

Lab 6: Environmental Change assignment (10%)

Due: Wednesday 30 October

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

1. General notes:

Picking the two before/after scenes may take the longest time in the assignment

Cloud cover: The two images should ideally be cloud-free; these are easier to find in drier locations. I suggest 0-5% (max) - remote cloudy places e.g. Iceland, Greenland, and equatorial regions have fewer options

Years: you are looking for change – could be long-term, but it doesn't have to cover the entire 1984-2023 period; it's better to have a good contrast than a long period.

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

In Canada, a date range might be June 1-September 30 (July 15-Sept 15 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 prefer to pick another area ...

2. EARTHEXPLORER: image view/download

<https://earthexplorer.usgs.gov/>

Note: Firefox may block pop-up windows which are essential here, so use Chrome
- Also check 'settings' to ensure it always asks you where to save downloads

Location

You need to fill in location, search criteria, Data sets and additional criteria as below:

Enter feature placename (after picking US or World), click on the feature if it is major enough to show - then 'show' .. it should zoom to the location if it's major; zoom in as much as possible to your area as needed.

click on 'use map' = map area will turn red (it will search for anywhere covered by this)

- Or you can draw a polygon around the area you want, click, click and end with double-click to close the polygon; there's also a circle option.

Date range to summer months as needed (except for tropical areas).

Change the months from 'All' to better suite your area e.g. July August September

Search from: insert your start date (day/month/year) and end date.

You could leave them if you plan to search the entire range e.g. Landsat 8/9 2013-24, though you are likely to be more selective.

Cloud cover : Move slider from 100% to 5%

Datasets: Landsat -> Landsat Collection level 2 → level 1

It appears you can pick all L8/9, L7 and L5 but you should only pick one for each search, as it will only search for the first one checked

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 recent Landsat 9 images and there is no preview)

If you have a huge number of scenes e.g. >100, maybe you forgot to limit cloud cover?

Check for the path and row for your images, and click on the first icon (show footprint)

It is usually ideal 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

You may want to change your browser options/preferences if it goes straight to the 'downloads' folder. Settings -> downloads. Scroll down to Downloads and check the button for 'Always asks you where to save files'.

3. Scene download

After selecting the scene download option:

This brings up a new window asking for a user name and password, if you didn't login at the start ... you could also login when you first start the webpage

The class group username is: **geog357**

The password is: **unbc4thenorth**

Select the download icon and then in the pop-up window the first listed download option (below the product bundle) :

Full Resolution Browse (Reflective Color) GeoTIFF

This is after the level 1 product bundle data at the top which is ~ 100 times bigger in size. **do NOT download the Product bundle** dataset (although you will choose this option for your project). The JPEG options are inadequate as they are not georeferenced.

Save the download to your folder.

You could also save the Thermal GEOTIFF for interest.

4. Viewing/subsetting in Catalyst *

Start Catalyst and open the two TIF files: one for before and one after

The two should perfectly align

Depending on your area of interest, you can 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 1200-1600 – assuming a 'landscape' format which will best fit the final powerpoint frame ... enhance as needed, and so the two images match. Note that the TIF image is already stretched and compressed to an 8-bit format with SWIR-NIR-Red bands in RGB, so they won't enhance the same way as previous lab samples. Include a 'marker feature' if there is one e.g. lake, river, town and when satisfied ...

Choose:

Tools-> Clipping/subsetting .. tick the rasters box in the new window, and enter a new name for the clip .. it should be .pix format

On the right panel, change definition method dropdown to **Use Current View**

The red inset frame 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 also 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 only 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)

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.

You can also open your scenes in ArcGIS or QGIS –they may have options to export / capture the two jpg images without having to clip, but I'm more comfy with Catalyst 😊

5. Adding to powerpoint

Open a new presentation with 2-4 blank slides

Insert (picture) each colour image into a blank slide; insert only, don't move them around or adjust, or you'll never get them to realign ...

Note: it usually fills the slide; but if they are either too big or small, then do this:

- 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 one 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

The goal at the end of the lab is to have your pair of images 'ready to go' in the ppt file. You can add the text and explanation for class presentation later. If you don't get this far or get stuck on 'where to pick', no worries – there's time over the next two weeks.

See also slides 16, 17 and 21 in the most recent lecture