GEOG357: Remote Sensing

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Lectures: Wed/Fri 9.30-10.20

Labs: 8-125: Thursday 11.30 – 14.20

Outline and notes (coming soon):   http://gis.unbc.ca

Another great course this fall that could complement GEOG357 if you need one more

UNBC
Geography

Fall 2020

Open to 3rd/4th year BA/BSc students

GEOG 416-3 / 616-3 Mountains

Explore the diversity of mountains, the physical processes that shape them,   and the part played by humans in their modification and preservation

Instructor: Dr. Faran Ali (faran.ali@unbc.ca)

Lectures MW 11.30-12.50pm

What is Remote sensing ?

"... the collection of information about a surface without direct contact"

(from a distance)   ... textbook definition

=   ... the acquisition and manipulation of aerial and satellite images

More practical definition (or something like that ...)

The term 'remote sensing' first appeared ~ 1960

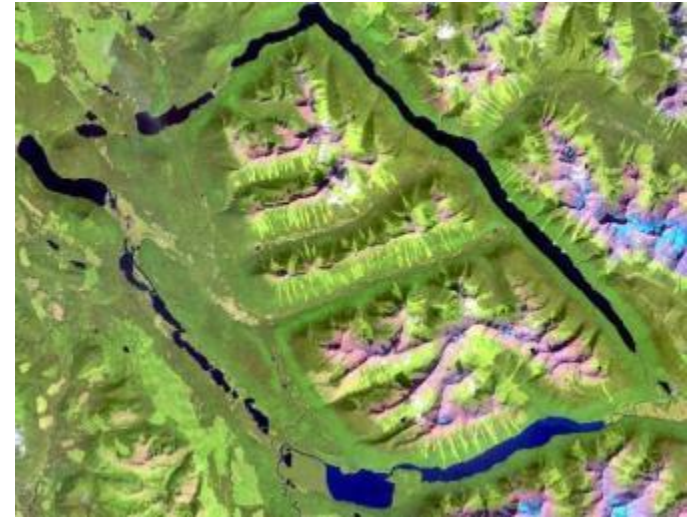 *attributed to Evelyn Pruit, technician*

    [I love this photo and her image]

Why did 'RS' appear in 1960s ?
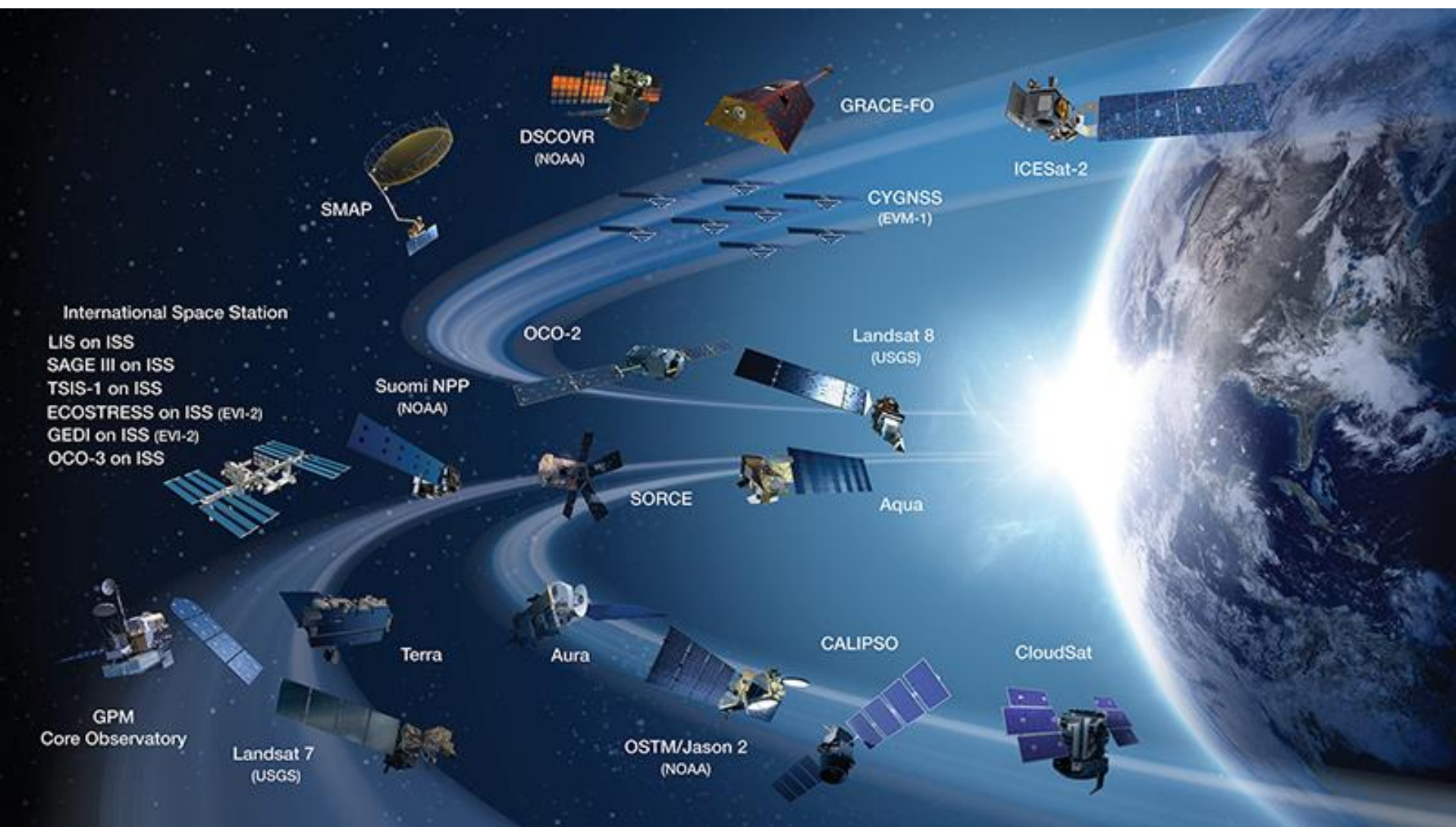
Advent of :

a. Satellites (Space Race)

b. use of non-visible energy e.g. infra-red, RADAR

- extended beyond conventional aerial photography

There are thousands of satellites in space, many of them for Earth Observation (EO)

As of ~2018: Satellite launches 8650,   still in space 4700,   operational 1700

Early to mid- 20th century RS milestones

1910s First use of aerial photography from planes
(World War I: photo interpretation)

1920s Development of photogrammetry for mapping

1940 Military use of RADAR (World War II)

1945 -> Main aerial photo programs in Canada

**1950s** Use of colour photography and infra-red

1960 First reconnaissance satellites: Corona
Term 'remote sensing' first appeared

1960s First weather satellites: Tiros (1960); Nimbus (1964)
(and first digital data transmission from space)

Why is Remote sensing (maybe) more 'important' than GIS, especially in Canada ?

➤ Size and remoteness of Canada – cannot be mapped easily

➤ vector data is often quickly outdated e.g. forest cover;
   …. while images can be current or recent

➤ Images cross administrative boundaries (vector data may stop)

➤ Images are not generalised (apart from scale)- shows it like it is

➤ Most GIS spatial data were created from remote sensing

Recent image example - Sept 1, 2020 (Landsat 8 satellite) – California fires
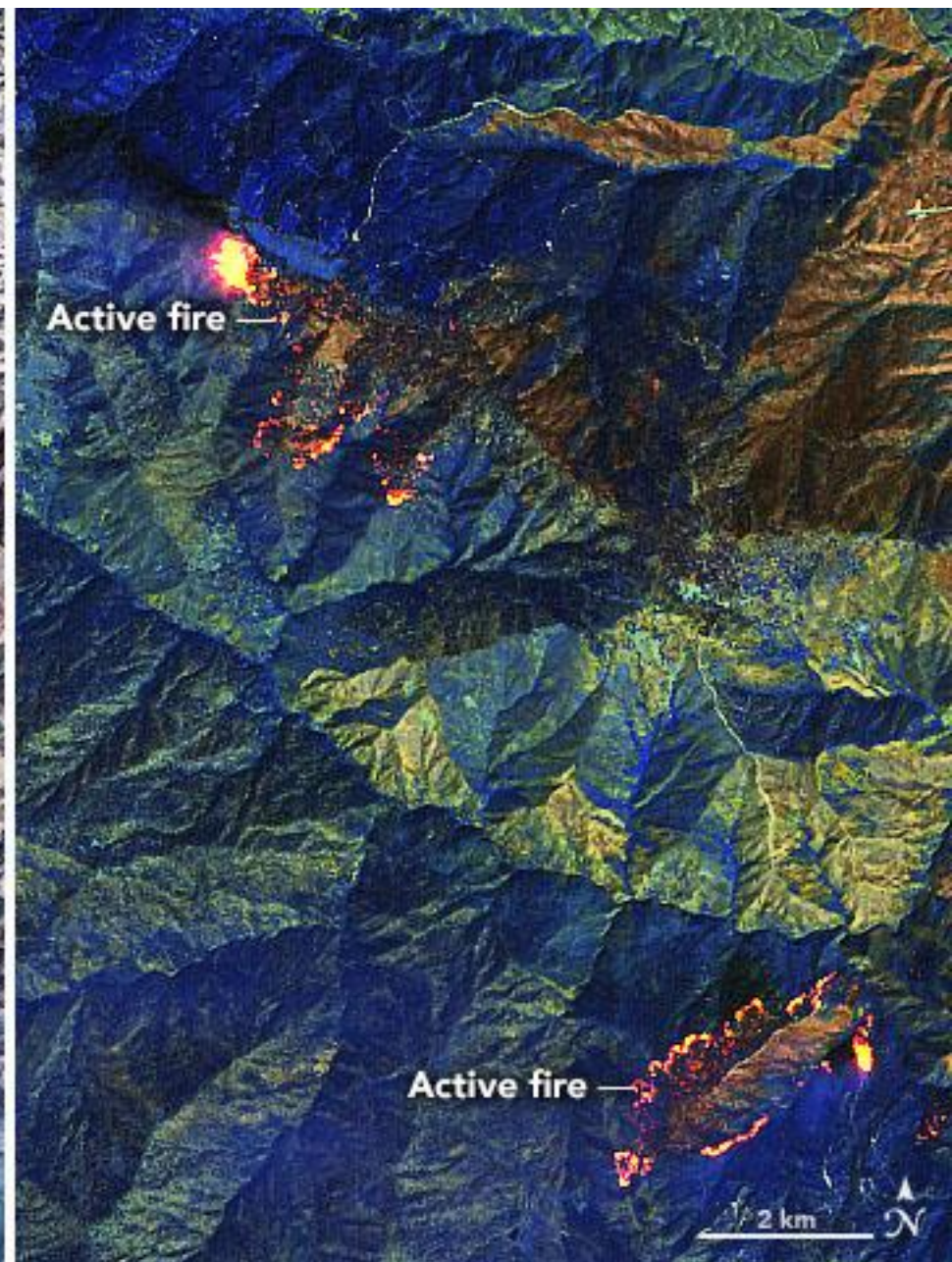
Myth #1 about remote sensing: This is a satellite photograph, but most are NOT
e.g. the previous slide image (the fires) was produced from a scanner, not a camera
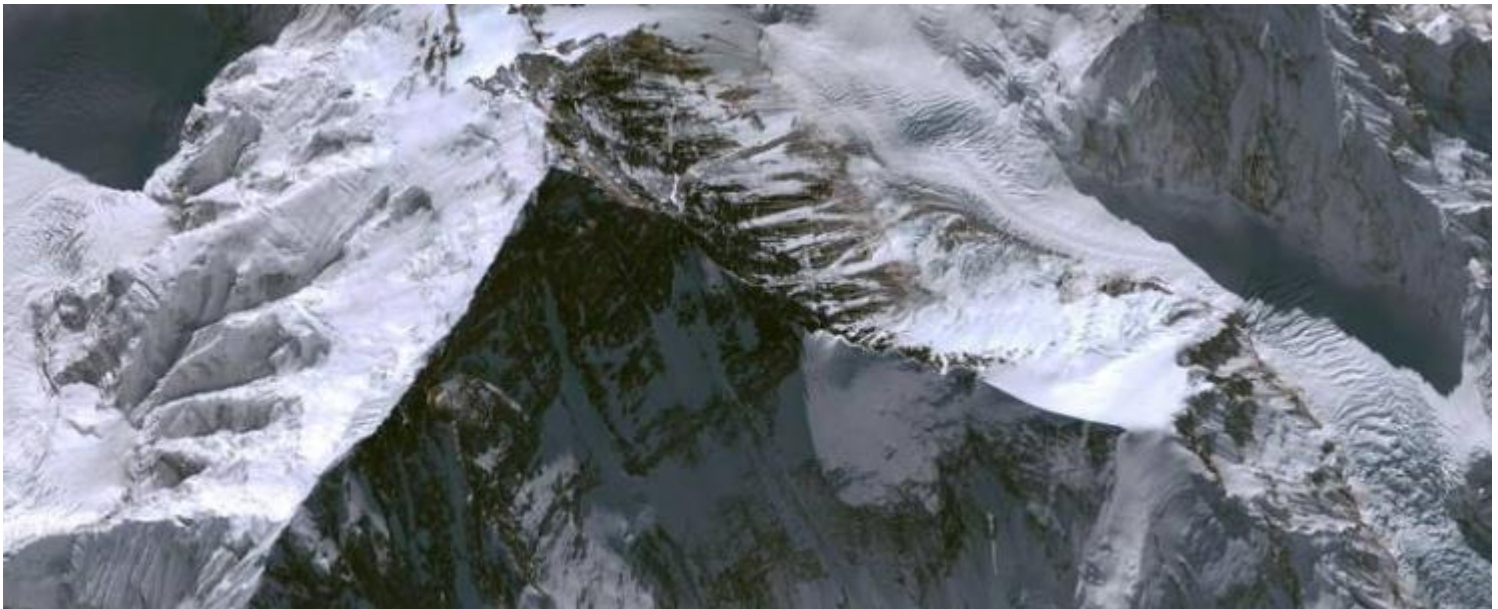

Alberta, BC and Rocky Mountain Trench, from International Space Station, Sept 06, 2014

Myth #2: **"Its so big you can see it from space":**

World's tallest building: Burj Khalifa, Dubai

World's tallest mountain: Everest, Himalaya

Since 2000, we have had very high resolution imagery = < 1 metres, so we can just about anything from space, similar detail to most aerial photography (& next slide)

Worldview3 2014
Rainbow Range
Chilcotin, BC 31cm

Traditional mapping from aerial photography and GIS layer creation – manual digitising

All Canada was mapped this way 1945-1995 = > 13,000 map sheets at 1:50,000 scale including many thematic layers e.g. forestry, geology

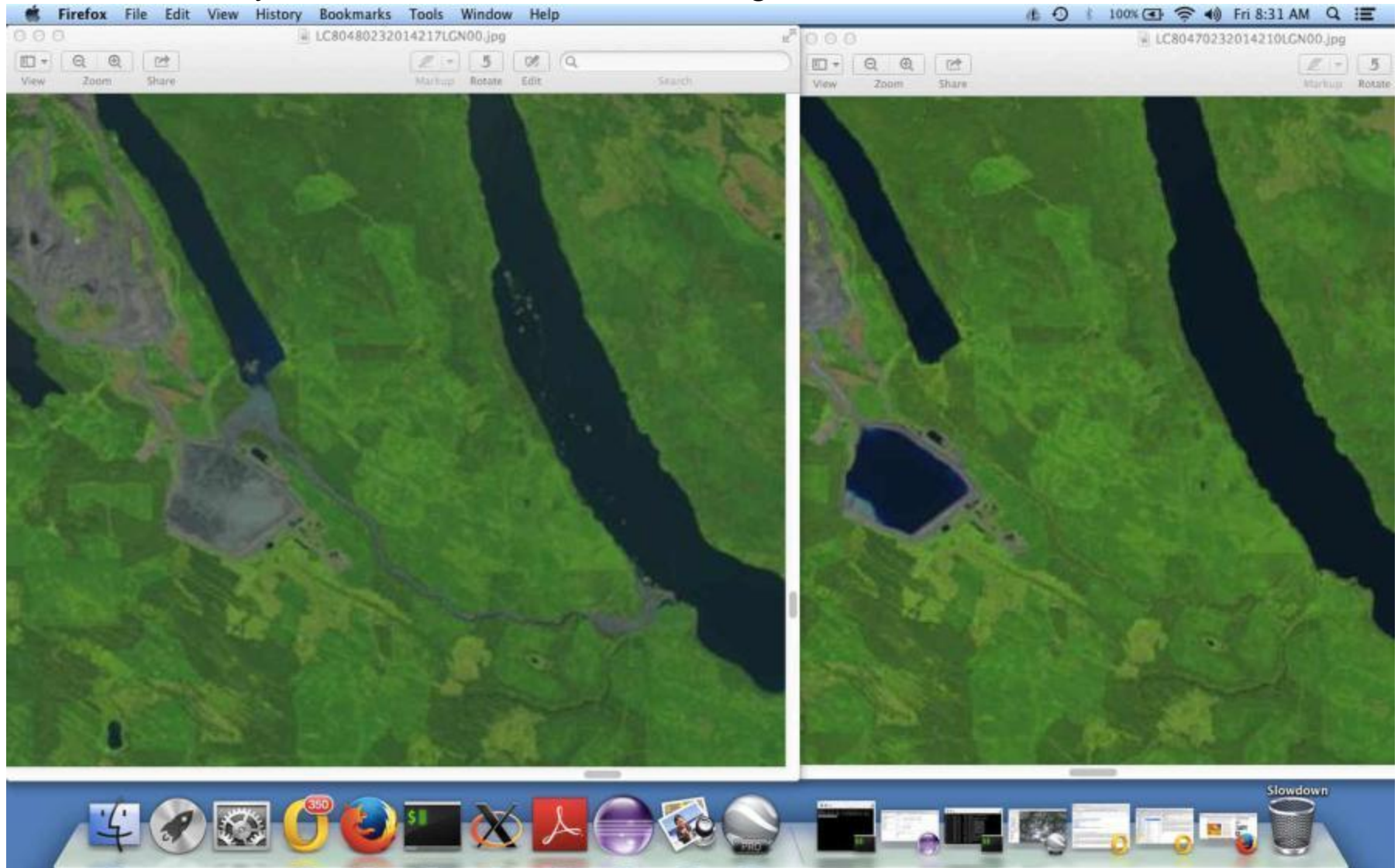Digital remote sensing imagery – auto-generation of GIS layers - polygon data

Sample
from
GEOG357
project:
non-
forested
layer
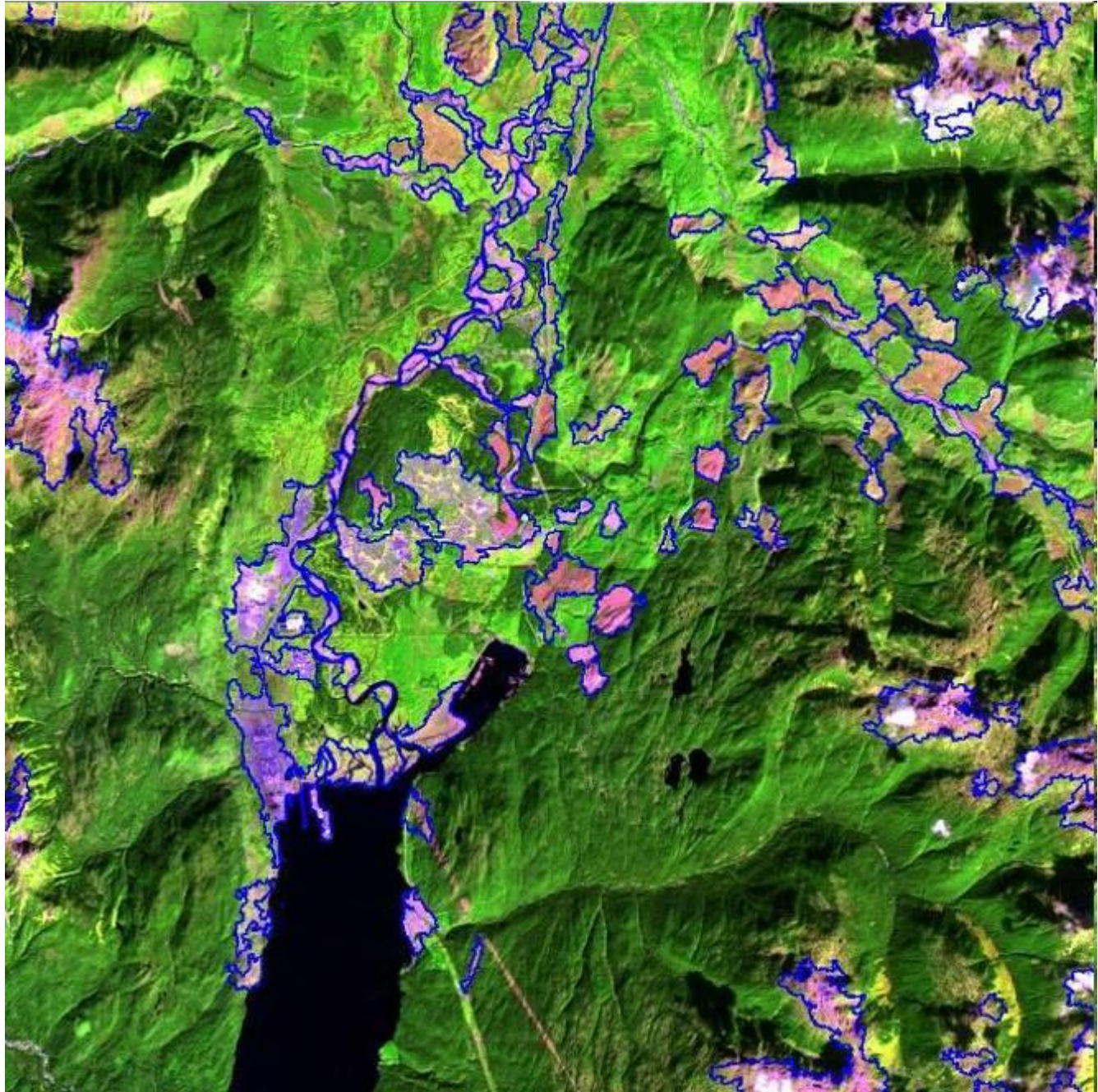
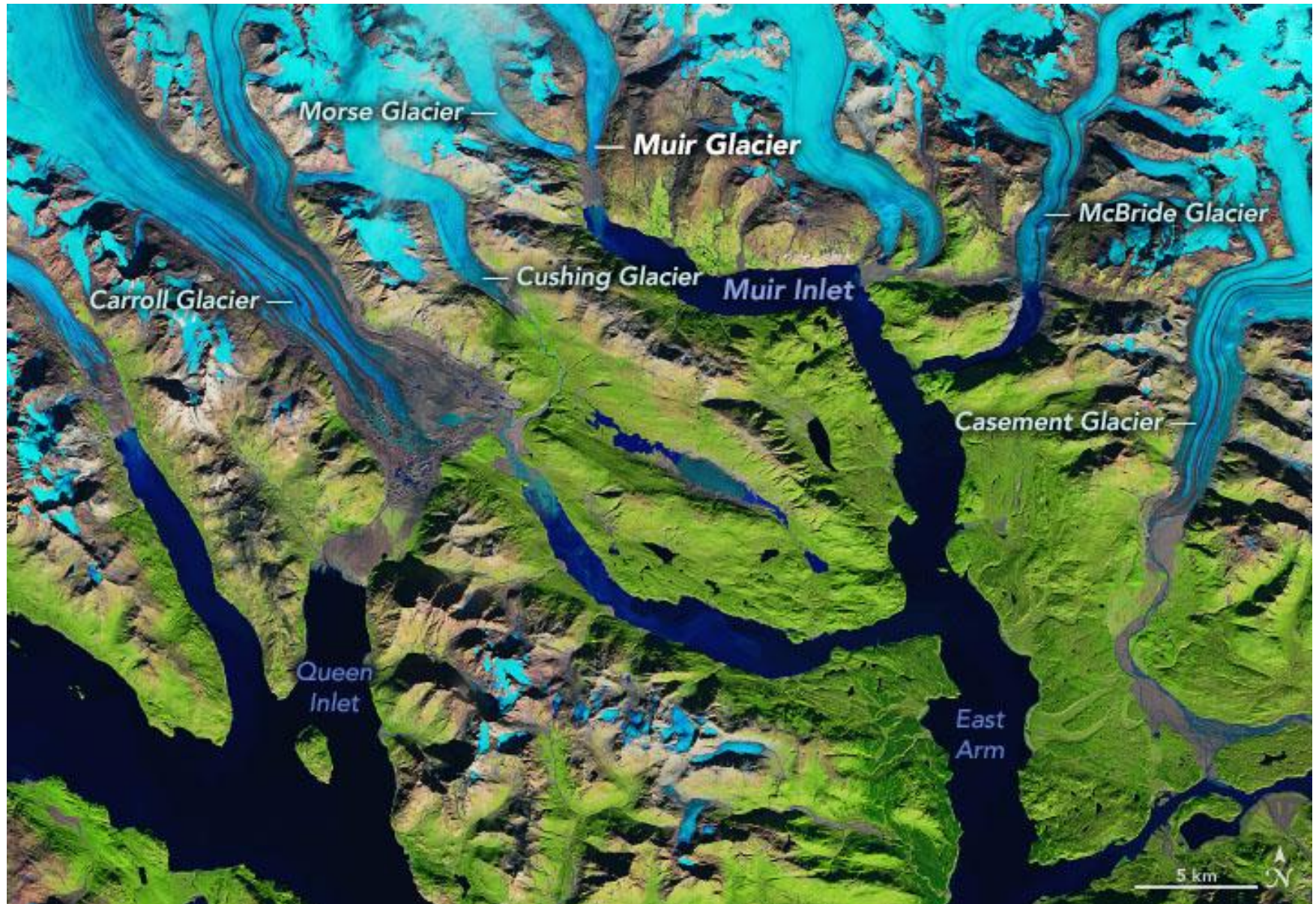# Local environmental change example from satellite imagery
http://earthobservatory.nasa.gov/IOTD/view.php?id=84202

Mount Polley Dam Breach, central BC, August 2014

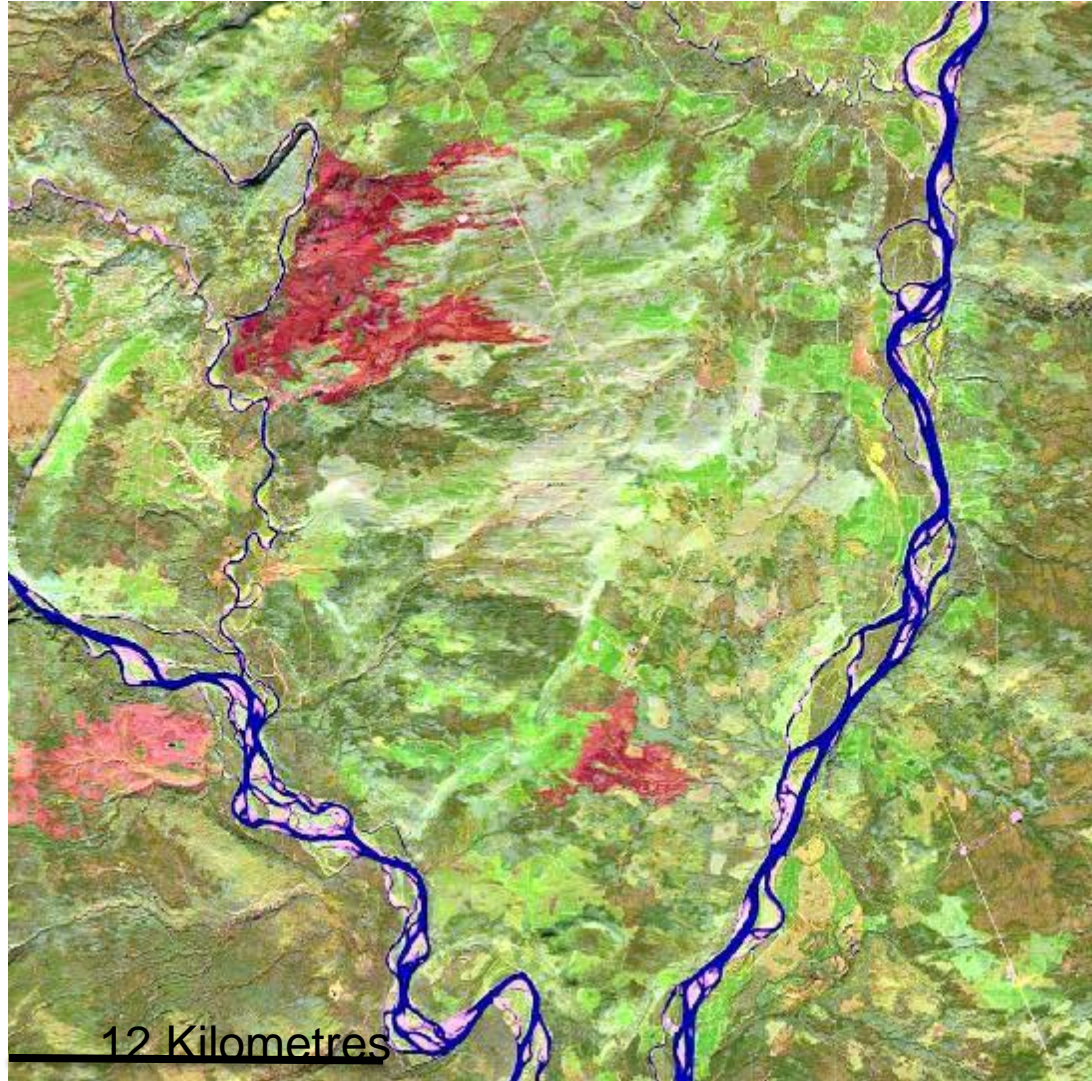Here's another example showing glacier change 1986-2019

GEOG357 assignment example- before / after

Nelson
Forks
September
3rd 2017
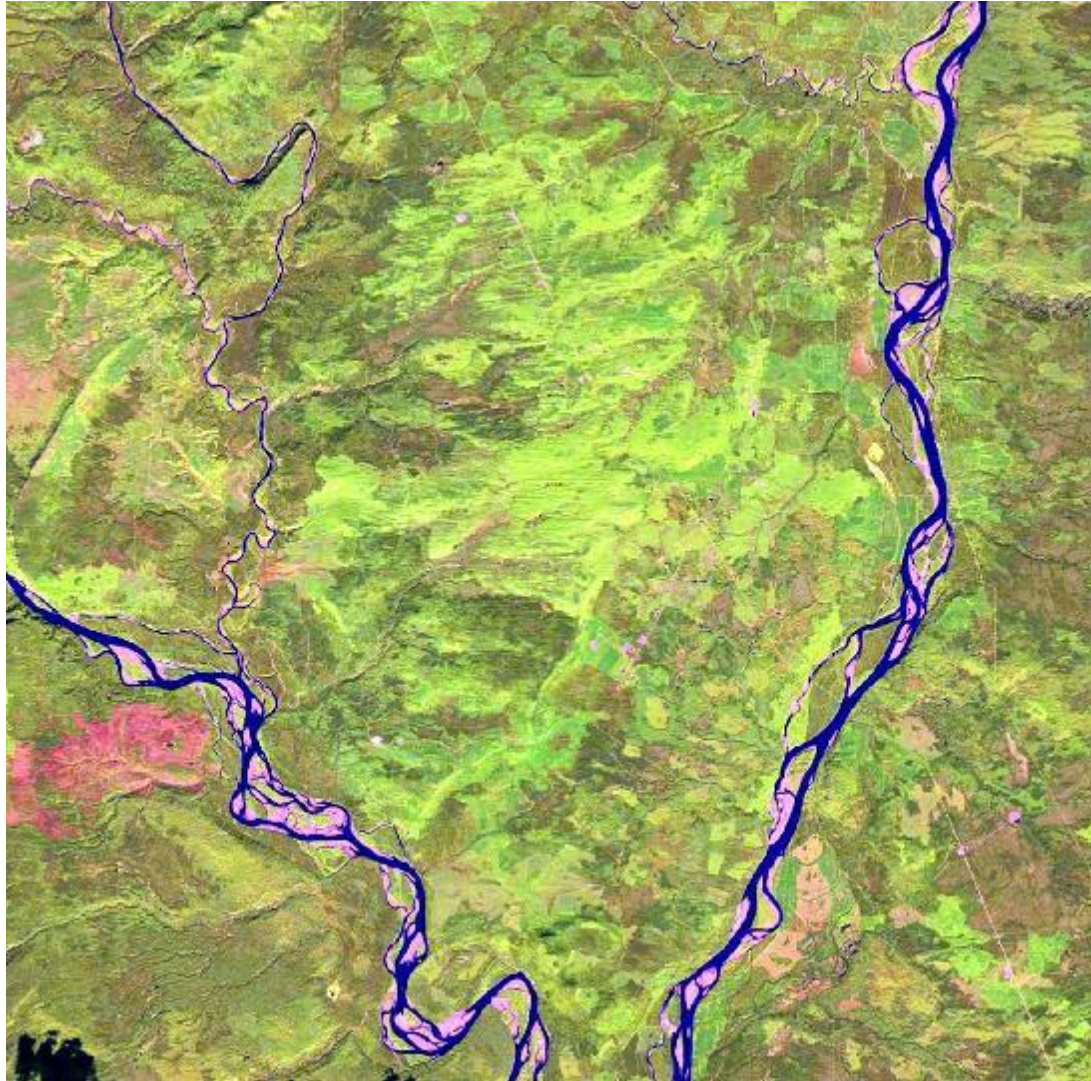
This is the first graded assignment – you select/download two images showing change
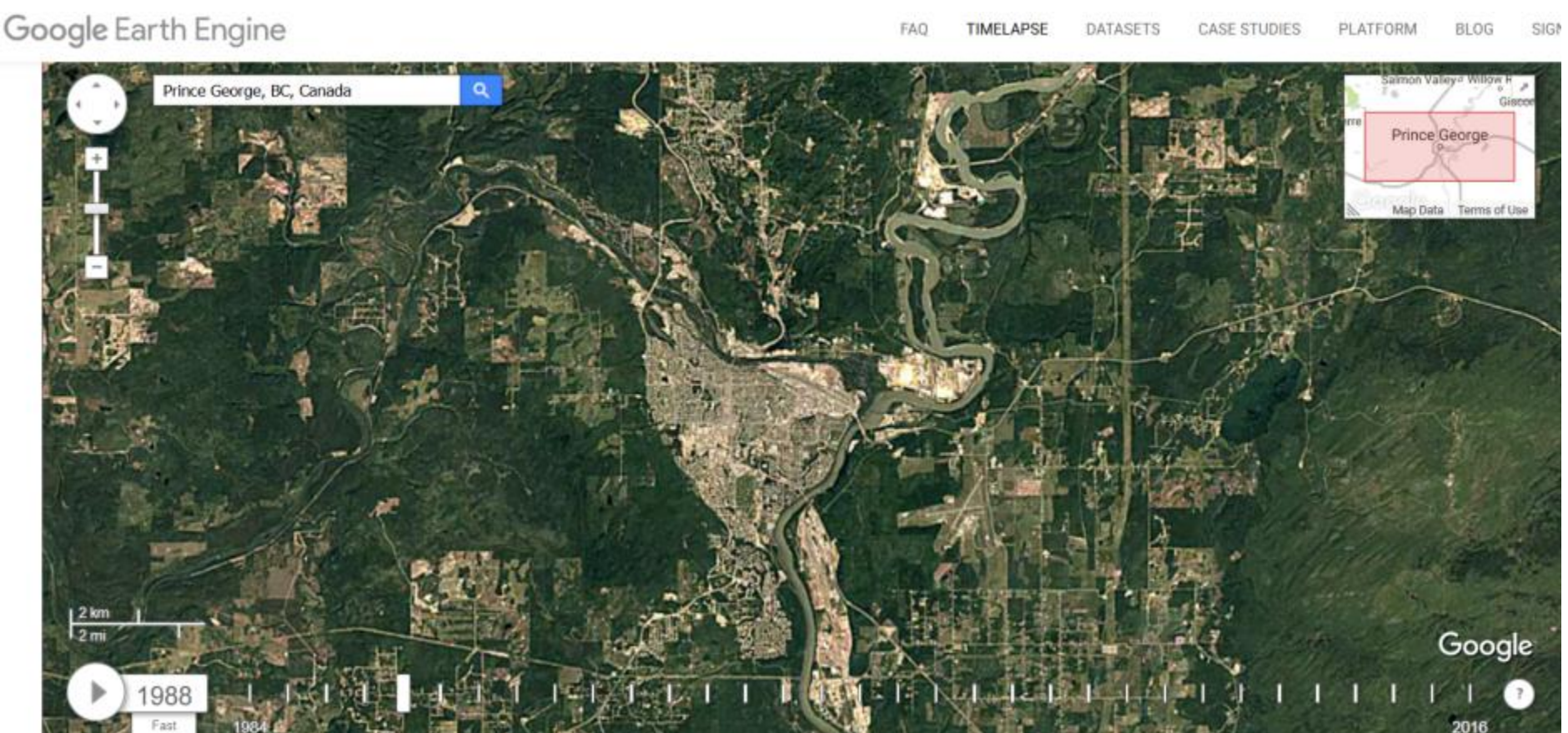
Nelson Forks September 9th, 2019

12 Kilometres

This was one of the student's last year, showing an area close to his home
Your project too should cover an area and topic of interest to you and your studies

Mapping and showing change
Landsat images 1984 - 2019 (30m res.)

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

The google earth engine now shows 35 years of change around the world, though the images chosen are not always the best – they will be in your work !.. You can use the link above to review where they might be interesting changes (quite subtle in Prince George)

Fires around the world, May 2019
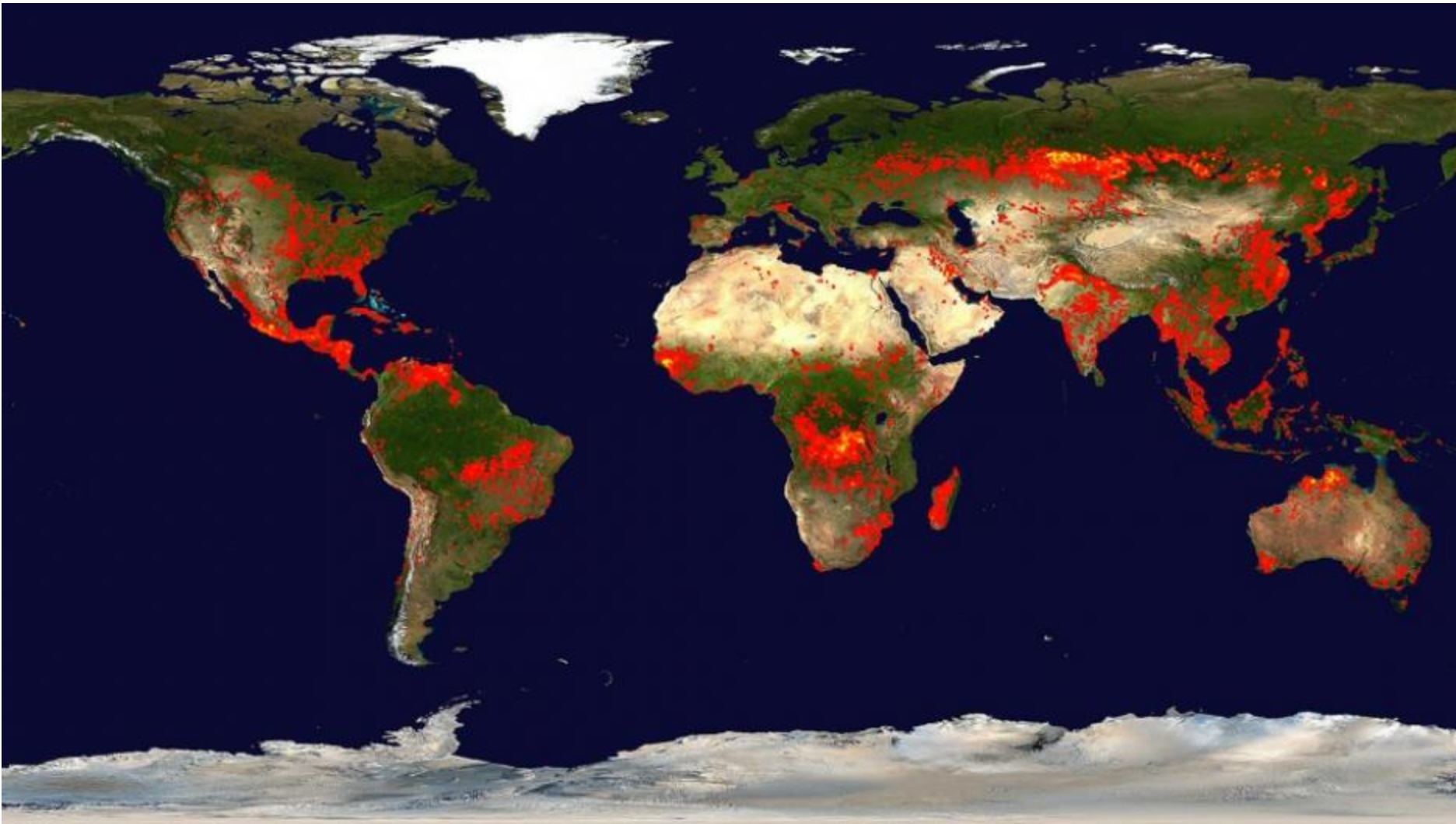
Example of Global Remote Sensing from free satellite imagery

Course goals, you should develop / gain:

➢ Understanding of imagery and wavelengths

➢ Potential of digital imaging to extract selected features

➢ The potential power of multispectral sensing

➢ Contribution of remote sensing to Geomatics / GIS

➢ Public education and media e.g. Google Earth

➢ Data availability for a range of applications

➢ Ongoing developments in current technology e.g. Mars !