Lab 5: Environmental Change assignment (10%)
Due: Wednesday 21 October

Procedure

Pick your area from personal knowledge / google maps, google earth time lapse etc..

1. General notes:

Picking the two image scenes will likely take the longest time in the assignment

Cloud cover: The two images should ideally be cloud-free; these are easier to find in sunnier (arid) locations. Options are from 0 <10% and < 20% - beyond 20% ; remote cloudy places e.g. Iceland, Greenland have fewer options than places to the south.

Years: you are looking for change – could be longterm, but it doesn't have to cover the entire 1984-2020 period; it's better to have a good contrast than a long period.

Dates: The ideal is same general time of year. A smaller year span but with closer date of year / season is likely to show better. Images should usually be free of seasonal snow.

In Canada, a date range might be June 15-September 15 (July 30-Sept10 in mountains); adjust for different areas – winter images in Canada and most places are not very useful. Landsat 7 ETM+ images after May 2003 are striped / of little use (1999-2002 are OK)

Area relative to scene edges: Some areas will be nicely placed in the middle of an image, while others may be on the edge, and not fit your screen as well. Technically if it's in Canada, there is 50% side scene overlap, so it could be on the edge of one scene, and the middle of another, in an E-W direction. Scenes are 'cut' along a N-S swath, so some places may be tough to get images simply because they are always near a 'join' or scene top/bottom edge. In such a case, you might be best to pick another area

2a. EARTHEXPLORER: https://earthexplorer.usgs.gov/

As of this morning, this site did not allow scene download, if so skip to 2b.
But I'll still demo this website, they should fix it soon.

Location
You need to fill in location, search criteria, Data sets and additional criteria as below:
Enter feature placename (after picking US/World), click on feature if it shows up - then 'show' .. it should show up with location if its major; zoom in to the area needed
click on 'use map' = map area will turn red (it will search for anywhere covered by this)
Change data range to summer months as needed (except for tropical areas)

Data sets: Landsat -> Collection level 1 → collection 1-1

It appears you can pick all L8, L7 and L5 but you should only pick one for each search, as it will only search for the first one checked
Change the months from 'All' to better suite your area –
You can do it all with Landsat 5 if 1984-2011 covers your change, otherwise L7 / L8

Additional criteria: cloud cover : Less than 10% Be sure to check cloud cover and anytime after you change the dataset

Click results – brings up the search results – click on scene image thumbnails for zoom view .. and again on the new enlarged image (we've found this does not always work with later images / Landsat 8 – not sure why.

Check for the path and row for your images, and click on the first icon (show footprint)
It is best to pick two images from the same path/row

You will need to do all this twice for your 'before' and 'after' images

when you have the best choices (see below) - You will need to login to download

2b. GLOVIS https://glovis.usgs.gov (if EarthExplorer is out of action)

The interface is actually a bit easier to select images, and pre-dates EarthExplorer
Select Landsat 5 or 8
metadata : pick date range/months, and cloud cover (0-10)
zoom to your area, click Apply
available images appear as dots on the timescale
click on any suitable dots to preview the image for that date
In the selected scenes window, check 'show footprints' to be sure it contains your area
When satisfied, click 'select' below the image/timescale
Repeat for second image

3. Scene download (from EE or GLOVIS)

After selecting the scene download option:
This brings up a new window asking for a user name and password
The class group username is: **geog357**
The password is**: unbc4thenorth** (I may change this to *unbc4lenorth* for easier typing)

Select the download icon and then the LandsatLook georeferenced image – 2nd bottom one listed. NOT the level 1 image data at the bottom which is ~ 100 times bigger in size. I repeat **do NOT download the bottom listed level 1 image** dataset (although yo will choose this option for your project in later labs)
Save to your folder.

You may need to change your browser options/preferences if it goes straight to the 'downloads' folder. In Firefox, click on the top right, 3 horizontal lines icon. Then options (preferences). Scroll down to Downloads and check the button for 'Always asks you where to save files'.

It downloads as a .zip, so unzip (double-click on its icon). Before you unzip the file, you will see its contents –3 TIF files– you will need the one listed as T1.tif (that is not identified with TIR – thermal IR). Click on the file and then the extract button – it should then be saved in your folder, and as a TIF, can be opened in Geomatica.
Repeat to download your 'After' image

4. Viewing/subsetting in Geomatica Banff Focus

Start a new project in Banff Focus and open the two TIF files: one for before and after
The two should perfectly align
Change your display area to be ~ 3 x 2 ratio 'landscape' image ... zoom as needed, but not so much that you can see individual pixels

Zoom/pan to an area of interest that should fit on a screen without having to pan; as a rule the dimensions could be 100-1500 x 700-1000 – assuming a 'landscape' format which will best fit the final powerpoint frame; don't zoom in so much you can see the pixels … enhance as needed, and so the two images match. Include a 'marker feature' if there is one e.g. lake, river, town and when satisfied, Choose:

Tools-> Clipping/subsetting .. check the rasters box in the new window, and enter a new name for the clip .. it can be .pix format
On the right panel, change definition method dropdown to **Use Current View**
The red inset below should now show your chosen area, and click on Clip to make it so

Repeat for the second image, ensure it's for the same area / current view - don't move around but you can be sure to match the clip by choosing 'select a file' for definition method and browse to select your first clip as the file.

New project – using your clipped images

Start a new project again, and load ONLY your two clipped images
enhance as needed so they match as closely as possible - except for the changed areas

file-> export map to save each image as JPG (change 'save as type' dropdown from AI)
Select JPG format, and display resolution to 150dpi
For each one, make sure you have the file you intend to be exported. To be sure, turn the other off and highlight the intended file when you export.
Double-check your two exported jpg files are what you intended – open in a graphics viewer by double-clicking on their icons in windows file manager.

5. Adding to powerpoint

Open a new presentation with 2 blank slides
Insert (picture) each image into a blank slide; insert only, don't move them around or adjust, as then you'll never get them to realign

Note: somehow it usually fills the slide; but if they are either too big or small, then use:
- right-click on an image -> size and position option to modify size - use EXACTLY the same parameters for each of the two slides

Add feature location / date / year on each slide (insert-text box), and a rough scale bar on the after image – in power point, just use a straight line and add suitable distance by text

Create an extra introductory slide to describe what we are seeing in the change – more on this in class on friday

The goal at the end of the lab is to have your pair of images 'ready to go' in the ppt file.