

RS&GIS

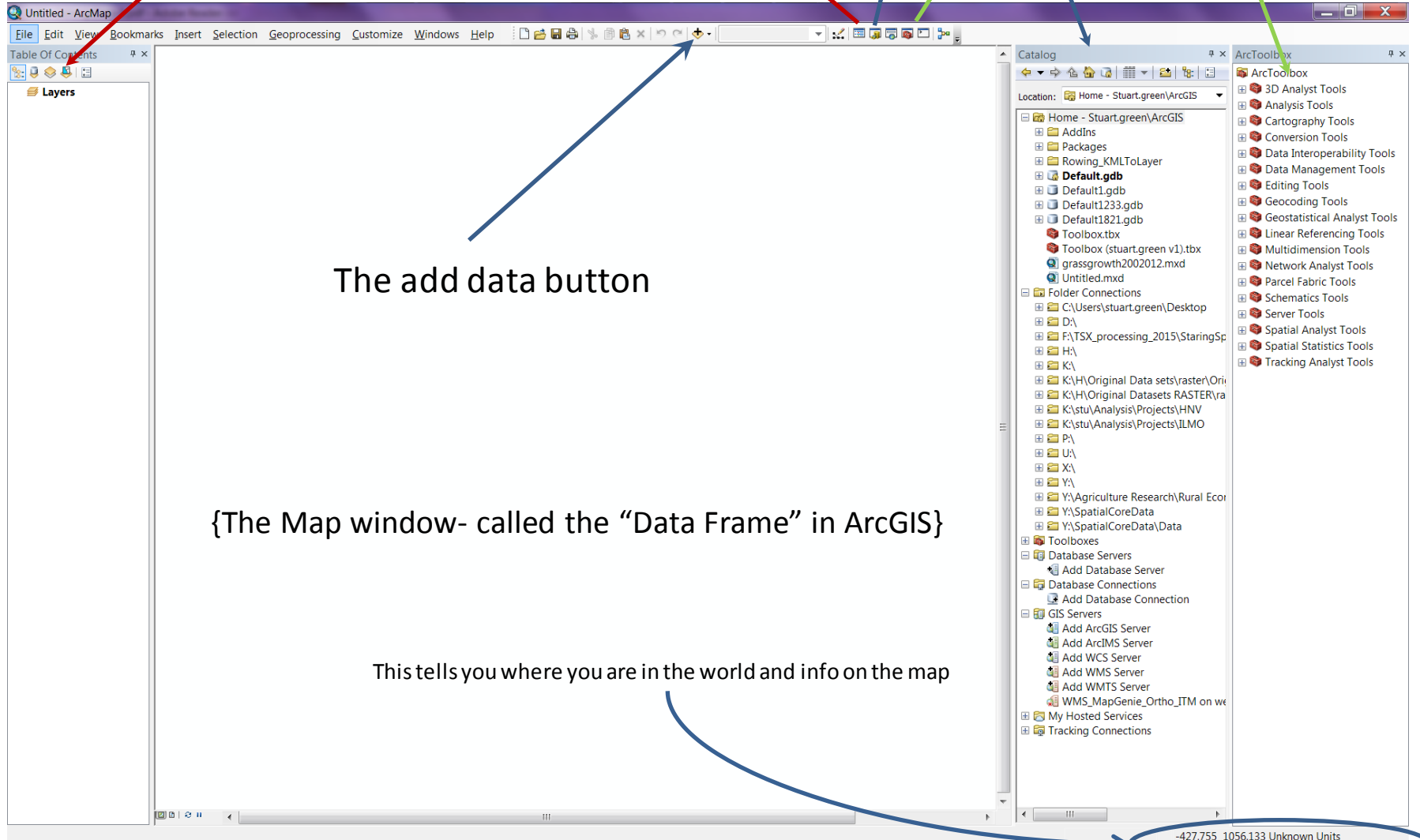
MERMS 2018

1. Introduction to images, maps and
ArcGIS

Turn on your Macs in Windows Mode

- Launch Arc GIS
- [Arcgis.com](https://www.arcgis.com)

ArcGIS



The add data button

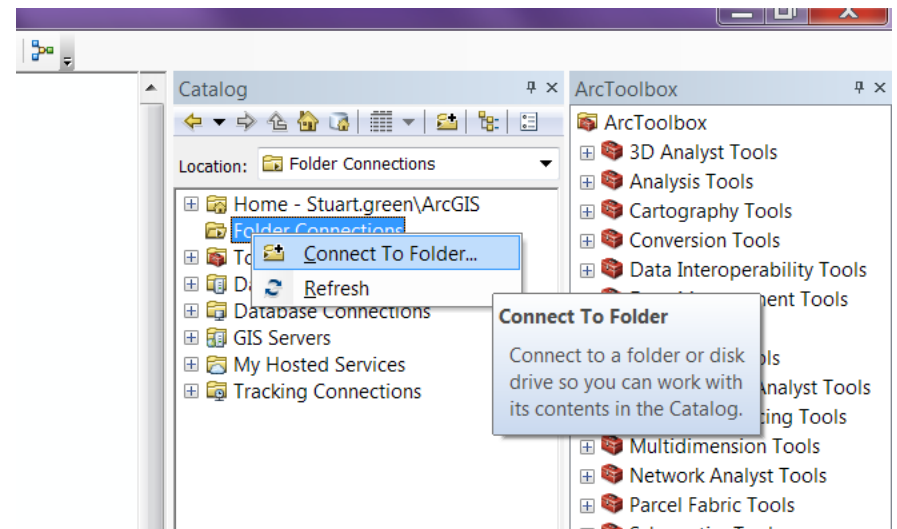
{The Map window- called the "Data Frame" in ArcGIS}

This tells you where you are in the world and info on the map

-427.755 1056.133 Unknown Units

The data structure- how files are stored, is a little more complex in GIS than in other apps. You have to make, move and copy ALL your files within the ArcGIS system.

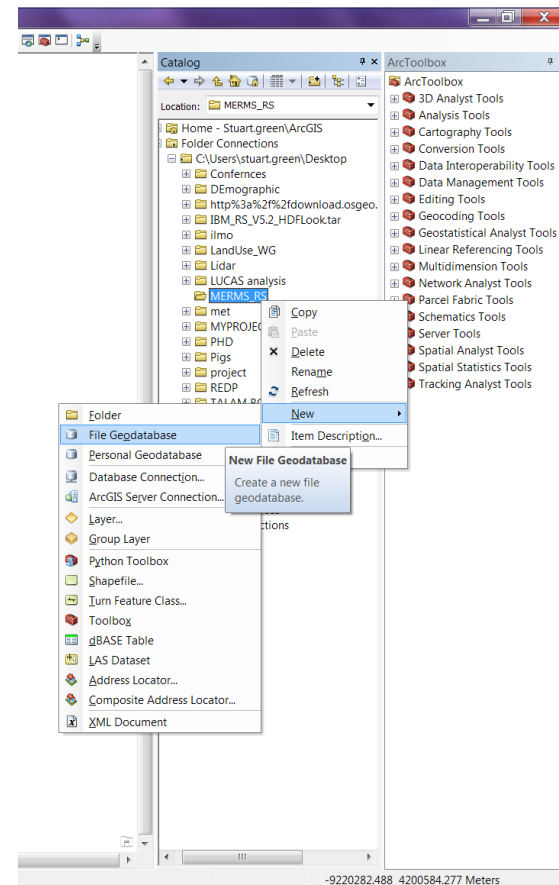
- First make a directory in Arc Catalogue you can store your files by “right clicking on Folder Connections:



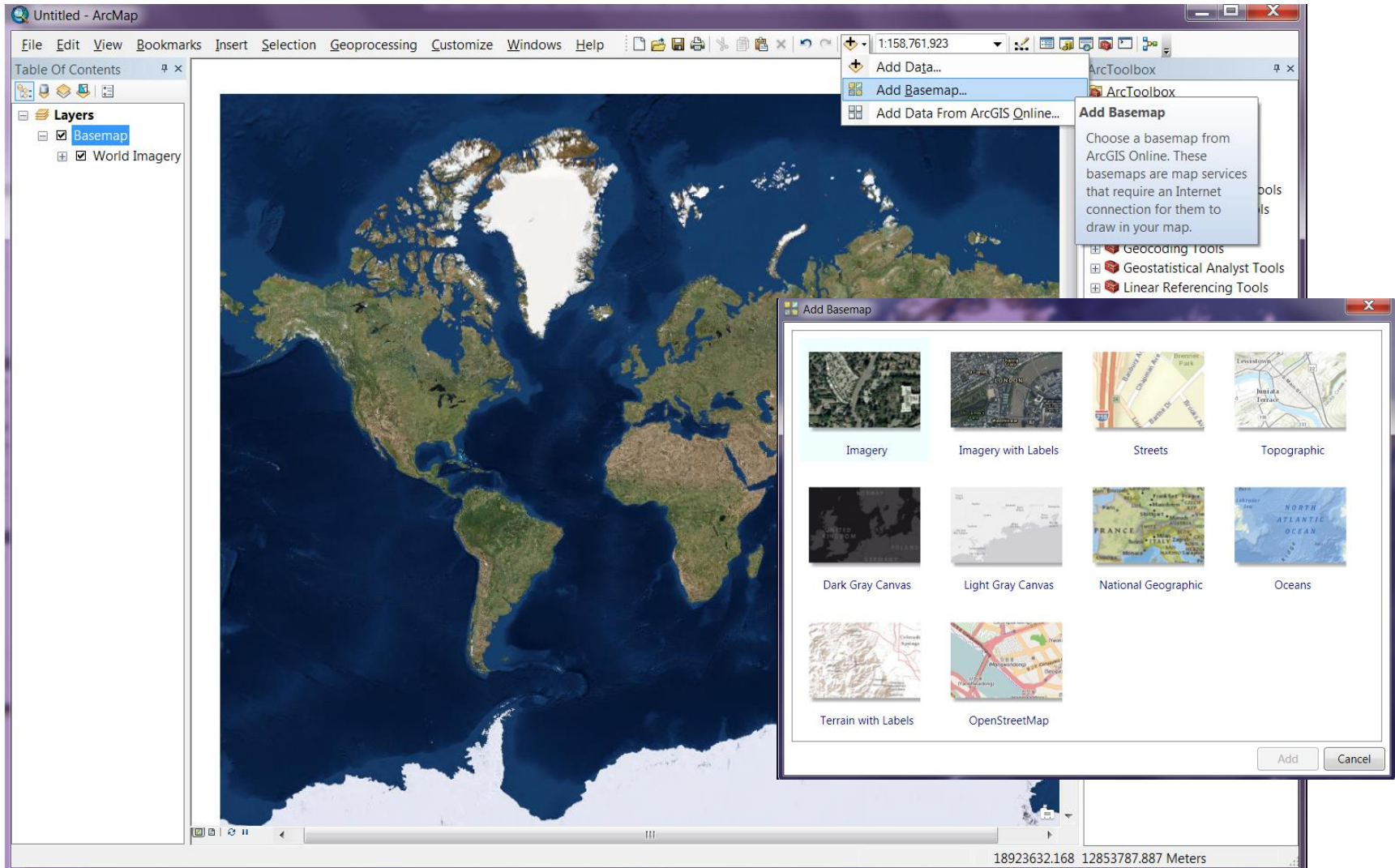
In the directory- you want to make a new File Geodatabase

- This is a ArcGIS database that will contain all the new files you produce:

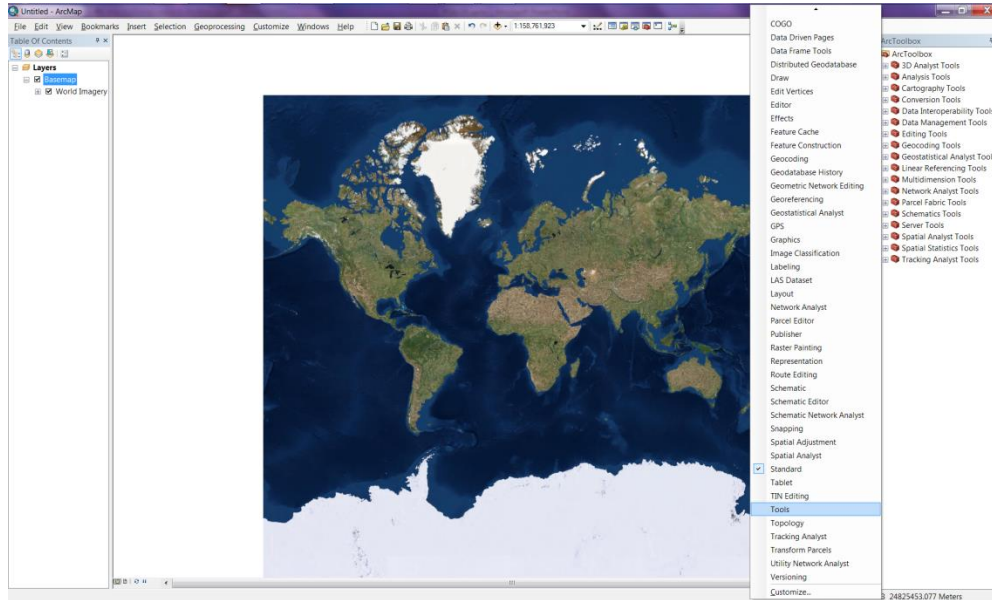
Keep ALL your work in this geodatabase



Add some imagery



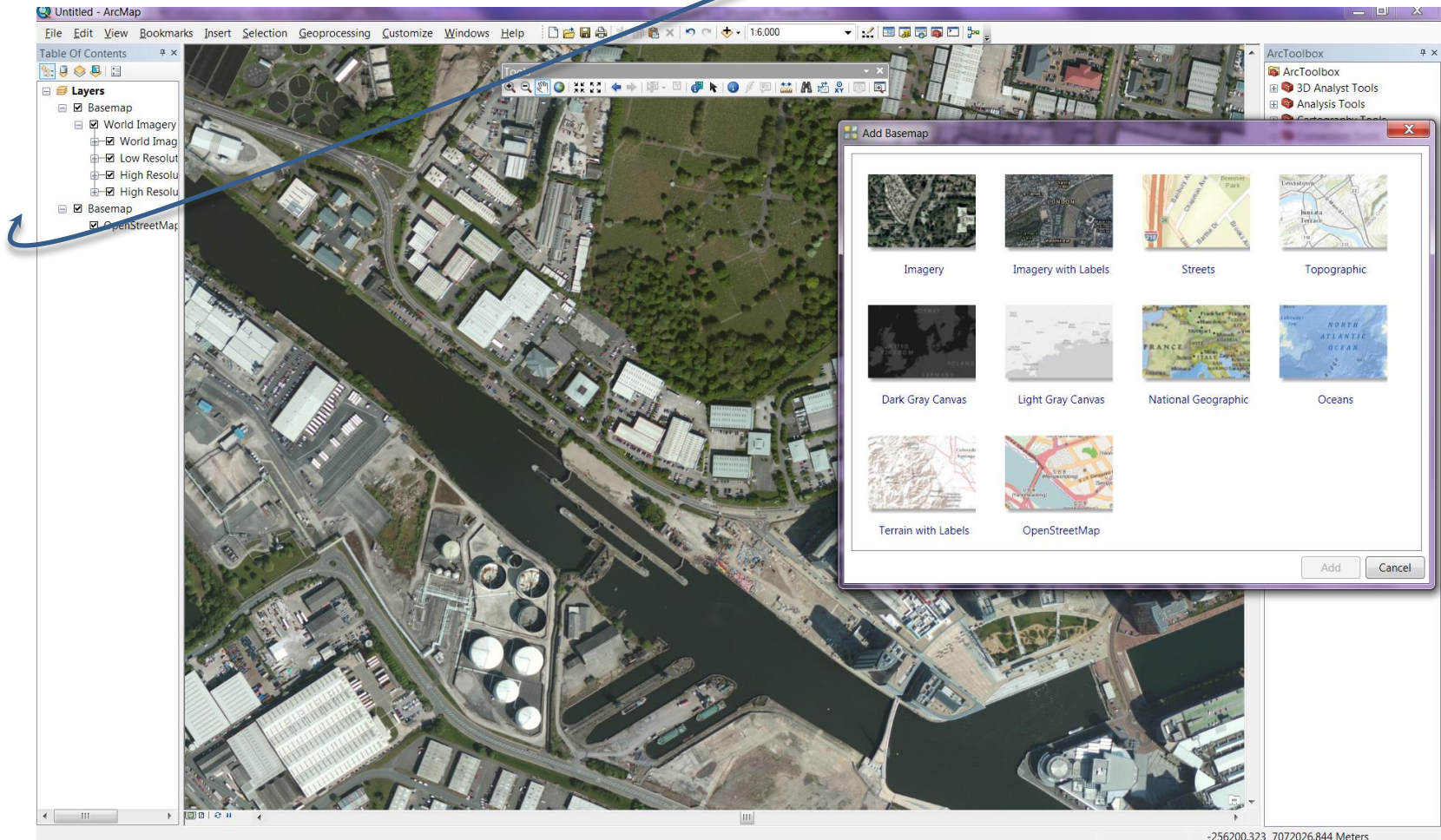
Right click on menu bar then click TOOLS on the menu



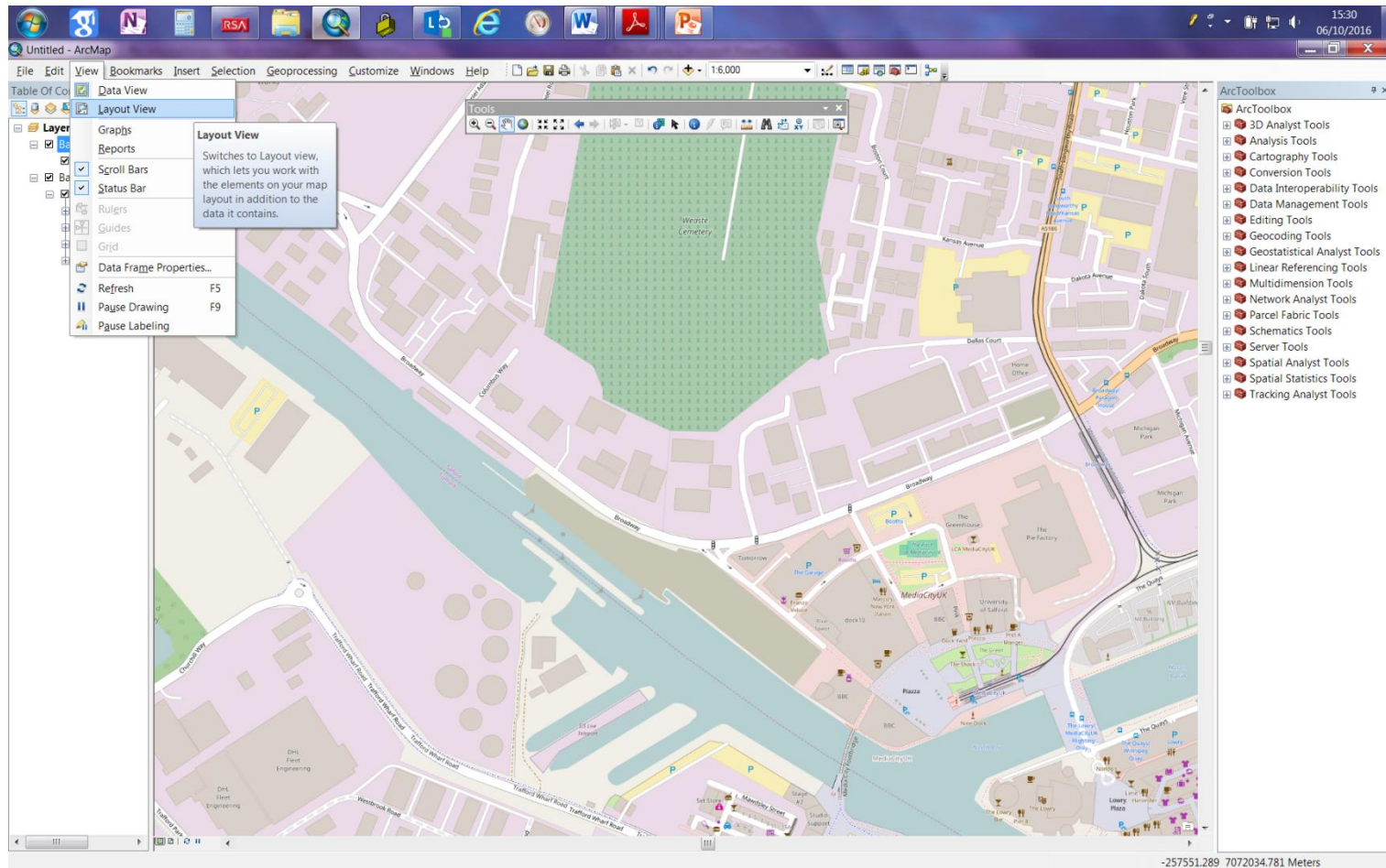
- You now have a tool bar to navigate through the image- try to zoom into the place you were born



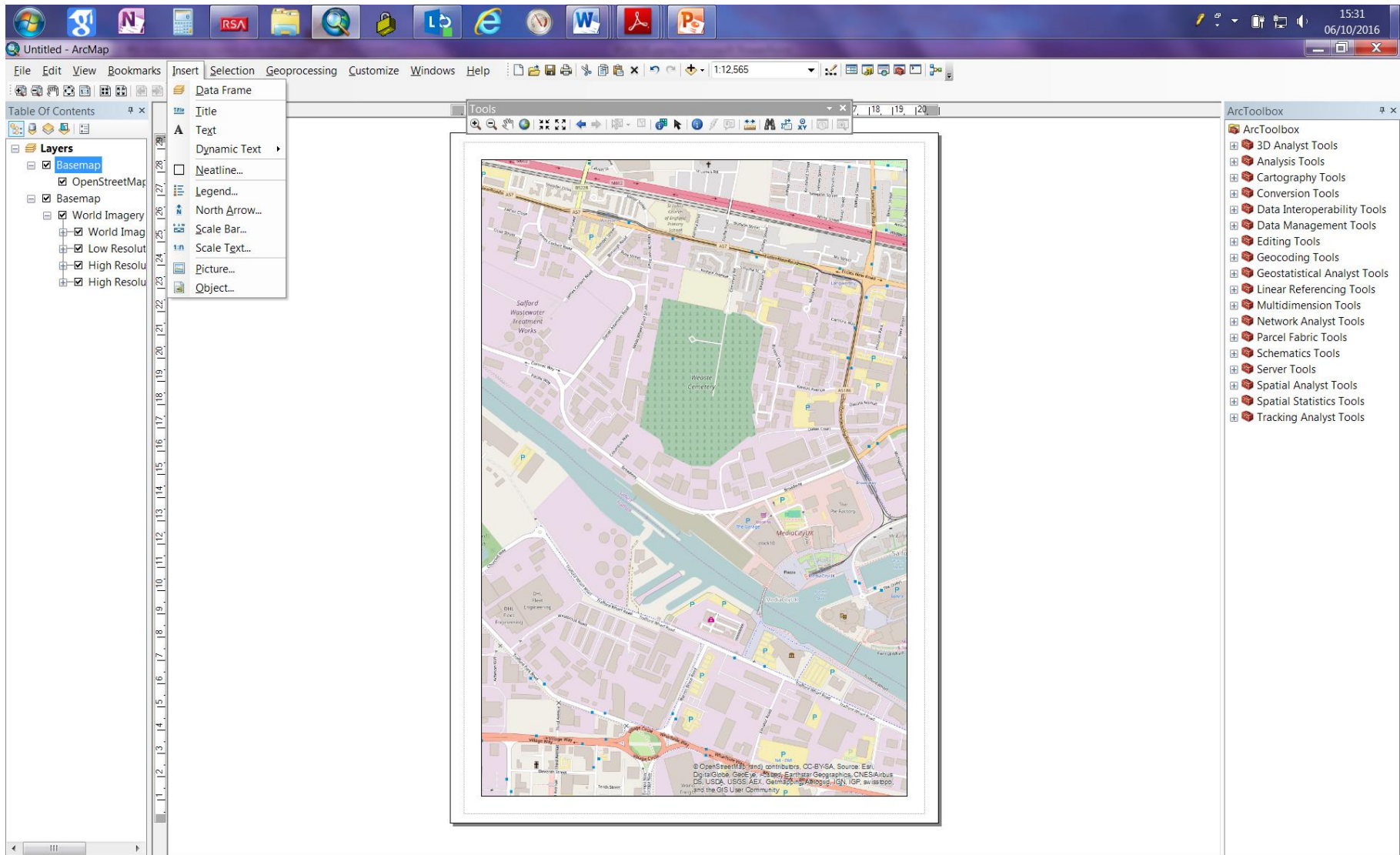
Try adding more map info. If you cant see what you have added-
make sure the map is at the Top of the Table Of Contents list, by
clicking and dragging



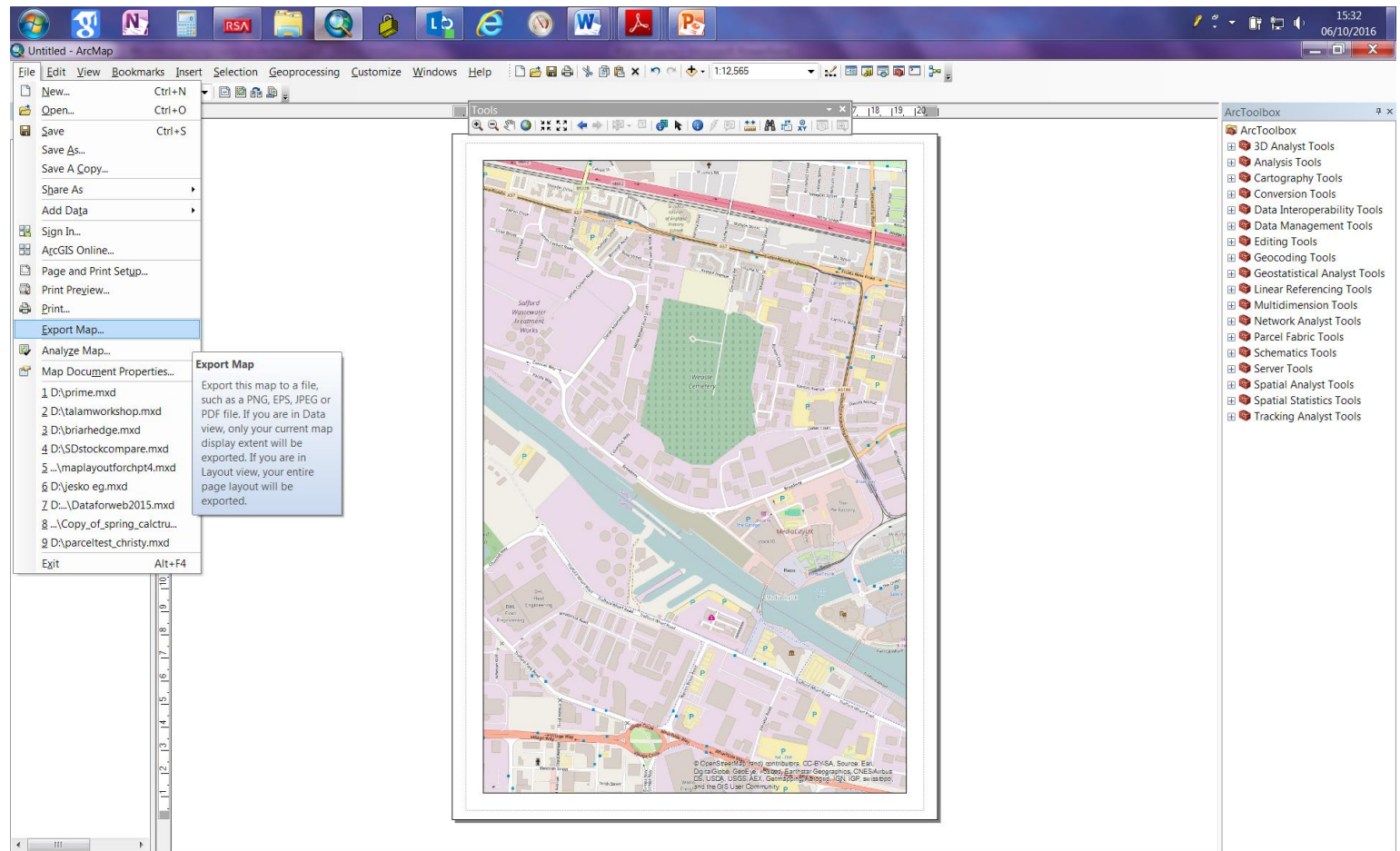
To make a map



Insert onto the Layout View, elements like north arrow and a scale bar



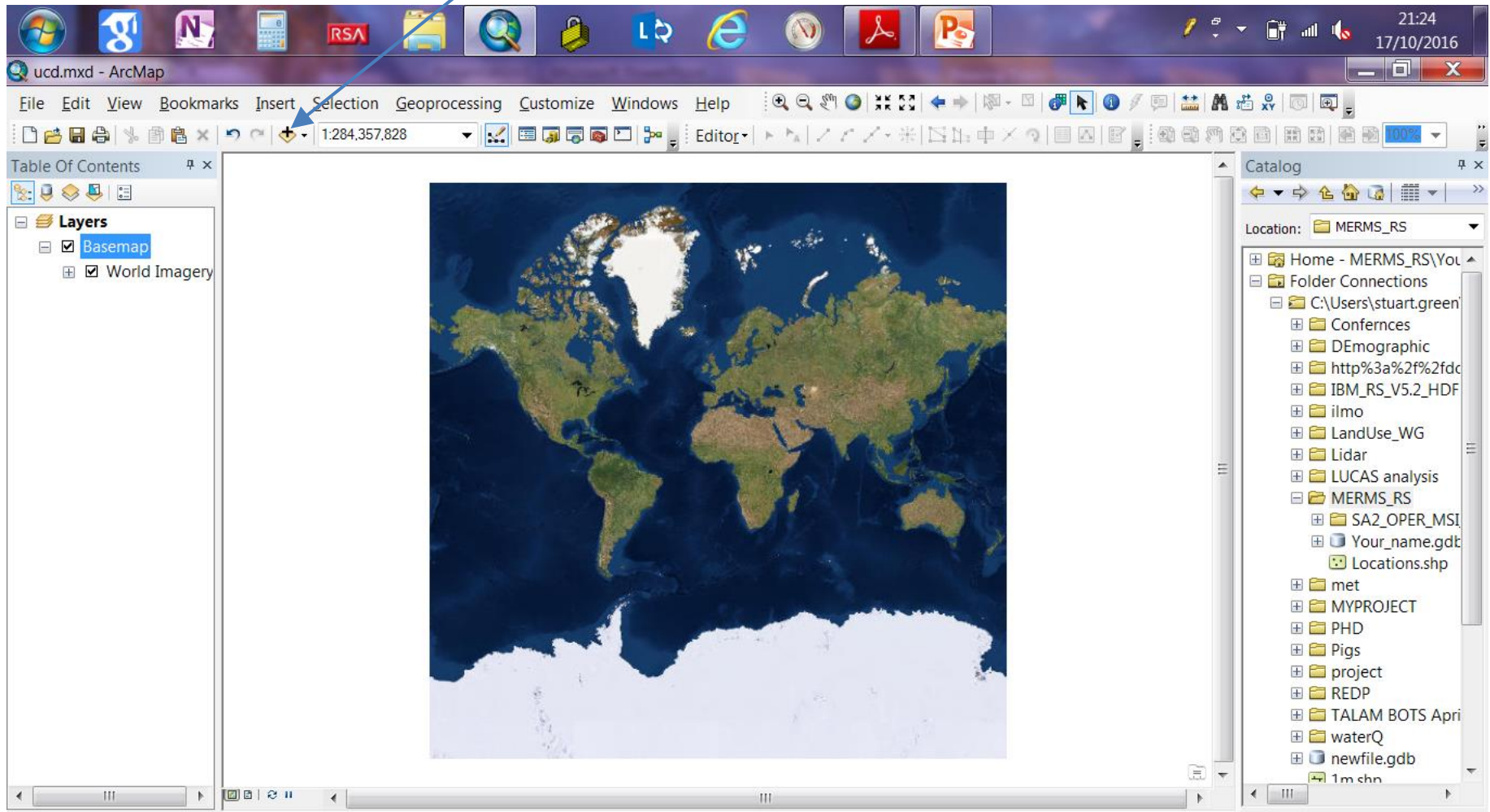
Export Map as JPEG



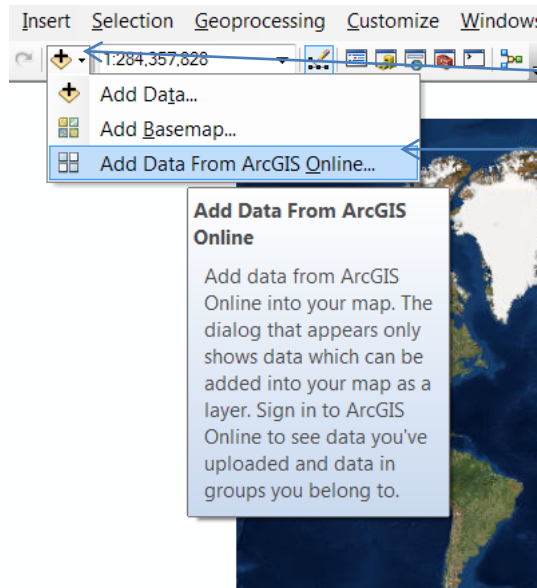
Save Map Document

- Save as Your Name.mxd in you geodatabase.
- VERY IMPORTANT!!!
- Saving the arcgis document does NOT save ANY data you have made- all it saves is the current view of arcgis, it saves the name and location of any data you have loaded up but DOES NOT save any chnages to that data.

1 Open Arc GIS- Click, “Add Data” , “Add BaseMap” “Imagery”



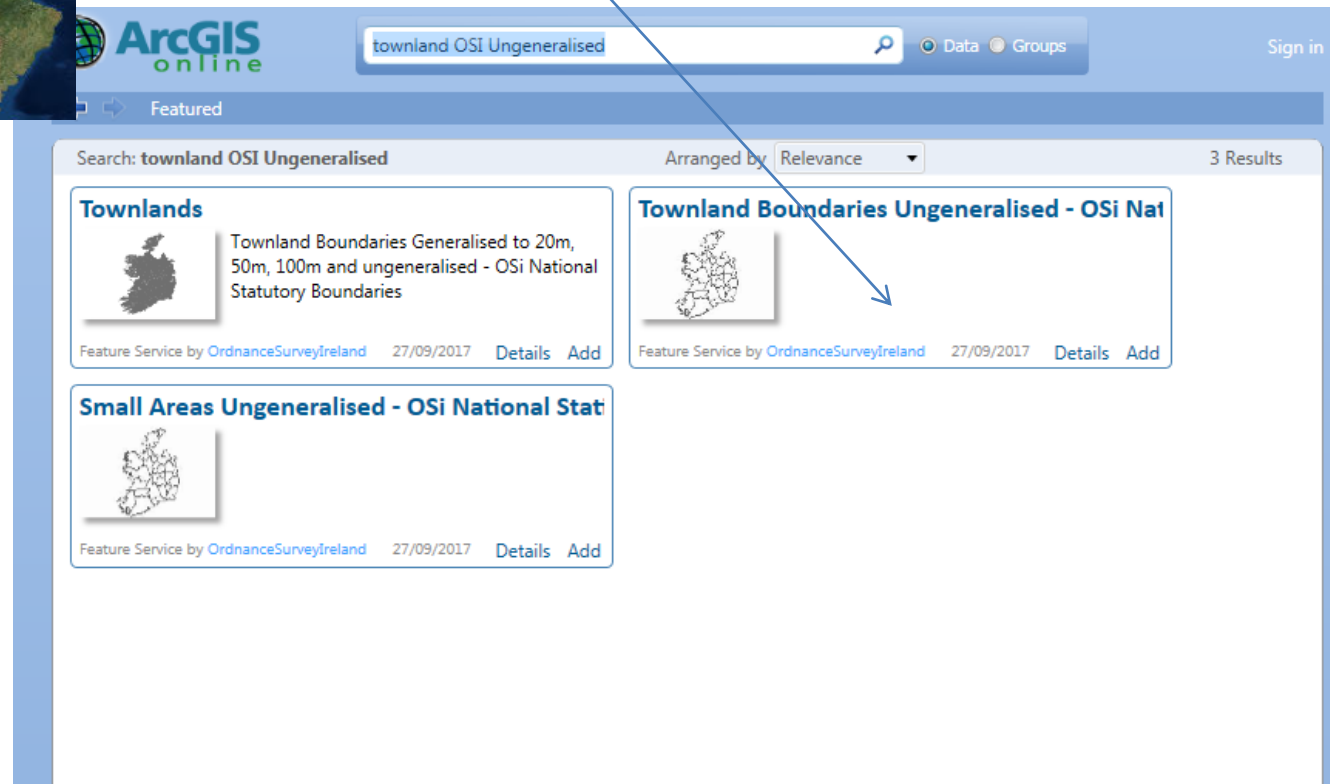
We will now add a new file- a townland map of Ireland From OSI



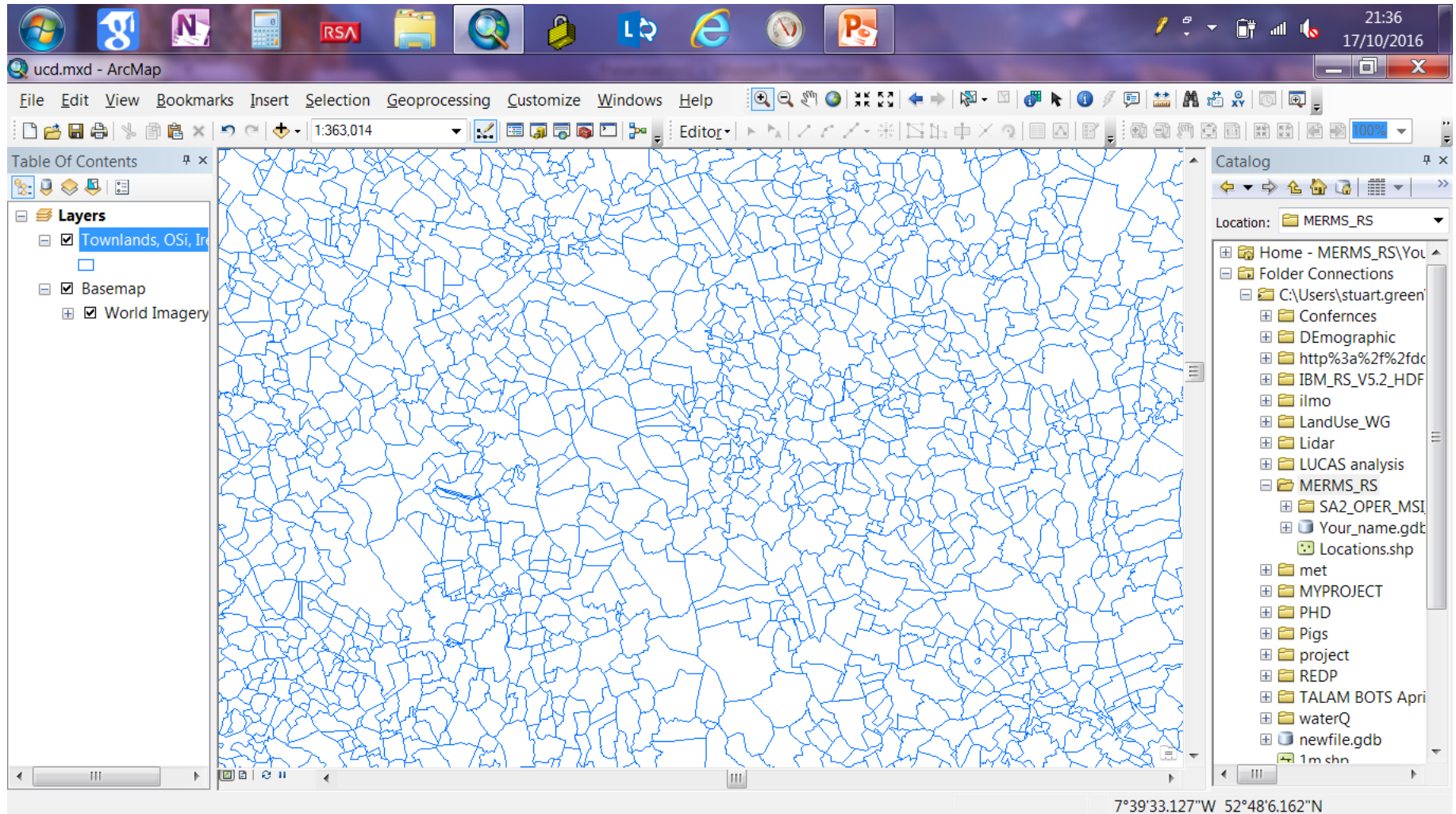
Click Add DATA Button, then Click "Add Data from ArcGIS Online"

Search for "Townlands"

Then Click the Add button for the TOWNLANDS, Osi, IRELAND map



You wont see much happening on the screen But if zoom into a small part of Ireland. Your screen will look like:



7°39'33.127"W 52°48'6.162"N

Each little mapped area is a “Townland” the smallest admin unit in Ireland. Right click on the townland in the TOC and select “Show Attribute Table”. This shows you the list of all the townlands in the map.

The screenshot shows the ArcMap interface with a map of townlands in Ireland. The attribute table is open, displaying the following data:

OBJECTID	TOWNLAND ID	TOWNLAND NAME	COUNTY	PROVINCE	CENTROID X	CENTROID Y
1	10316	KILCARRY	CARLOW	Leinster	690115	661602
2	10254	DRUMMIN (Forth By)	CARLOW	Leinster	686829	665376
3	10229	CRAANS	CARLOW	Leinster	688813	668015
4	10112	BALLYSHANCARRAGH	CARLOW	Leinster	687444	659726
5	10031	BALLINTEMPLE	CARLOW	Leinster	688025	665580
6	10353	KNOCKBARRAGH	CARLOW	Leinster	685312	661800
7	10371	KNOCKROE (Rathvilly By)	CARLOW	Leinster	688644	681526
8	10189	CLONEGALL	CARLOW	Leinster	691526	661688
9	10401	MOANAMANAGH	CARLOW	Leinster	679435	674930
10	10252	DRUMFEA	CARLOW	Leinster	678473	657381
11	10289	GRAIGUEALUG	CARLOW	Leinster	676947	668087
12	10479	RATHLYON	CARLOW	Leinster	686618	676100
13	10288	GRAIGUE	CARLOW	Leinster	671449	676753
14	10385	LEANY	CARLOW	Leinster	690456	668255
15	10011	ANNAGAR	CARLOW	Leinster	663601	662704
16	10336	KILLENORA	CARLOW	Leinster	678876	673979
17	10190	CLONETOOSE	CARLOW	Leinster	678669	662164
18	10536	TINNACLASH (Rathvilly By)	CARLOW	Leinster	694349	683535
19	10495	RICKETSTOWN	CARLOW	Leinster	684802	683684
20	10388	LISGARVAN	CARLOW	Leinster	681673	663636
21	10361	KNOCKENDRANE	CARLOW	Leinster	679049	655705
22	10196	CLONMULLEN	CARLOW	Leinster	689554	655795
23	10350	KNOCKACADDY	CARLOW	Leinster	664927	667700

We are going to search for 1 townland and then zoom to it.
Click "Table Options" Button

The screenshot shows the ArcMap interface with a table of townland data. The table has the following columns: OBJECTID, TOWNLAND ID, TOWNLAND NAME, COUNTY, PROVINCE, CENTROID X, and CENTROID Y. The data is as follows:

OBJECTID	TOWNLAND ID	TOWNLAND NAME	COUNTY	PROVINCE	CENTROID X	CENTROID Y
1	10316	KILCARRY	CARLOW	Leinster	690115	661602
2	10254	DRUMMIN (Forth By)	CARLOW	Leinster	686829	665376
3	10229	CRAANS	CARLOW	Leinster	688813	668015
4	10112	BALLYSHANCARRAGH	CARLOW	Leinster	687444	659726
5	10031	BALLINTEMPLE	CARLOW	Leinster	688025	665580
6	10353	KNOCKBARRAGH	CARLOW	Leinster	685312	661800
7	10371	KNOCKROE (Rathvilly By)	CARLOW	Leinster	688644	681526
8	10189	CLONEGALL	CARLOW	Leinster	691526	661688
9	10401	MOANAMANAGH	CARLOW	Leinster	679435	674930
10	10252	DRUMFEA	CARLOW	Leinster	678473	657381
11	10289	GRAIGUEALUG	CARLOW	Leinster	676947	668087
12	10479	RATHLYON	CARLOW	Leinster	686618	676100
13	10288	GRAIGUE	CARLOW	Leinster	671449	676753
14	10385	LEANY	CARLOW	Leinster	690456	668255
15	10011	ANNAGAR	CARLOW	Leinster	663601	662704
16	10336	KILLENORA	CARLOW	Leinster	678876	673979

The 'Table Options' button is located in the toolbar of the table window, indicated by a blue arrow. The status bar at the bottom of the table window shows '(0 out of 1500 Selected)'.

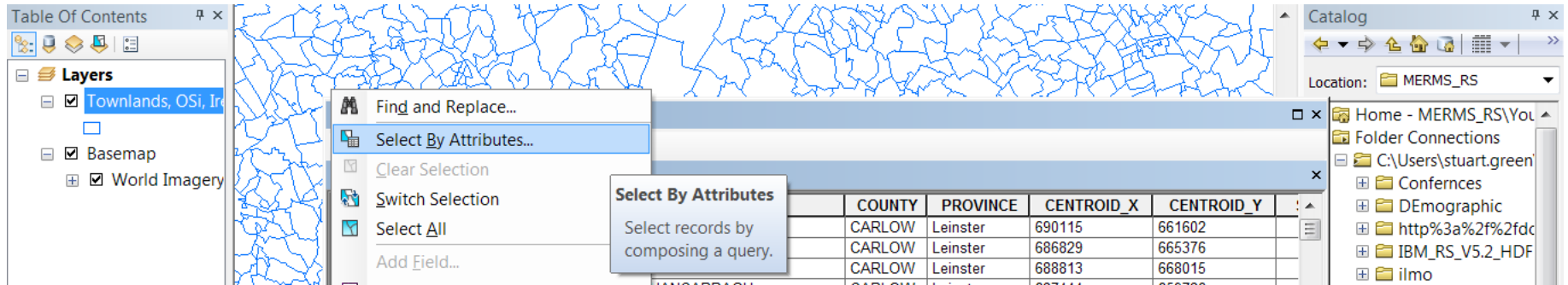
Click OFF “Showfield aliases”.

This means the column names match the names in the background database

The screenshot shows the ArcMap interface with the 'Show Field Aliases' menu option checked. The menu is open, and the 'Show Field Aliases' option is highlighted. A tooltip explains that this option toggles between (database) field name and alias. The background shows a map of townlands and a data table with columns: TOWNLAND NAME, COUNTY, PROVINCE, CENTROID X, and CENTROID Y.

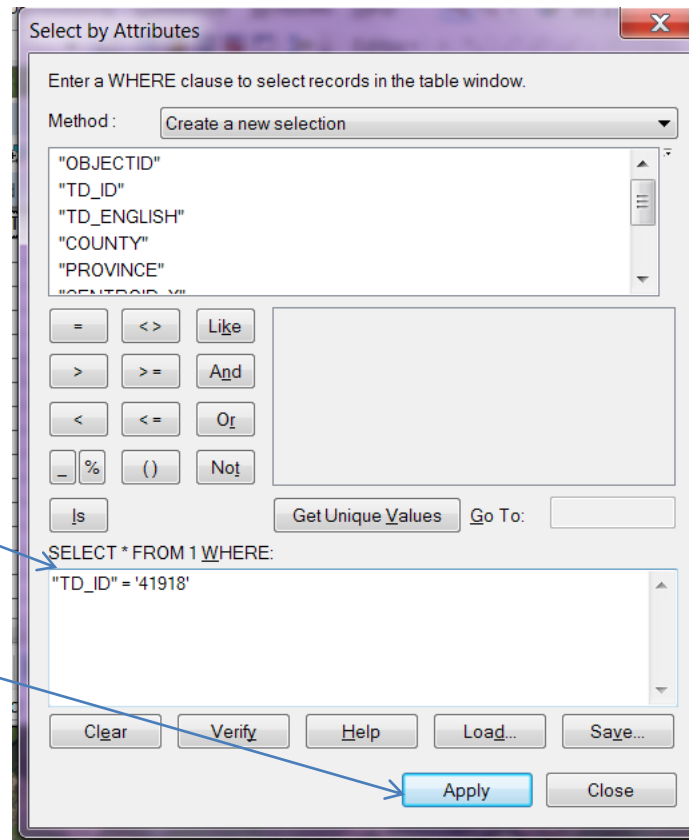
TOWNLAND NAME	COUNTY	PROVINCE	CENTROID X	CENTROID Y
Y	CARLOW	Leinster	690115	661602
N (Forth By)	CARLOW	Leinster	686829	665376
	CARLOW	Leinster	688813	668015
HANCARRAGH	CARLOW	Leinster	687444	659726
EMPLE	CARLOW	Leinster	688025	665580
ARRAGH	CARLOW	Leinster	685312	661800
ly By)	CARLOW	Leinster	688644	681526
	CARLOW	Leinster	691526	661688
	CARLOW	Leinster	679435	674930
	CARLOW	Leinster	678473	657381
	CARLOW	Leinster	676947	668087
	CARLOW	Leinster	686618	676100
	CARLOW	Leinster	671449	676753
	CARLOW	Leinster	690456	668255
AR	CARLOW	Leinster	663601	662704
RA	CARLOW	Leinster	678876	673979

Click Table Options- Select By Attribute



Enter "TD_ID" = '41918'

And click APPLY



Back in the Townland Attribute Table
we can see that one row has been selected
If we click the “zoom to selected” button we can see it on the map

Table

Townlands, OSi, Ireland

OBJECTID	TD_ID	TD_ENGLISH	COUNTY	PROVINCE	CENTROID_X	CENTROID_Y
1	10316	KILCARRY	CARLOW	Leinster	690115	661602
2	10254	DRUMMIN (Forth By)	CARLOW	Leinster	686829	665376
3	10229	CRAANS	CARLOW	Leinster	688813	668015
4	10112	BALLYSHANCARRAGH	CARLOW	Leinster	687444	659726
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7	10371	KNOCKROE (Rathvilly By)	CARLOW	Leinster	688644	681526
8	10189	CLONEGALL	CARLOW	Leinster	691526	661688
9	10401	MOANAMANAGH	CARLOW	Leinster	679435	674930
10	10252	DRUMFEA	CARLOW	Leinster	678473	657381
11	10289	GRAIGUEALUG	CARLOW	Leinster	676947	668087
12	10479	RATHLYON	CARLOW	Leinster	686618	676100
13	10288	GRAIGUE	CARLOW	Leinster	671449	676753
14	10385	LEANY	CARLOW	Leinster	690456	668255
15	10011	ANNAGAR	CARLOW	Leinster	663601	662704
16	10336	KILLENORA	CARLOW	Leinster	678876	673979

2 (1 out of 1500 Selected)

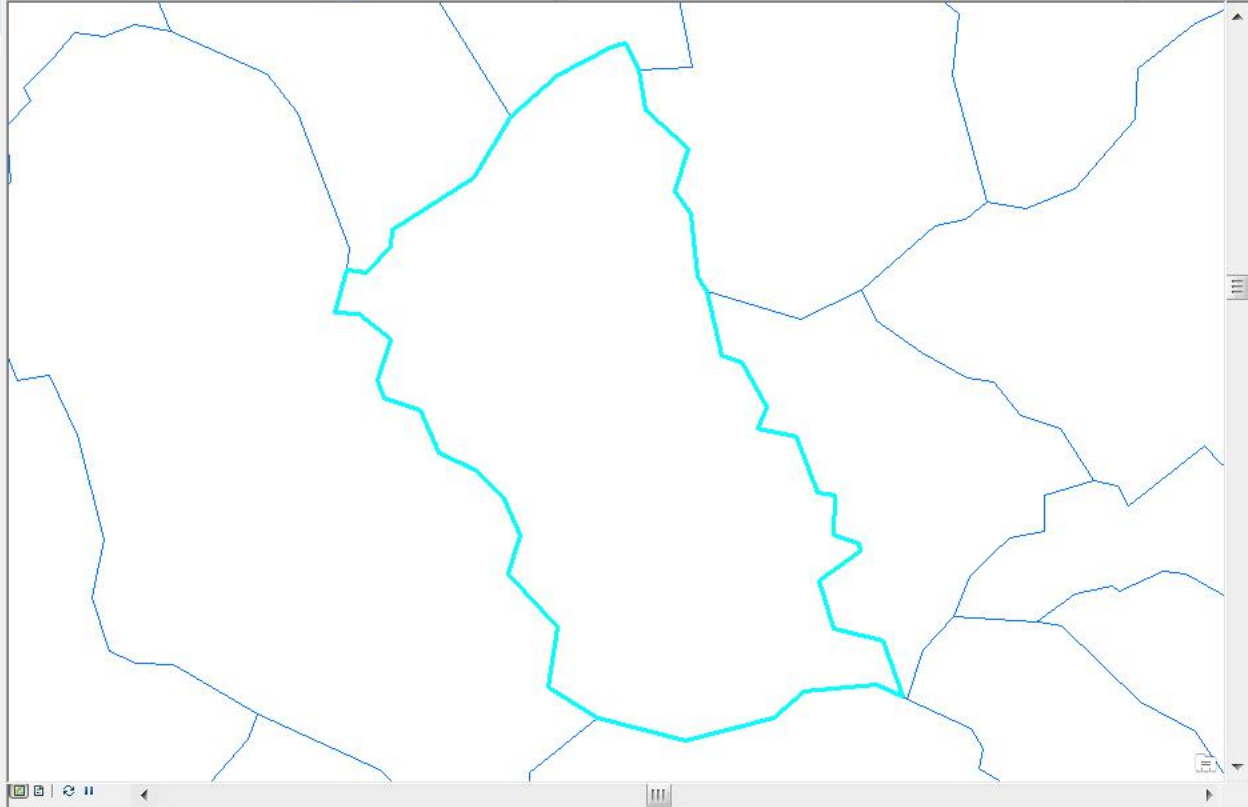
Townlands, OSi, Ireland

Windows taskbar with icons for Internet Explorer, Google, Notepad, Calculator, RSA, File Explorer, ArcGIS, Lock, Lync, Edge, and PowerPoint. System tray shows the time 21:53 and date 17/10/2016. The application title bar reads "ucd.mxd - ArcMap".

ArcMap menu bar: File, Edit, View, Bookmarks, Insert, Selection, Geoprocessing, Customize, Windows, Help. Below the menu bar is a toolbar with various GIS tools and a scale indicator showing 1:26,574.

Table Of Contents panel showing the Layers list:


- Layers
 - Townlands, OSi, Ir
 -
 - Basemap
 - World Imagery

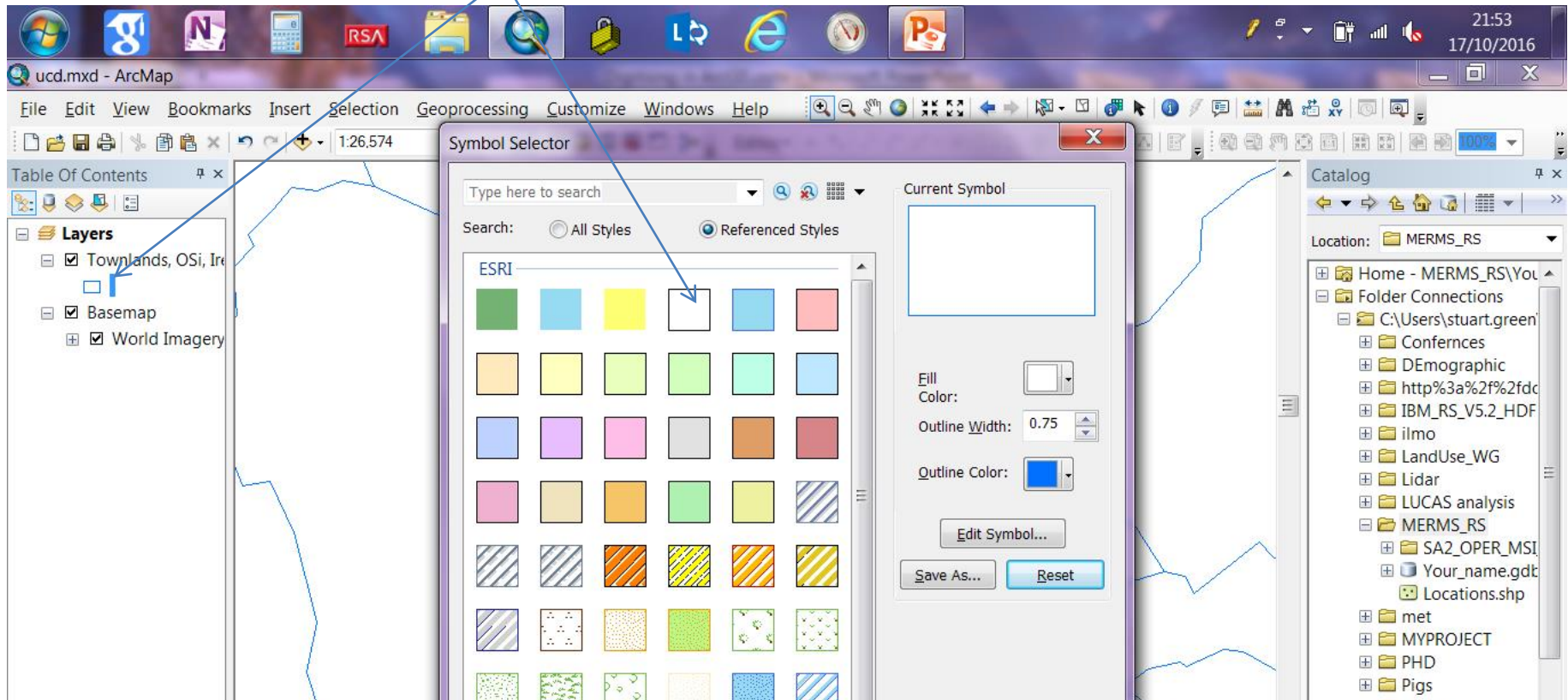


Catalog panel showing the file system structure:

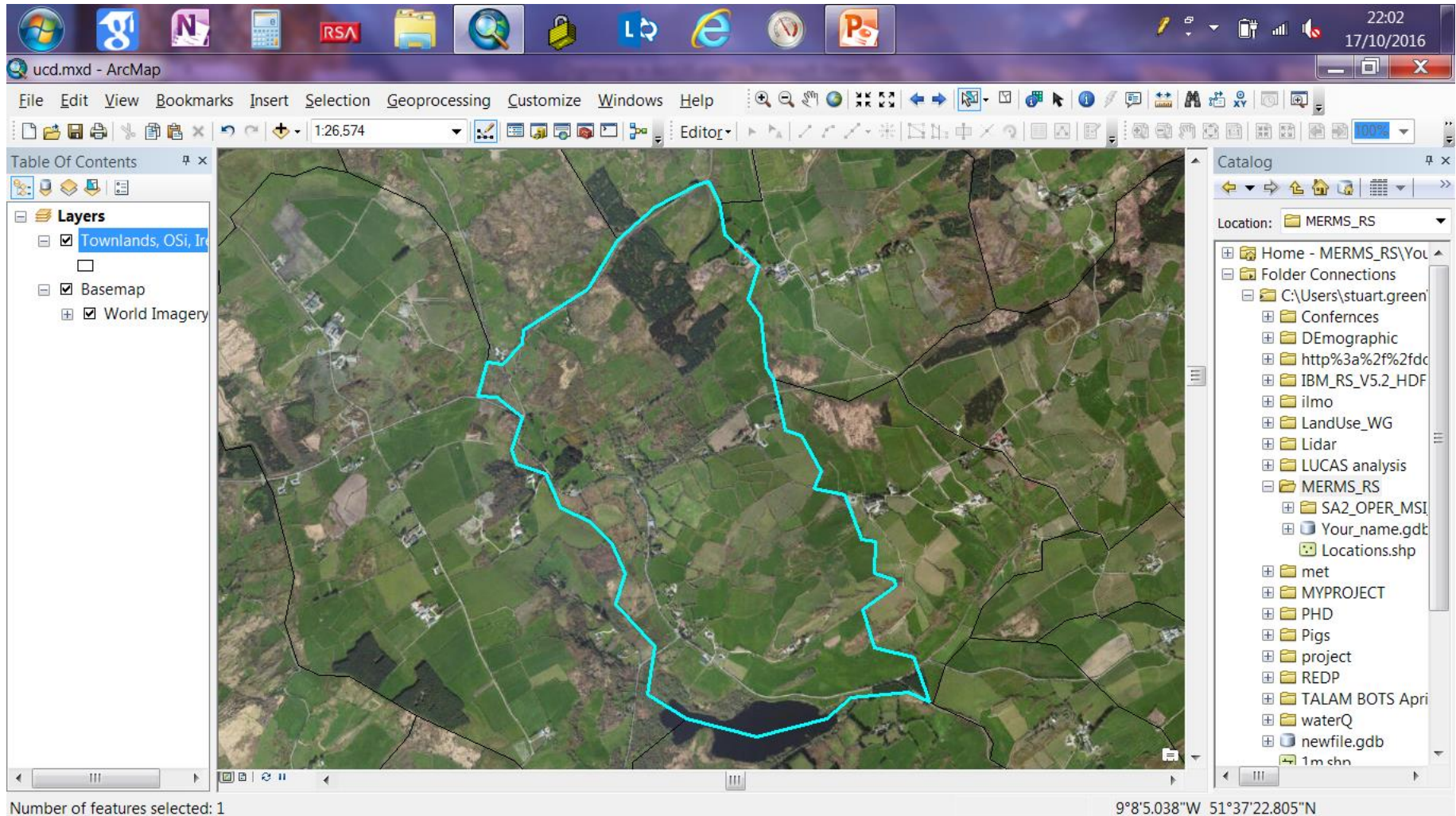
- Location: MERMS_RS
- Home - MERMS_RS\You
- Folder Connections
 - C:\Users\stuart.green
 - Conferences
 - DEmographic
 - http%3a%2f%2fd
 - IBM_RS_V5.2_HDF
 - ilmo
 - LandUse_WG
 - Lidar
 - LUCAS analysis
 - MERMS_RS
 - SA2_OPER_MSI
 - Your_name.gdt
 - Locations.shp
 - met
 - MYPROJECT
 - PHD
 - Pigs
 - project
 - REDP
 - TALAM BOTS Apri
 - waterQ
 - newfile.gdb
 - 1m.shp

9°6'28.858"W 51°37'41.014"N

If we click on the symbol  under townland we can change the symbology to be hollow and see the image underneath



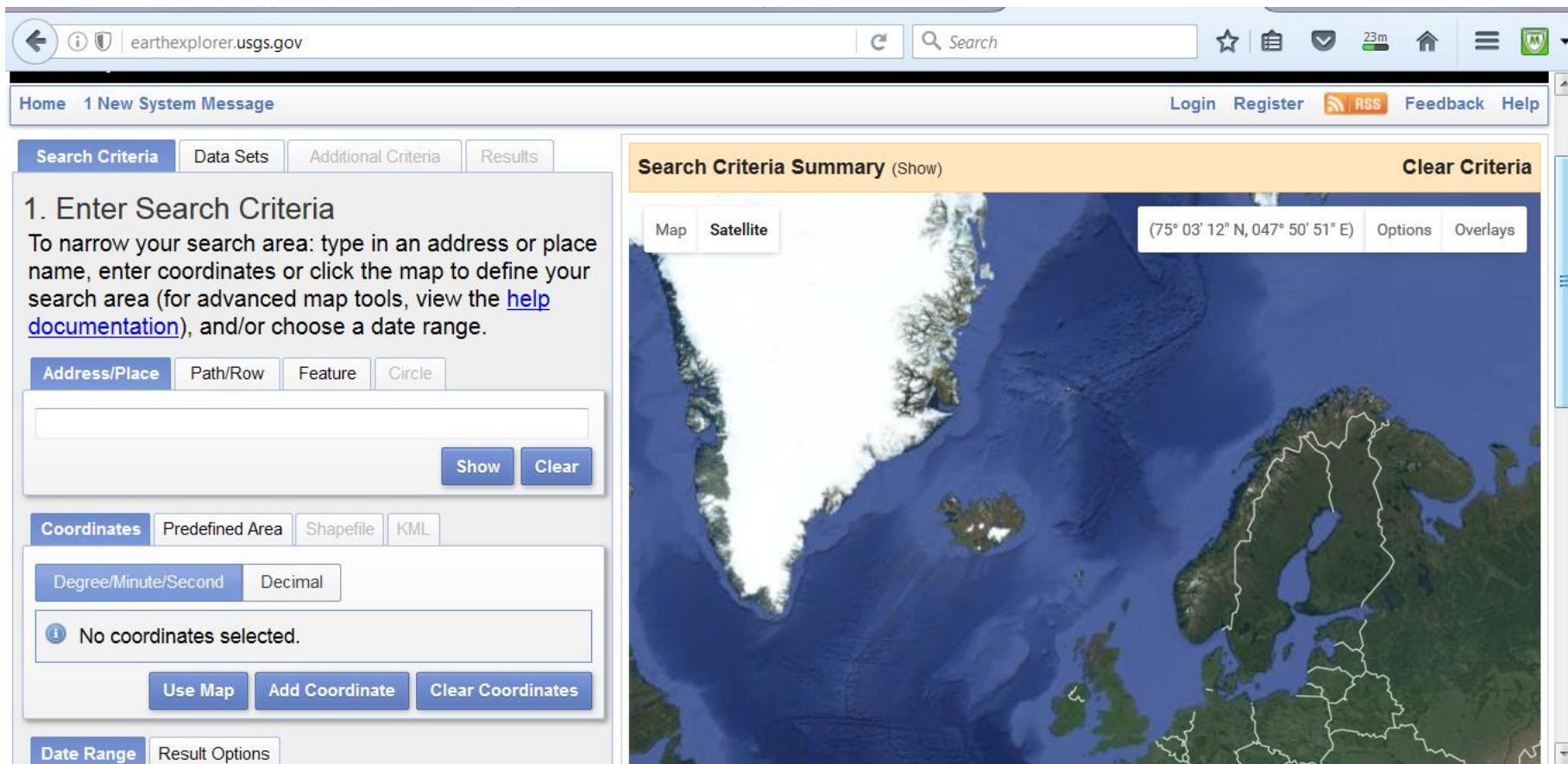
This is the small area we are going to digitise to produce a simple land cover map



- Register for an account then LOGIN
- Select your area of interest and select date form 1st Oct 2015 to 1st Oct 2016

Find new imagery

- Find the Lat/Long of your place of birth and go to earthexplorer.usgs.gov



The screenshot displays the Earth Explorer website interface. The browser address bar shows "earthexplorer.usgs.gov". The page header includes "Home 1 New System Message" and navigation links for "Login Register RSS Feedback Help". The main content area is divided into two sections:

Search Criteria (Left Panel):

- Buttons: Search Criteria, Data Sets, Additional Criteria, Results
- Section: 1. Enter Search Criteria
- Text: To narrow your search area: type in an address or place name, enter coordinates or click the map to define your search area (for advanced map tools, view the [help documentation](#)), and/or choose a date range.
- Buttons: Address/Place, Path/Row, Feature, Circle
- Input field: [Empty text box]
- Buttons: Show, Clear
- Buttons: Coordinates, Predefined Area, Shapefile, KML
- Buttons: Degree/Minute/Second, Decimal
- Text: No coordinates selected.
- Buttons: Use Map, Add Coordinate, Clear Coordinates
- Buttons: Date Range, Result Options

Search Criteria Summary (Right Panel):

- Buttons: Map, Satellite
- Coordinates: (75° 03' 12" N, 047° 50' 51" E)
- Buttons: Options, Overlays
- Buttons: Clear Criteria

Select Sentinel 2 as Data set

The screenshot shows the Earth Explorer interface. The browser address bar displays `earthexplorer.usgs.gov`. The page title is "2. Select Your Data Set(s)". Below the title, there is a checkbox for "Use Data Set Prefilter" and a "Data Set Search:" input field. A list of data set categories is shown on the left, including "Aerial Imagery", "AVHRR", "CEOS Legacy", "Commercial Satellites", "Declassified Data", "Digital Elevation", "Digital Line Graphs", "Digital Maps", "EO-1", "Global Fiducials", "Global Land Survey", "HCMM", "ISERV", "Land Cover", "Landsat Archive", "Landsat Legacy", "Landsat MRLC", "NASA LPDAAC Collections", "Radar", and "Sentinel". Under the "Sentinel" category, the "Sentinel-2" checkbox is selected. A red pin is located on the map of the British Isles. An arrow points from the title "Select Sentinel 2 as Data set" to the "Sentinel-2" checkbox.

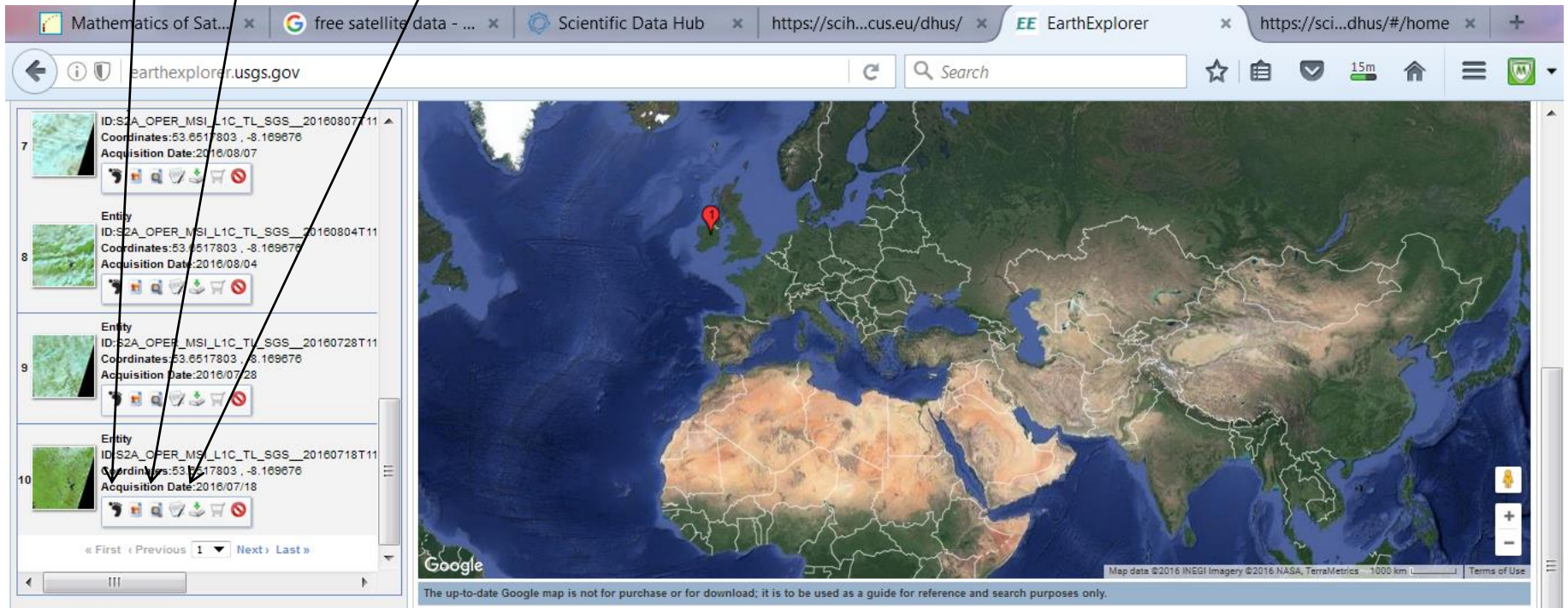
Additional Criteria

- Cloud cover <30%.
- Then click results
- Find an image you like

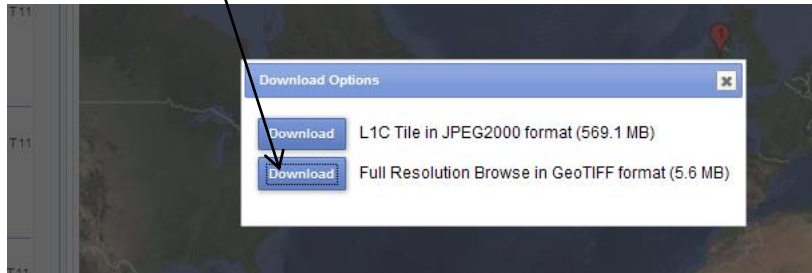
- Shows foot print on main image

- Gives image info

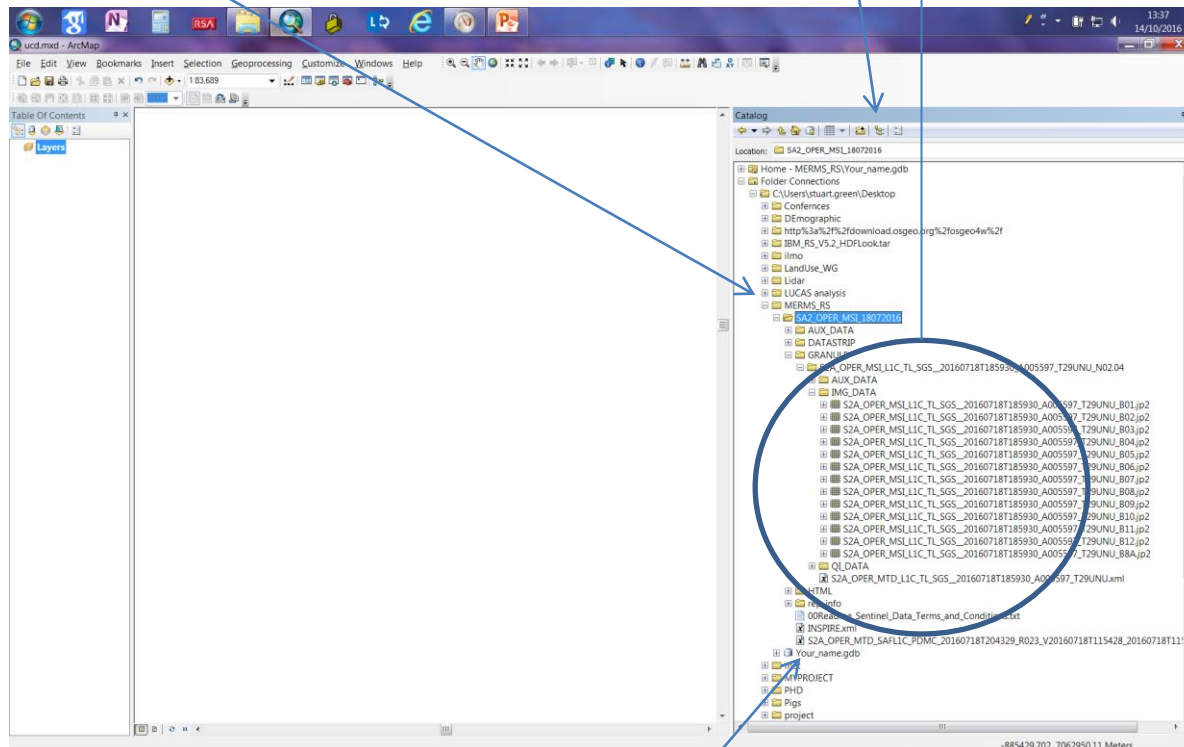
- Download Image



For now just look at the browse sample (a compact version of the data for checking)- you can see it's a hundred times smaller than the full set.
Download to you working directory and then have a look at the image

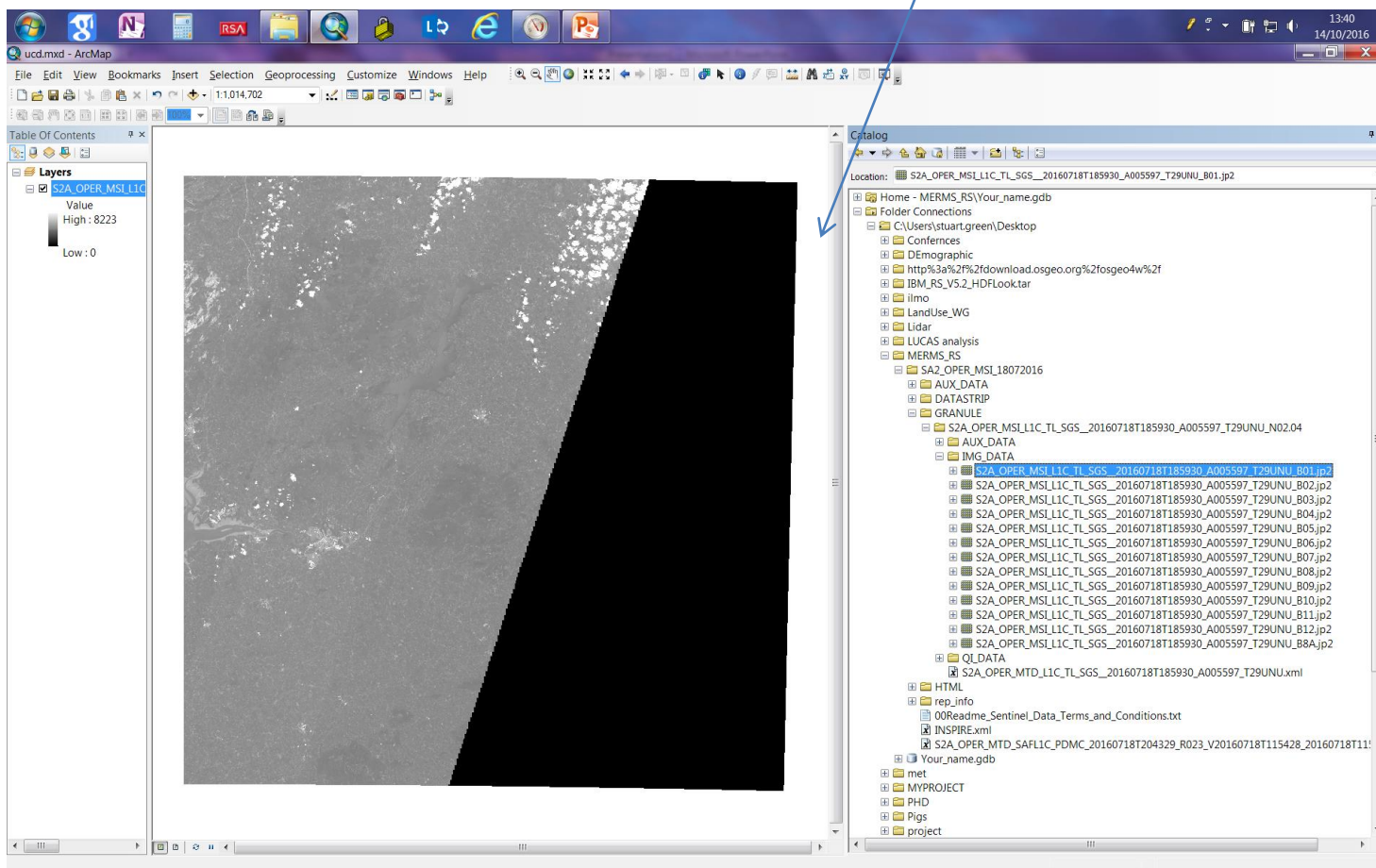


Start ArcGIS. Go to the Catalogue, find your directory on the desktop and click through until you reach the list of image bands

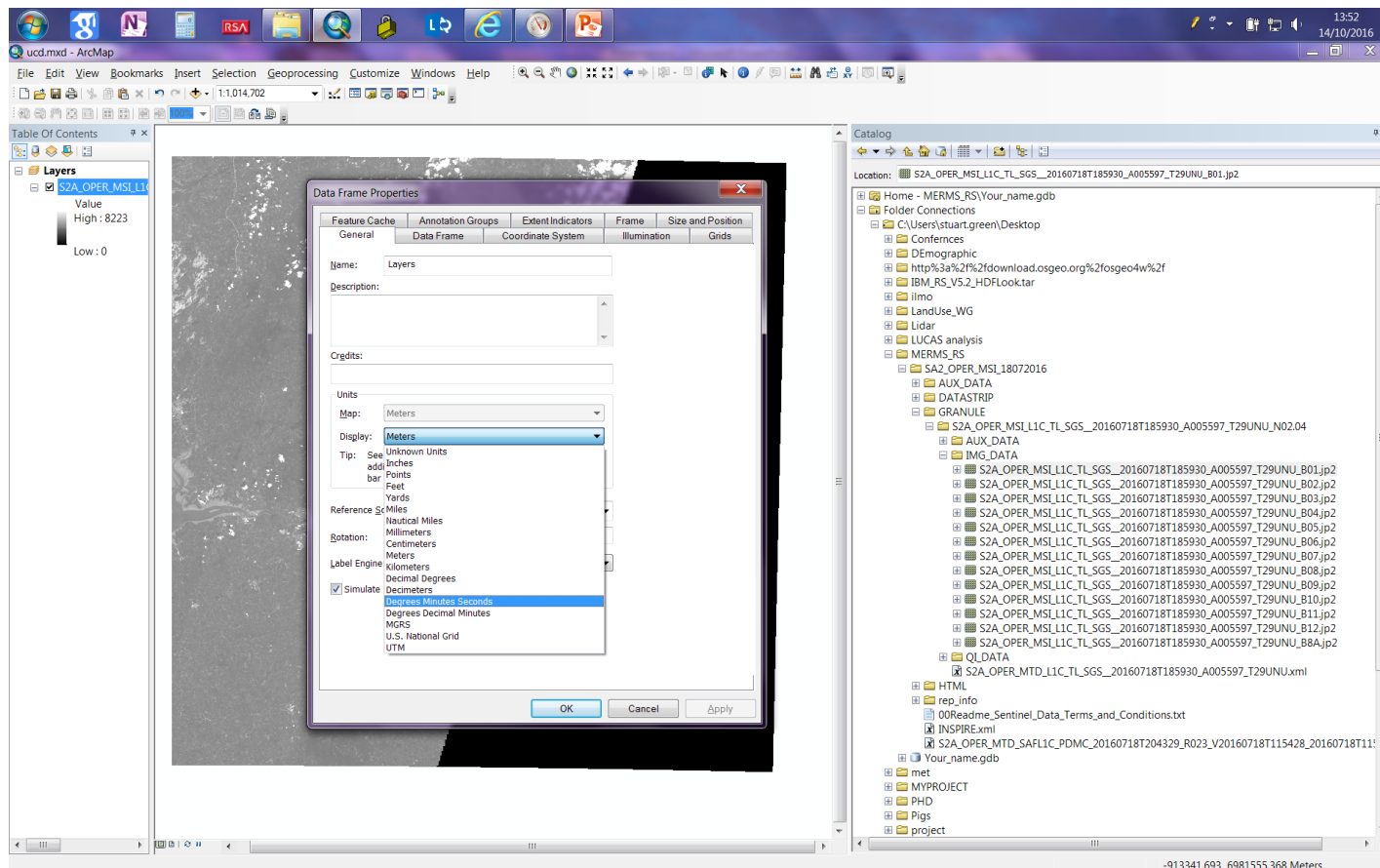


Note the Image Directory is NOT in your file geodatabase

Drag and Drop Band 1 into the Data Frame. Using Right-click/Properties-
What is the Spatial Reference of this band?
What is the spatial resolution?

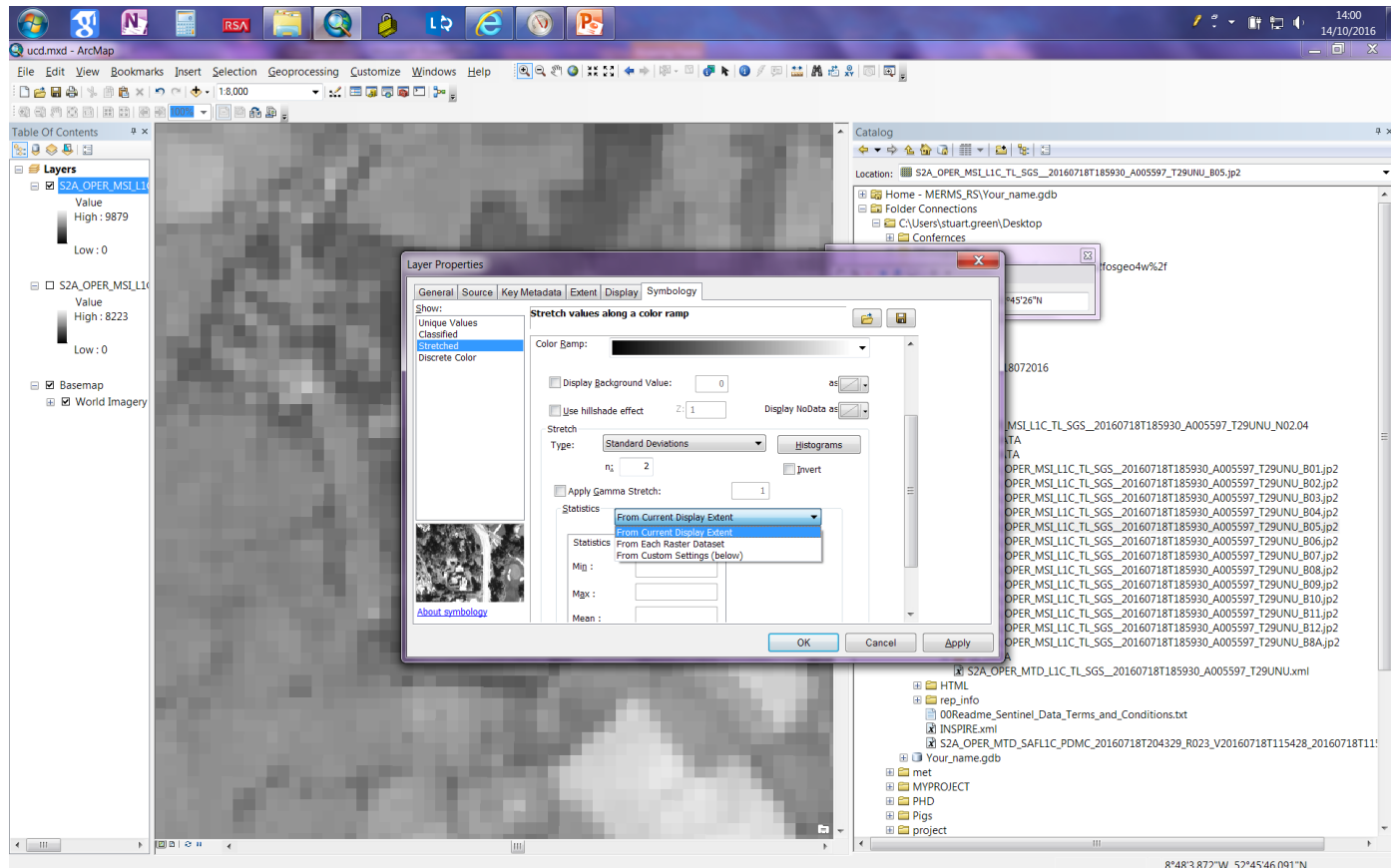


Right-Click/Data Frame Properties. On the General TAB change Units to Degrees



Load up bands 2,3,4,5,6,7

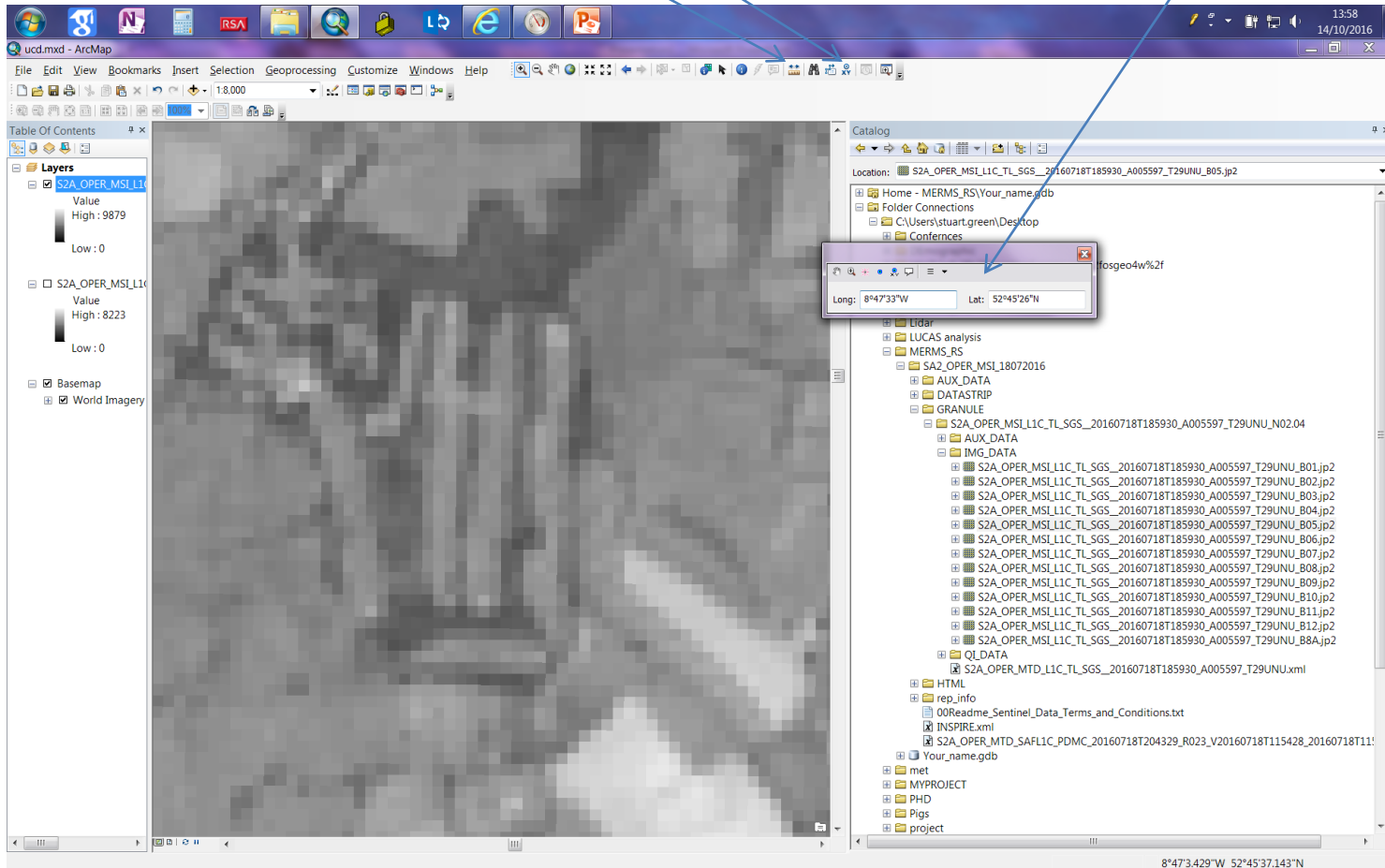
Each time rightclick on the file name in the TOC and change display properties – Symbology. SO that stretch is calculated form display extent- what effect does this have ? (try zooming in)



Using "Go TO XY" button. Navigate to these coordinates.

What do you think this object is?

]Use the measure Button to get an idea of the size



Also look at

- <https://scihub.copernicus.eu/dhus/#/home>
- <https://worldview.earthdata.nasa.gov/>