

Environmental change – monitoring with RS

The extended record of remotely sensed imagery enables:

- Map current and past land cover
- Monitor change e.g. since 1984 (Landsat 5 TM) – lower res. from 1972

There are always changes, but with increasing population, resource extraction and impacts, global warming etc..

These have various characteristics

- Long / short term
- Gradual / catastrophic
- Local / global
- Single event / cyclical
- Natural / human induced

Forest Changes in British Columbia

Revised October 11, 2008



July 28, 2003



August 22, 1992

Google Earth Time Lapse 1984-2022

40 years of Landsat images, RGB, >70,000 images - >1 petabytes of data

<https://earthengine.google.com/timelapse/>

Note: mountain areas are affected by seasonal snow, Landsat 7 by stripes



GEOG357: Environmental change exercise 2024

... the world is your oyster. Pick a good example

Goal: identify an event or change somewhere in (1972) 1984 - 2024, and find/download/clip before/after image ... see below

This could also be before/after and then beyond (but not required) e.g. before / after fire -> and also regrowth

Download and prepare images in Lab 6: Oct 16 *

*schedule-based – we also have time next week

Send your slides via moodle or email by Oct 30, 17:00

Give a 3 minute summary in class on Oct 31 (Nov 5 if you miss that day)

The Landsat collection has the longest record

Landsat 1-3 MSS 1972-84 (80m, no SWIR)

Landsat 5 TM 1984-2011

Landsat 7 ETM+ 1999-2002 (afterwards striped except for centre strip)

Landsat 8 OLI 2013->

Landsat 9 OLI 2022->

The before/after should be from the same season/month and near as possible to the 'anniversary date' but phenology can vary by 2 weeks either way

Cloud-free is more important than exact date



Landslide Dams the Chilcotin River



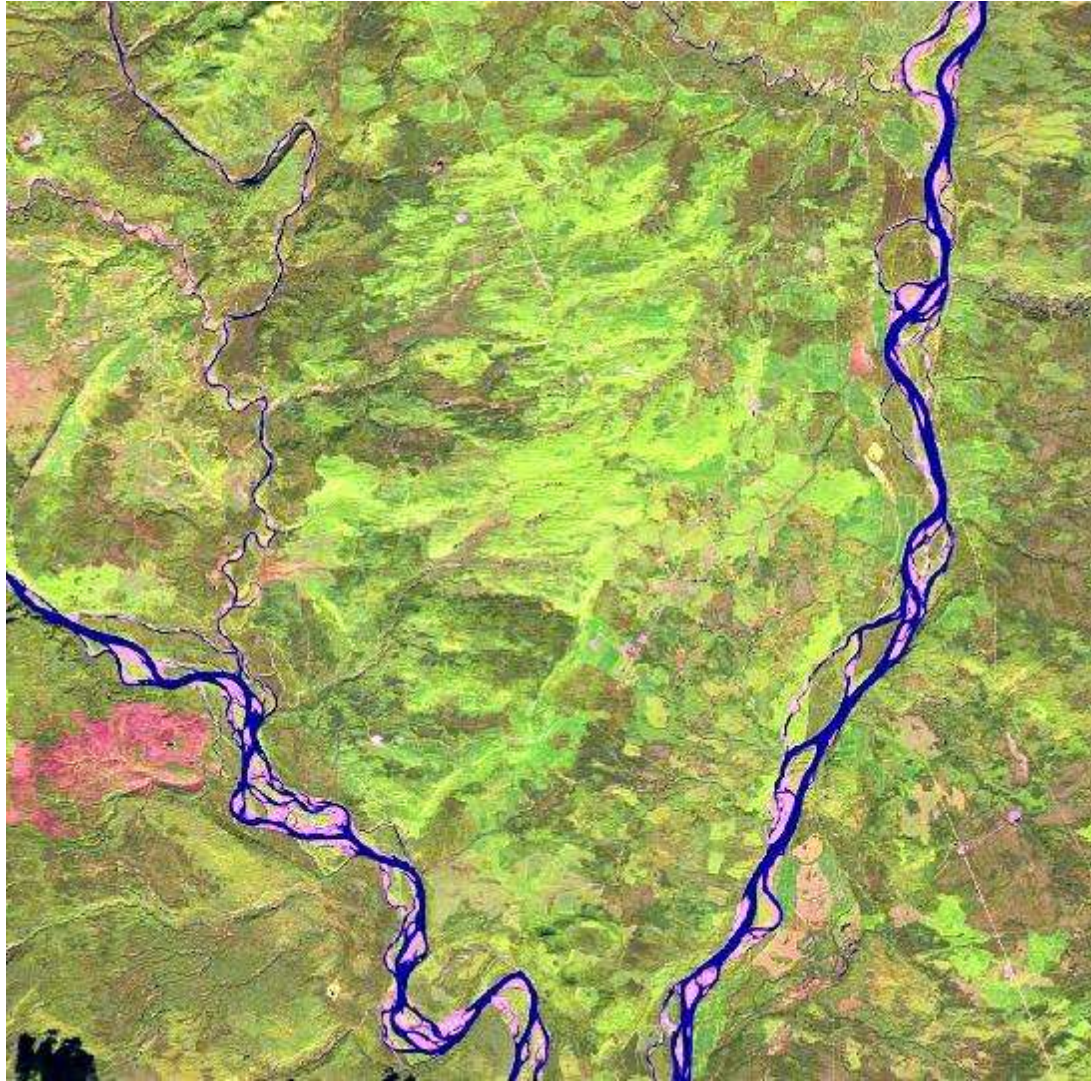
July 16, 2024

August 1, 2024

<https://earthobservatory.nasa.gov/images/153158/landslide-dams-the-chilcotin-river>

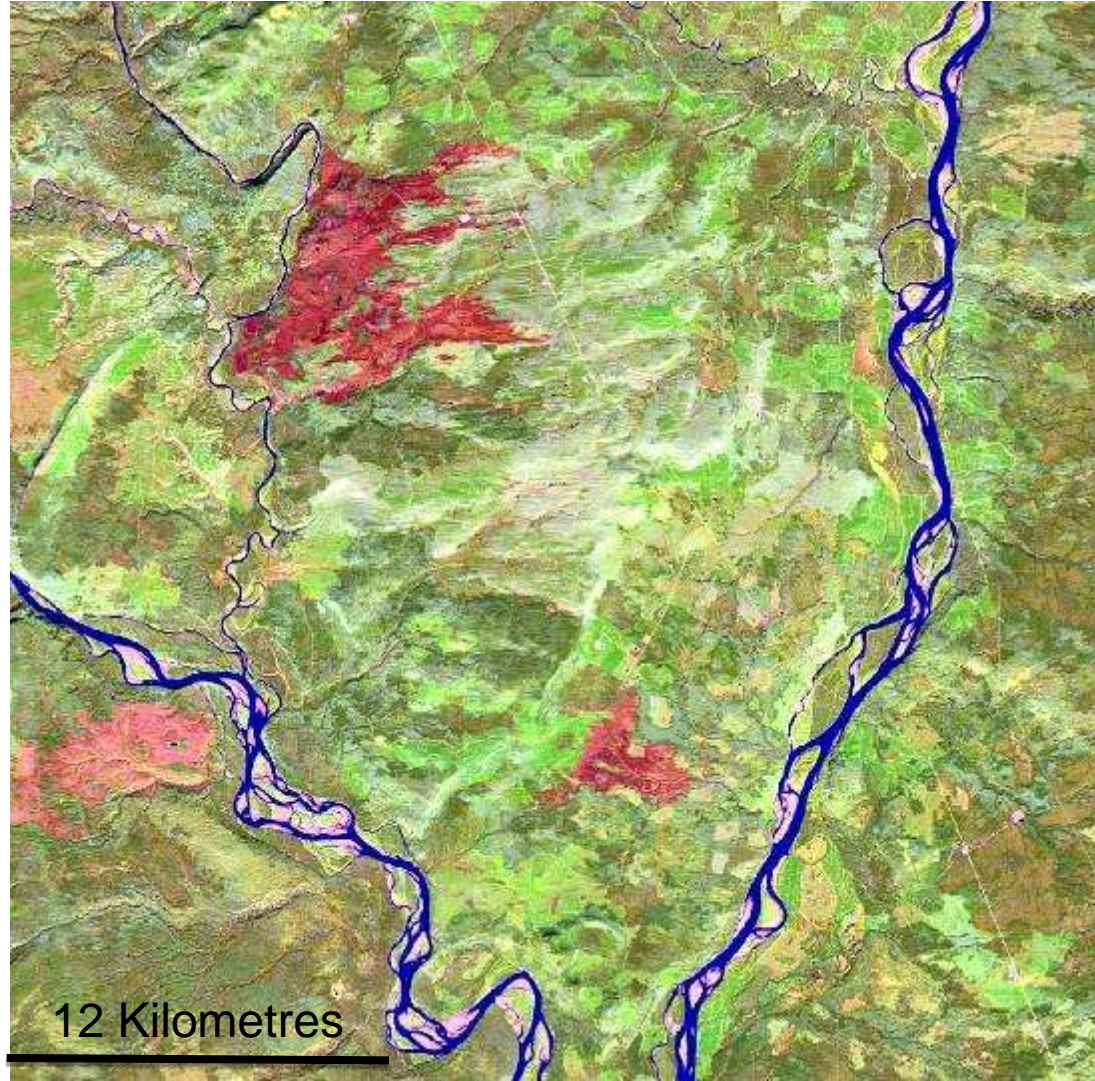
GEOG357 environmental change before / after

Nelson Forks
September 3rd
2017



10% assignment – you select/download two images showing change

Nelson Forks
September 9th
2019



Pick an area and topic of interest to you and your studies

Three Gorges Dam, China

Dam location: 30°49' North 111°00' East



<http://www.businessinsider.com/chinas-enormous-three-gorges-dam-is-turning-out-to-be-a-huge-mistake-2012-4>

Environmental Change

Sandouping, August 1999



Sandouping, August 2017



Bohai Bay 2000-2023



2000 Aug 29

- New developed industry area
- Increase in economic zone
- The construction of shipping port
- Decrease area in aquaculture
- Increase in discharge of Chaobai river



20 km →

2023 Aug 21

Solar Power plants Ivanpah, CA – Primm, NV



35 degrees North, 115 degrees West

September 18, 1989 (LS 5 TM)



September 23, 2014 (LS 8 OLI)



1. Enter Search Criteria

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.

Geocoder KML/Shapefile Upload

Select a Geocoding Method
 Feature (GNIS)

Search Limits: The search result limit is 100 records; select a Country, Feature Class, and/or Feature Type to reduce your chances of exceeding this limit.

US Features World Features

Feature Name
 (use % as wildcard)

State
 All

Feature Type
 All

Show Clear

Polygon Circle Predefined Area

Degree/Minute/Second Decimal

No coordinates selected.

Use Map Add Coordinate Clear Coordinates

Date Range Cloud Cover Result Options

Search from: mm/dd/yyyy to:
 mm/dd/yyyy

Search months: (all)

Lab 6: LANDSAT DATA SEARCH

Use Chrome browser – Firefox blocks critical pop-up windows

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

Login: geog357

Password: unbc4thenorth

- Only needed to download (not to browse)
- Geocoding: feature or path/row
- US or world features
- Feature name / country click on name found
- Zoom to area wanted, then 'use map' –turns red
- Data range – change dates, months and years
- Cloud cover < 5
- Datasets -> Landsat -> Landsat collection 2 level 1
- Landsat 4-5 or 8-9 (can only do one each search)
- Results

To download data

- Select Download button

- Pick first download option (BELOW product bundle) *

* For projects, we'll use the bundle, but for here pick the compact GEOTIFF

- **Full Resolution Browse (Reflective Color) GeoTIFF**

Direct the download to your lab folder

– you may need to change 'settings' on your browser it will go to 'downloads'

Three dot symbol on the top right of browser -> settings -> downloads

Pick 'ask where to save each file before downloading'

The georeferenced TIFF file(s) will open in Catalyst

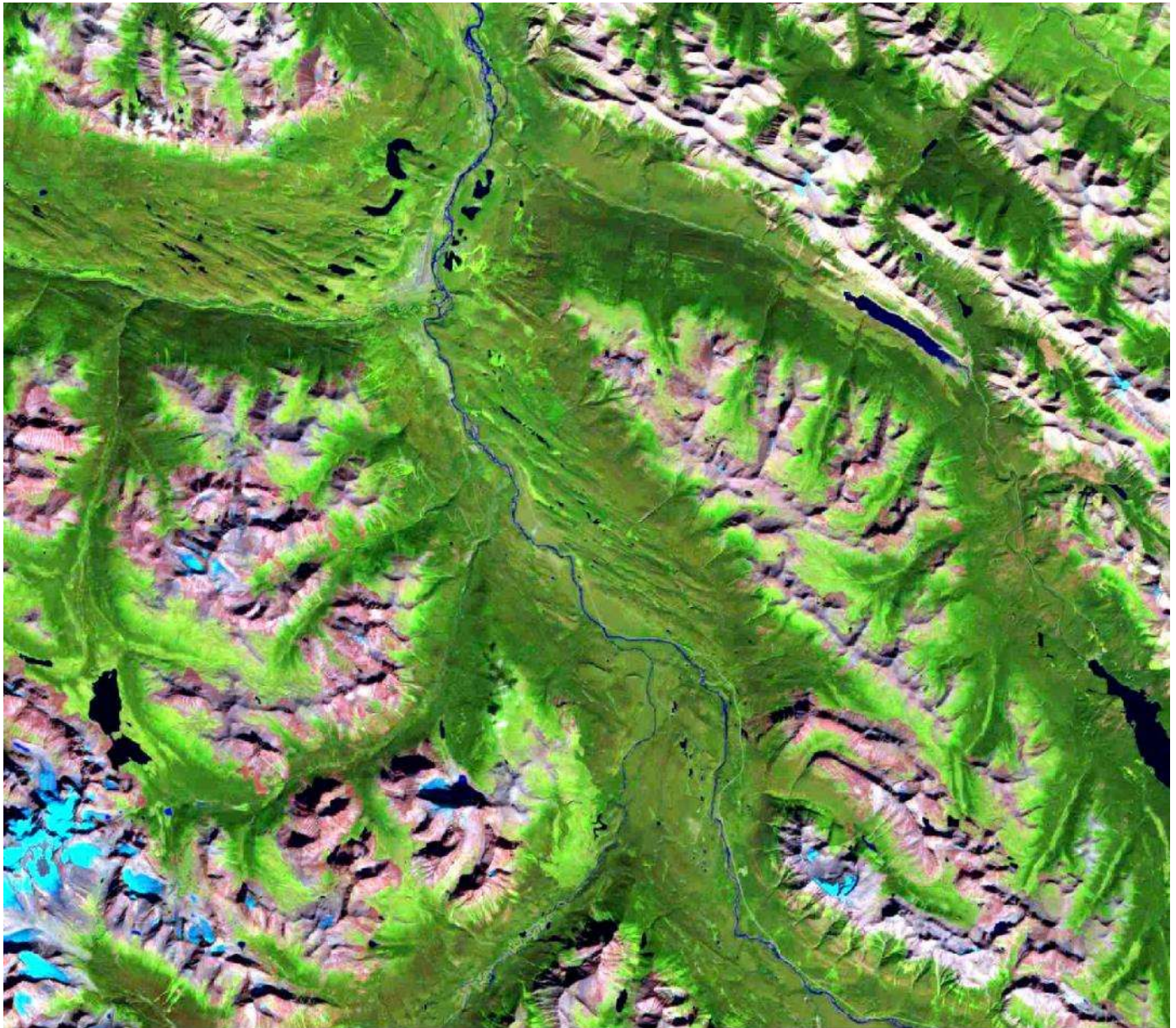
See posted Lab 6 for more directions on search, download and Catalyst

I have not yet found a similar option for Sentinel data, but I suspect there is one

Jasper example
Sept 2, 2023
Path/row 45-23

See also August
25, 2023

This is a geotiff
bands 654
compressed to
8-bit data
Channels123



Jasper
Aug 19, 2024
Path/row 45-23



Environmental change assignment (10%)

Summary of deliverables

powerpoint slides

1. Intro slide: general location, describe the event / change
– could include a ground photo (or bing / google map)
2. Before image with date/year
3. After image with date/year

Include a scale bar and location - name or lat/long (degrees/minutes)

x. Possible extra image as needed

Some themes: forest cover, glaciers, urban development, volcanic eruptions etc..