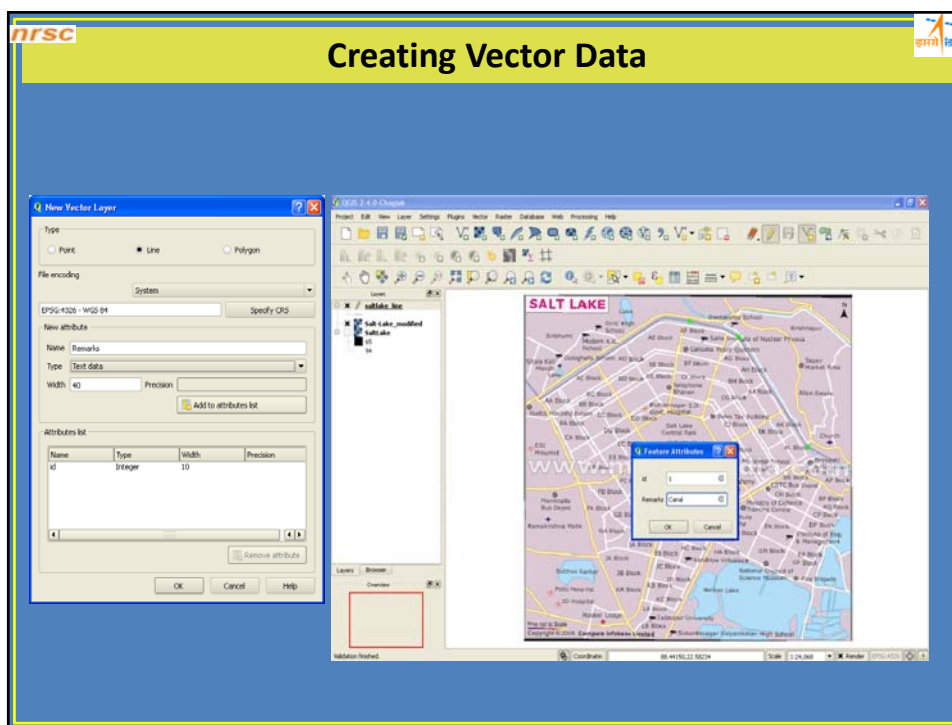
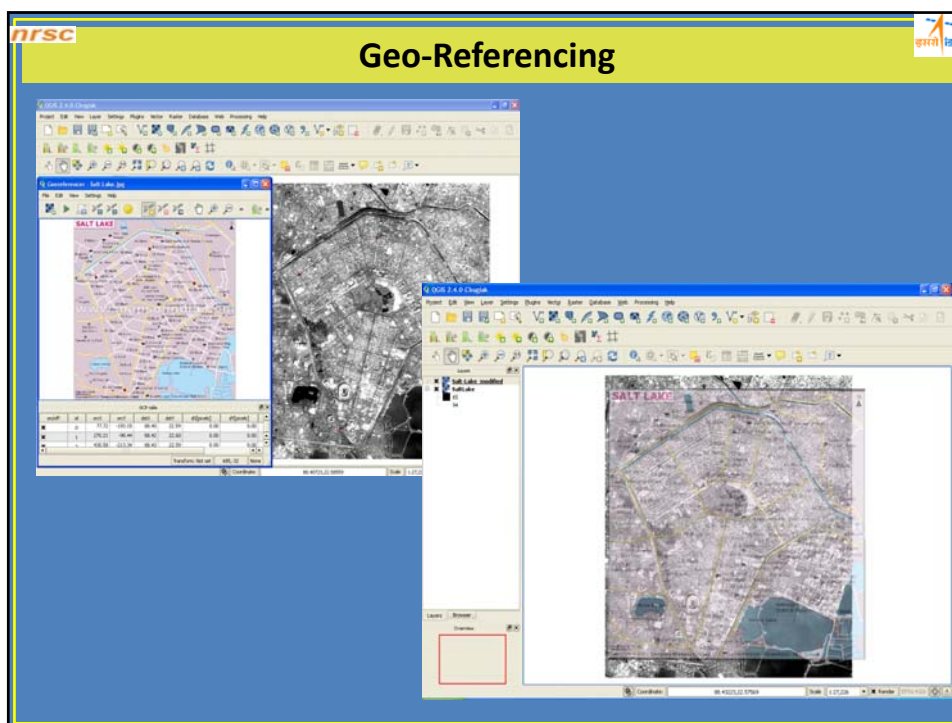
Maximum rows: 30



☐ Remove duplicate rows from table

☐ Show only features visible within a map

Composer map: Map 0



☐ Show only features intersecting atlas feature







## Start Flexing

- ✓ Open QGIS
- ✓ Explore the Toolbars.
  - Turn on and off panels, tool bars
  - Just click any where and blind explore QGIS
- ✓ Add some data to the Map Display
  - Raster
  - vector
- ✓ Use the Identify Features tool to show attribute to some data layers.





## Data handling Vectors

- ✓ Open vector layer – methods
- ✓ Understanding Styles
- ✓ Manipulating styles
  - ✓ Fill / colors / shades
  - ✓ Labels – from fields, placing, fonts, advanced labeling
  - ✓ Attribute data and visualization
  - ✓ Checking with scale
  - ✓ Other properties





## Data handling Rasters

- ✓ Open raster layers – Different types of rasters
- ✓ Understanding Styles – histogram and stretching
- ✓ Transparency , data values, data types
- ✓ Manipulating styles
  - ✓ Fill / colors / shades
  - ✓ Checking actual values
  - ✓ Understanding coordinate / projection systems
  - ✓ metadata
  - ✓ Other properties





## Data from WebGIS

- ✓ Understanding different source from web
- ✓ Activating online servers
- ✓ Adding data and checking
  - ✓ Rasters
  - ✓ Vectors
  - ✓ Catalogues



## Analysis in GIS - Tools


- ✓ Raster data analysis
  - ✓ Tools
- ✓ Vector data analysis
  - ✓ Tools
- ✓ Database
- ✓ Web Processing
- ✓ Plugins
- ✓ Models
- ✓ Others – Map Composing, measurements and other tools



## MYANMAR DATA ANALYSIS USING QGIS

nrsc


MODIS DATA





- Moderate-Resolution Imaging Spectroradiometer
- Launched in 1999 aboard the EOS AM (Terra); EOS PM (Aqua) followed in 2002
- Monitors 36 spectral bands between 0.4  $\mu\text{m}$  and 14.4  $\mu\text{m}$
- Repeativity 1-2 days at 1 km resolution
- Swath Dimensions: 2330 km
- Spatial Resolution:
  - (bands 1-2) 250 m
  - (bands 3-7) 500 m
  - (bands 8-36) 1000 m
- Projection - Sinusoidal Data
- Format - HDF-EOS
- Resolution - 250 meters

Primary Use	Band	Bandwidth <sup>1</sup>	Spectral Radiance <sup>1</sup>	Required SNR <sup>1</sup>
Land/Cloud/Aerosols Boundaries	1	620 - 670	21.8	128
	2	841 - 876	24.7	201
	3	459 - 479	35.3	243
	4	545 - 565	29.0	228
	5	1230 - 1250	5.4	74
Ocean Color/Phytoplankton/Biochemistry	6	1628 - 1652	7.3	27.5
	7	2105 - 2155	1.0	110
	8	405 - 420	44.9	880
	9	438 - 448	41.9	838
	10	483 - 493	32.1	802
	11	526 - 536	27.9	754
	12	546 - 556	21.0	750
	13	662 - 672	9.5	910
	14	673 - 683	8.7	1087
	15	743 - 753	10.2	586
Atmospheric Water Vapor	16	862 - 877	6.2	516
	17	890 - 920	10.0	167
	18	931 - 941	3.6	57
Primary Use	19	915 - 965	15.0	250
	20	3660 - 3840	0.45(300K)	0.05
	21	3929 - 3989	2.38(335K)	2.00
Surface/Cloud Temperature	22	3929 - 3989	0.67(300K)	0.07
	23	4020 - 4080	0.79(300K)	0.07
	24	4433 - 4498	0.17(250K)	0.25
Atmospheric Temperature	25	4482 - 4549	0.59(275K)	0.25
	26	1360 - 1390	6.00	150(SNR)
Cirrus Clouds Water Vapor	27	6535 - 6895	1.16(240K)	0.25
	28	7175 - 7475	2.18(250K)	0.25
Cloud Properties	29	8400 - 8700	9.58(300K)	0.05
	30	9580 - 9880	3.69(250K)	0.25
Surface/Cloud Temperature	31	10780 - 11280	9.55(300K)	0.05
	32	11770 - 12270	8.94(300K)	0.05
Cloud Top Altitude	33	13185 - 13485	4.52(260K)	0.25
	34	13485 - 13785	3.76(250K)	0.25
	35	13785 - 14085	3.11(240K)	0.25
	36	14085 - 14385	2.08(220K)	0.35

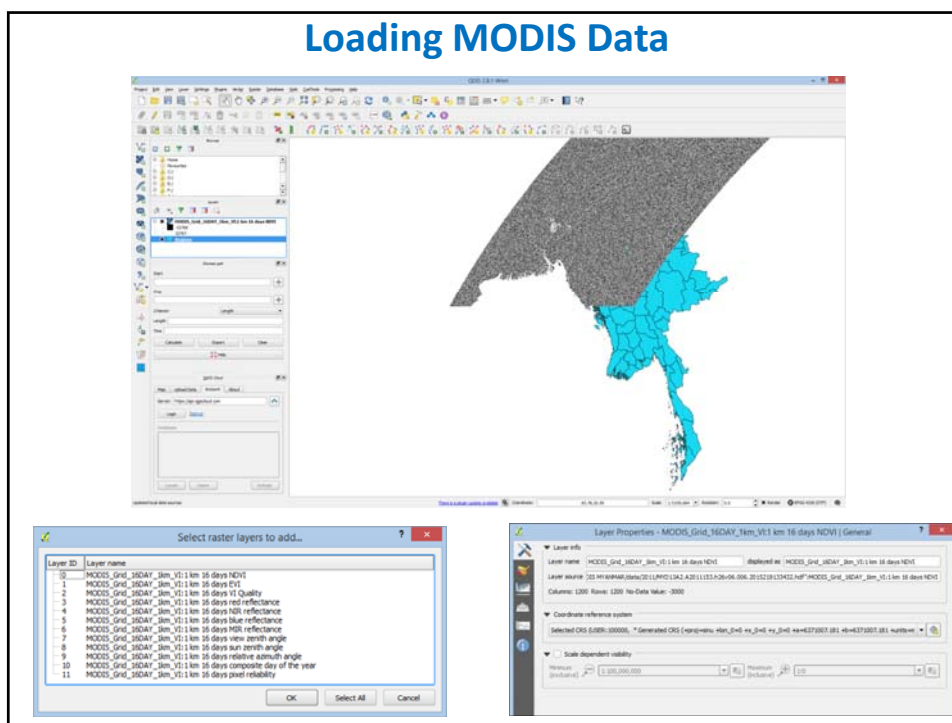
nrsc		MODIS DATA PRODUCTS		इसरो	
<p><b>Calibration</b> (see also: <a href="http://mcst.gsfc.nasa.gov/">http://mcst.gsfc.nasa.gov/</a>)</p> <p><a href="#">MOD 01 - Level-1A Radiance Counts</a>  <a href="#">MOD 02 - Level-1B Calibrated Geolocated Radiances</a>  <a href="#">MOD 03 - Geolocation Data Set</a></p> <p><b>Atmosphere</b> (see also: <a href="http://modis-atmos.gsfc.nasa.gov/">http://modis-atmos.gsfc.nasa.gov/</a>)</p> <p><a href="#">MOD 04 - Aerosol Product</a>  <a href="#">MOD 05 - Total Precipitable Water (Water Vapor)</a>  <a href="#">MOD 06 - Cloud Product</a>  <a href="#">MOD 07 - Atmospheric Profiles</a>  <a href="#">MOD 08 - Gridded Atmospheric Product</a>  <a href="#">MOD 35 - Cloud Mask</a></p> <p><b>Land</b> (see also: <a href="https://lpdaac.usgs.gov/products/modis_products_table">https://lpdaac.usgs.gov/products/modis_products_table</a> and <a href="http://modis-land.gsfc.nasa.gov/">http://modis-land.gsfc.nasa.gov/</a>)</p> <p><a href="#">MOD 09 - Surface Reflectance</a>  <a href="#">MOD 11 - Land Surface Temperature &amp; Emissivity</a>  <a href="#">MOD 12 - Land Cover/Land Cover Change</a>  <a href="#">MOD 13 - Gridded Vegetation Indices (Max NDVI &amp; Integrated MVI)</a>  <a href="#">MOD 14 - Thermal Anomalies, Fires &amp; Biomass Burning</a>  <a href="#">MOD 15 - Leaf Area Index &amp; FPAR</a>  <a href="#">MOD 16 - Evapotranspiration</a>  <a href="#">MOD 17 - Net Photosynthesis and Primary Productivity</a>  <a href="#">MOD 43 - Surface Reflectance</a>  <a href="#">MOD 44 - Vegetation Cover Conversion</a></p> <p><b>Cryosphere</b> (see also: <a href="http://nsidc.org/daac/modis/index.html">http://nsidc.org/daac/modis/index.html</a>)</p> <p><a href="#">MOD 10 - Snow Cover</a>  <a href="#">MOD 29 - Sea Ice Cover</a></p>					

 <b>Science Data Sets for MODIS Aqua Vegetation Indices 16-Day L3 Global 250m SIN Grid V005 (MYD-इसरो डिजिटल)</b>					
Science Data Sets (HDF Layers) (12)	UNITS	BIT TYPE	FILL	VALID RANGE	MULTIPLY BY SCALE FACTOR
250m 16 days NDVI	NDVI	16-bit signed integer	-3000	-2000, 10000	0.0001
250m 16 days EVI	EVI	16-bit signed integer	-3000	-2000, 10000	0.0001
250m 16 days VI Quality detailed QA	Bits	16-bit unsigned integer	65535	0, 65534	NA
250m 16 days red reflectance (Band 1)	Reflectance	16-bit signed integer	-1000	0, 10000	0.0001
250m 16 days NIR reflectance (Band 2)	Reflectance	16-bit signed integer	-1000	0, 10000	0.0001
250m 16 days blue reflectance (Band 3)	Reflectance	16-bit signed integer	-1000	0, 10000	0.0001
250m 16 days MIR reflectance (Band 7)	Reflectance	16-bit signed integer	-1000	0, 10000	0.0001
250m 16 days view zenith angle	Degree	16-bit signed integer	-10000	-9000, 9000	0.01
250m 16 days sun zenith angle	Degree	16-bit signed integer	-10000	-9000, 9000	0.01
250m 16 days relative azimuth angle	Degree	16-bit signed integer	-4000	-3600, 3600	0.1
250m 16 days composite day of the year	Julian day of year	16-bit signed integer	-1	1, 366	NA
250m 16 days pixel reliability summary QA	Rank	8-bit signed integer	-1	0, 3	NA

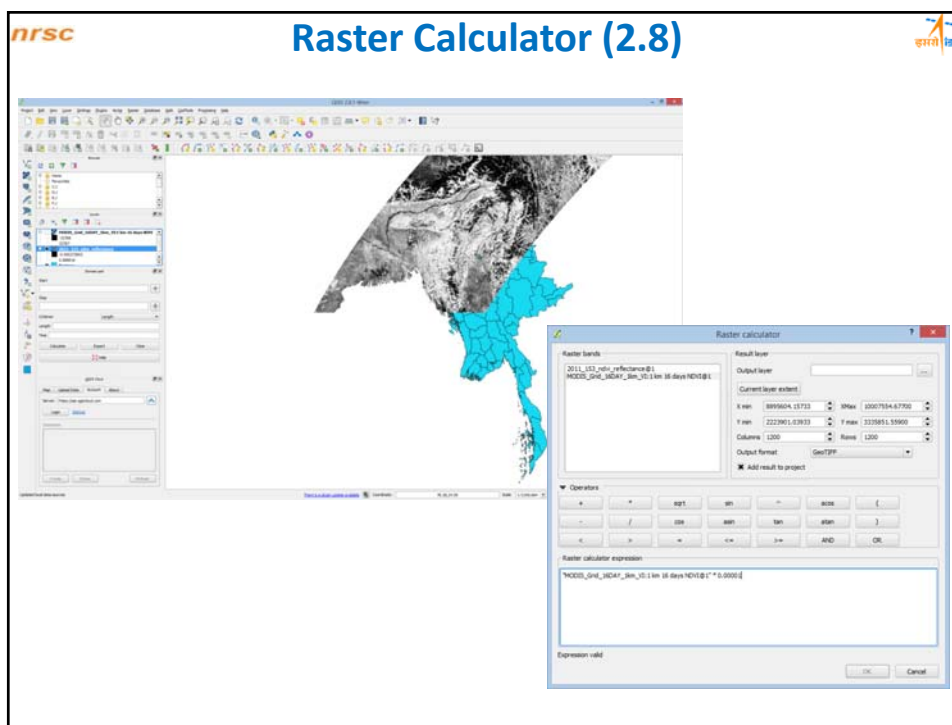
<div>  <div> <h2>Modis Data Analysis</h2>  </div> </div> <ol style="list-style-type: none"> <li>1. Load Vector data for regions : Regions.shp</li> <li>2. Load raster data eg : MYD13A2.A2011153.h26v06.006.2015219133432.hdf</li> <li>3. Select NDVI 16 day data for exercise.</li> <li>4. Check projections of data and values by using identify. Values will show integers and these need to be rescaled to get reflectance values.</li> <li>5. Using Raster calculator convert the integers to reflectance values ( * 0.0001 )</li> <li>6. Using Projections Warp, convert the data projection to WGS84.</li> <li>7. Similarly load all other datasets of 2011_153 covering the country</li> <li>8. Using merge, mosaic all the data.</li> <li>9. Using clip, clip the country coverage.</li> <li>10. Using Zonal Statistics, extract required statistics like mean, max, st. dev etc.</li> <li>11. Faster methods - VRT</li> </ol> <p>* Repeat steps for all season data for given year / path / season as planned</p> <p>* Note that these do not take care of cloud coverage and special area requirements.</p>
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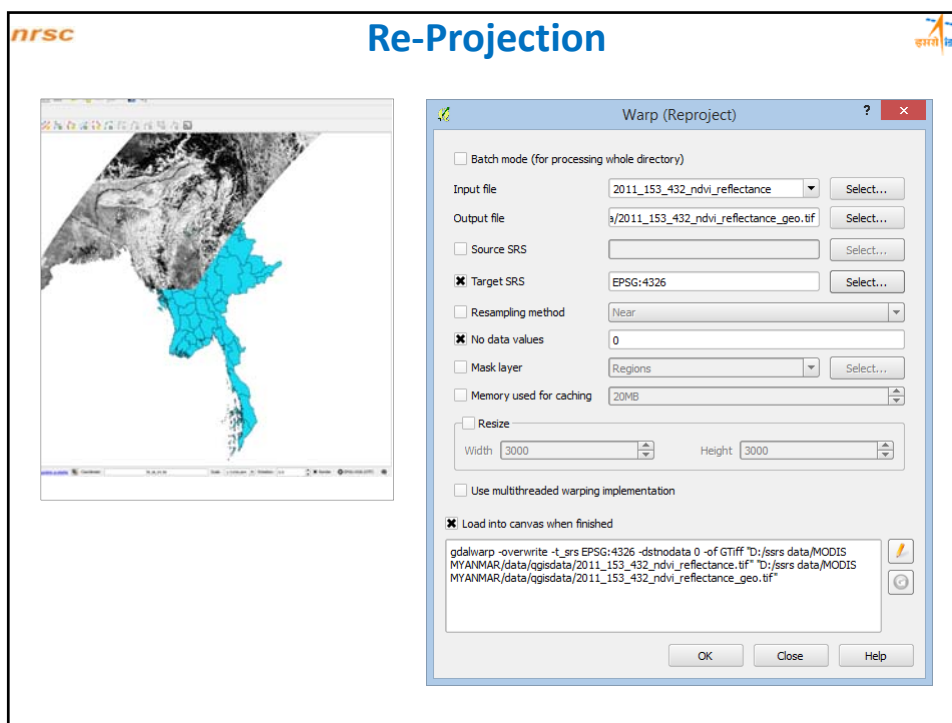


## Loading MODIS Data

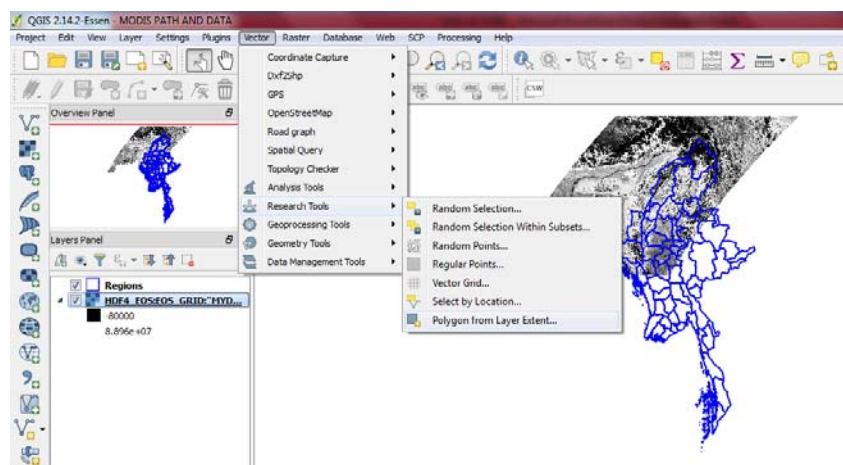


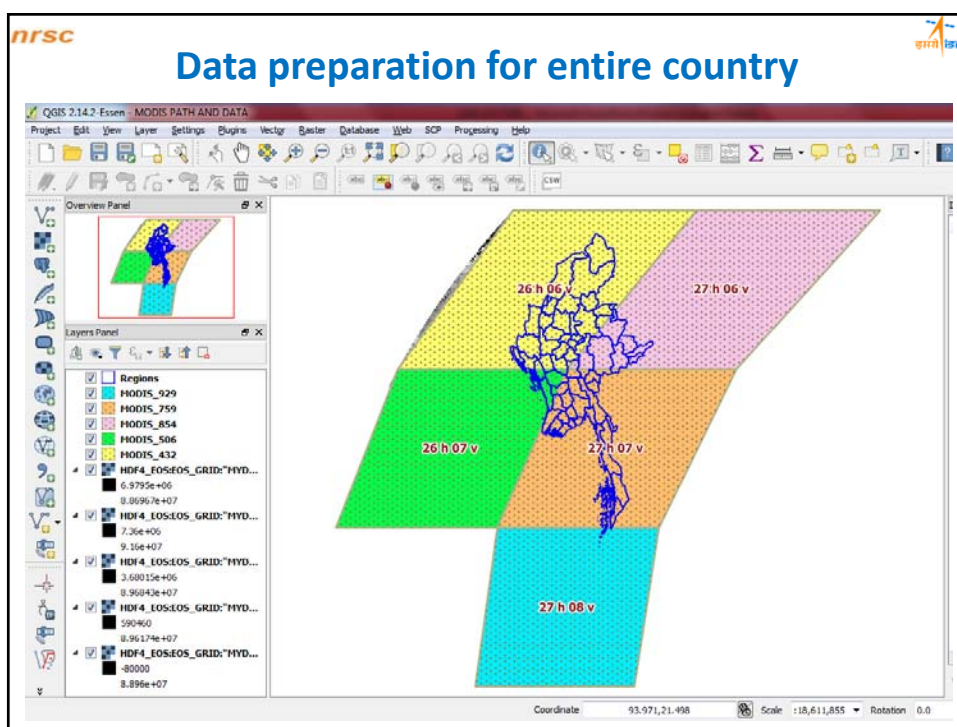
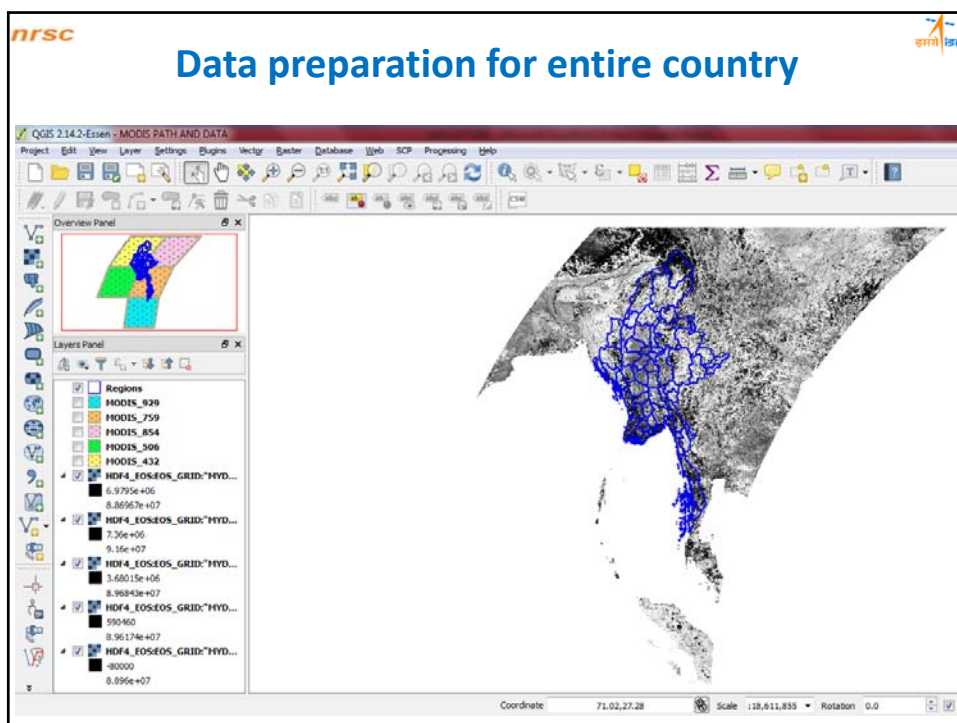
## Raster Calculator (2.8)





## Extracting Layer Extents

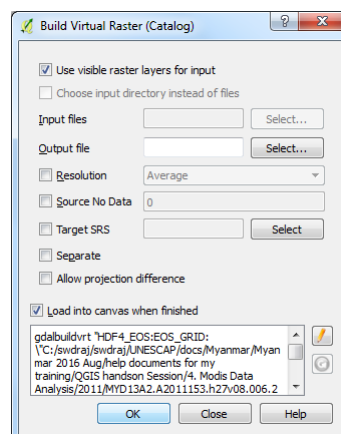
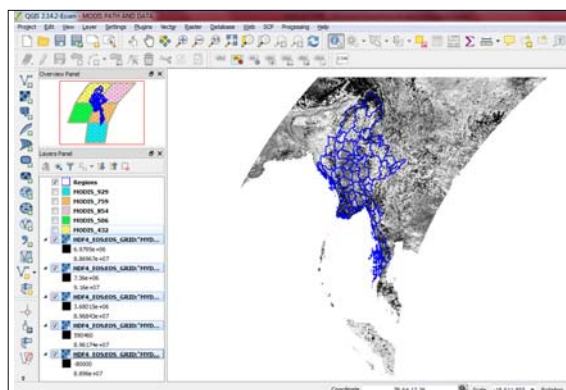




## Data preparation for entire country Faster way and doing all together

1. Load NDVI band of 2011\_153 all scenes ( Just drag and drop )
2. Start Build Virtual Raster ( a virtual compiled overview ) from

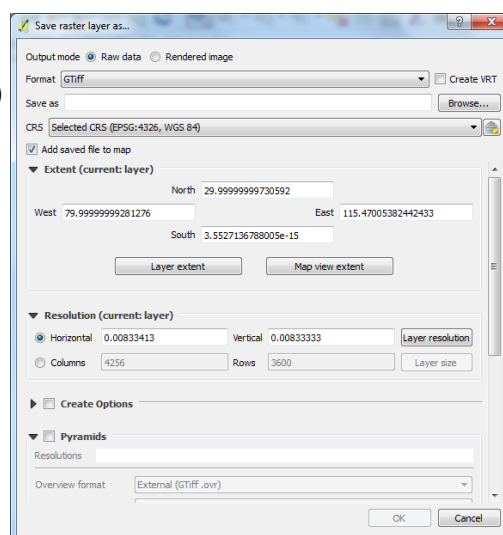
Raster->Miscellaneous->Build Virtual Raster



\* Note that these do not take care of cloud coverage and special area requirements.

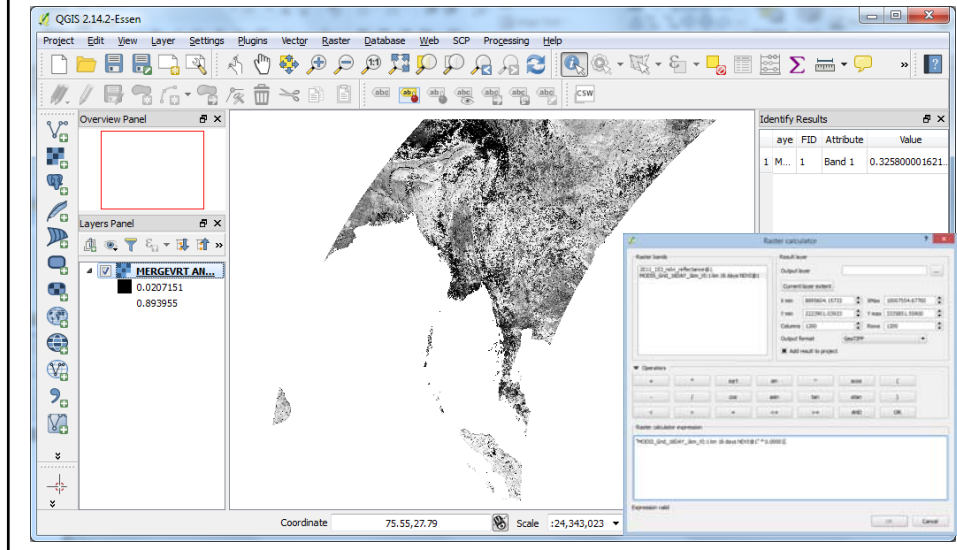
## Data preparation for entire country Faster way and doing all together

1. Export VRT to Geotiff file . (Using File Save or Properties Save As on the layer )
2. \* Change resolution
3. \* Change No data values
4. \* Change projection ( as per project )



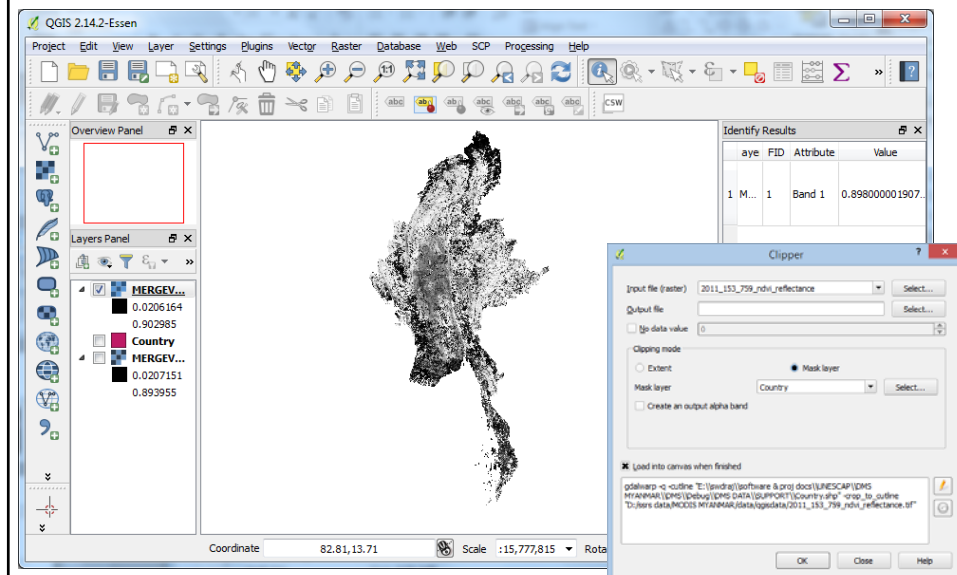
## Data preparation for entire country Faster way and doing all together

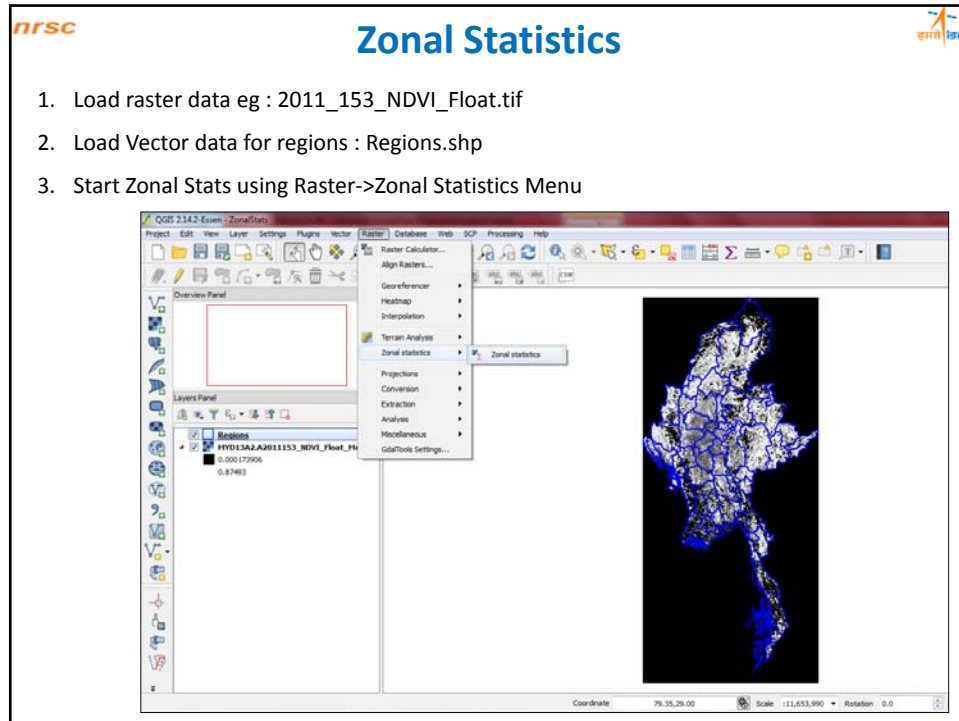
1. Use Raster Calculator to convert data to reflectance values and check ( -1 to +1 )



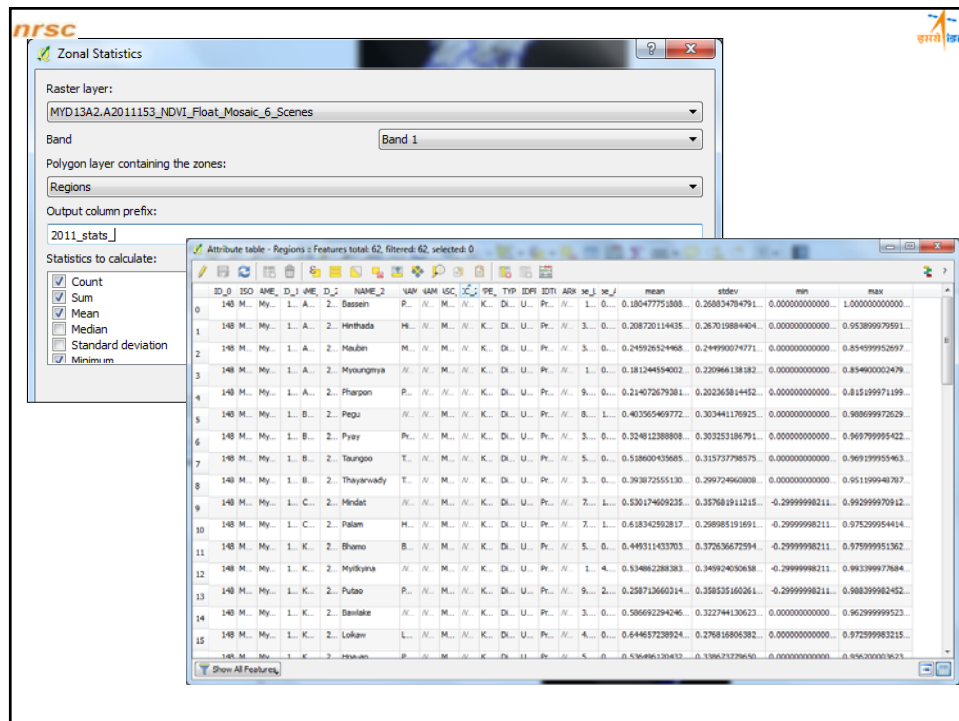
## Data preparation for entire country Faster way and doing all together

1. Run Raster -> Extract -> Clip ( Do it for all seasons and years )





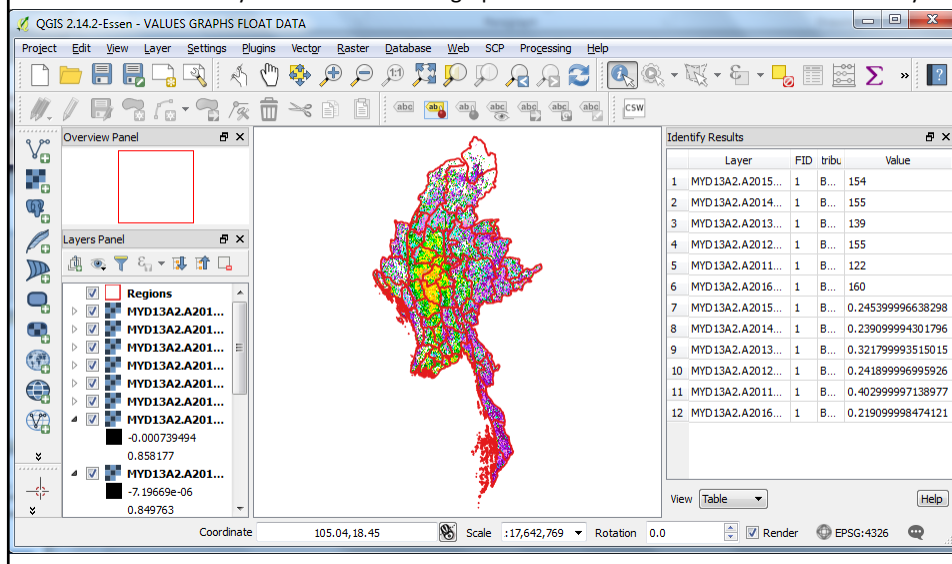
1. Load raster data eg : 2011\_153\_NDVI\_Float.tif
2. Load Vector data for regions : Regions.shp
3. Start Zonal Stats using Raster->Zonal Statistics Menu





## Analysis and interpretation

1. Load raster data – all byte data ndvi, float data ndvi
2. Check the identify values in tables and graphs. Check areas of cloud and water carefully.



## Many More to analyse

- Explore all the Raster and Vector tools
- Explore Plugins and Models for development of new indices and analysis methods
- Map Composition and Rainfall data analysis

Thank You