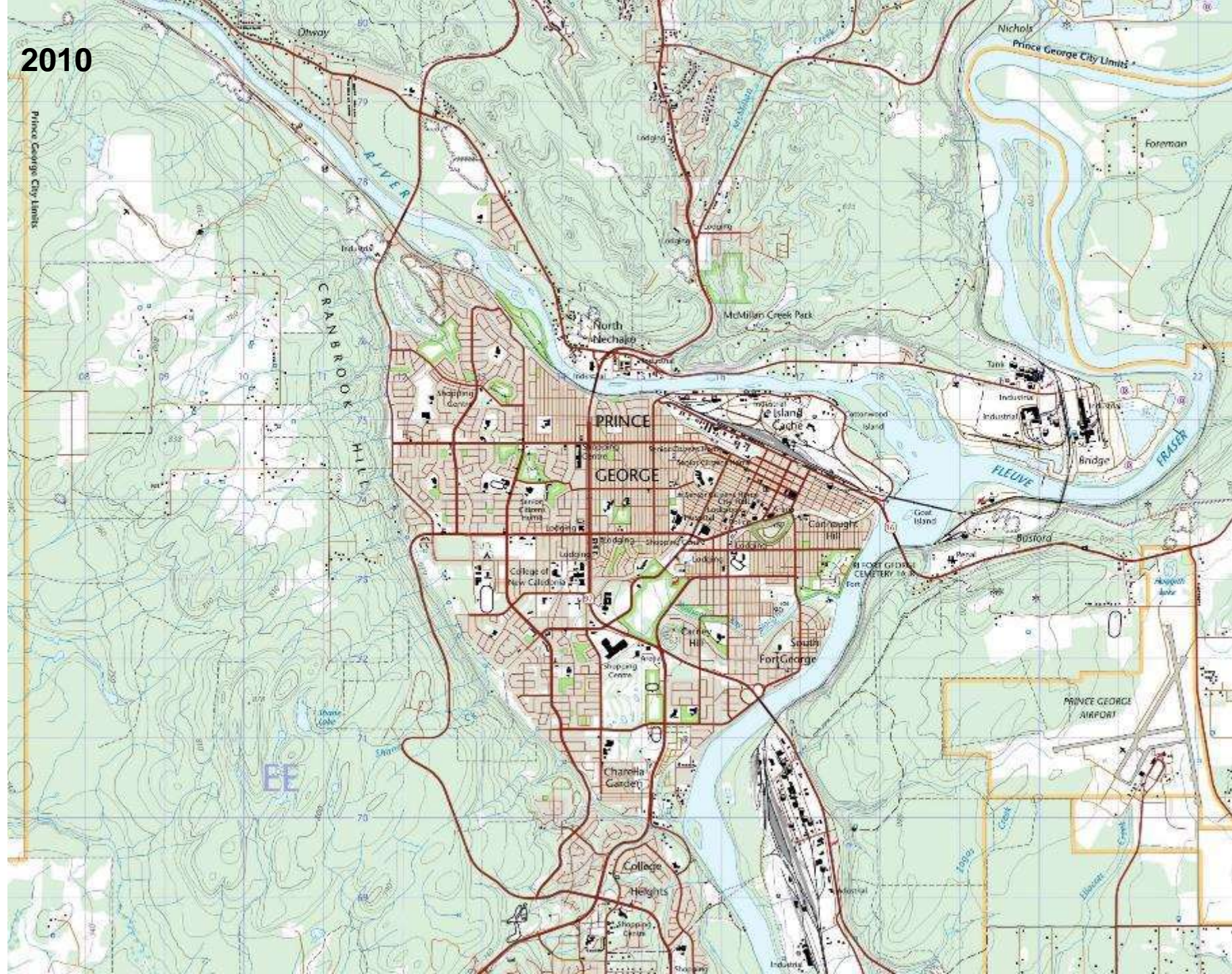


2010

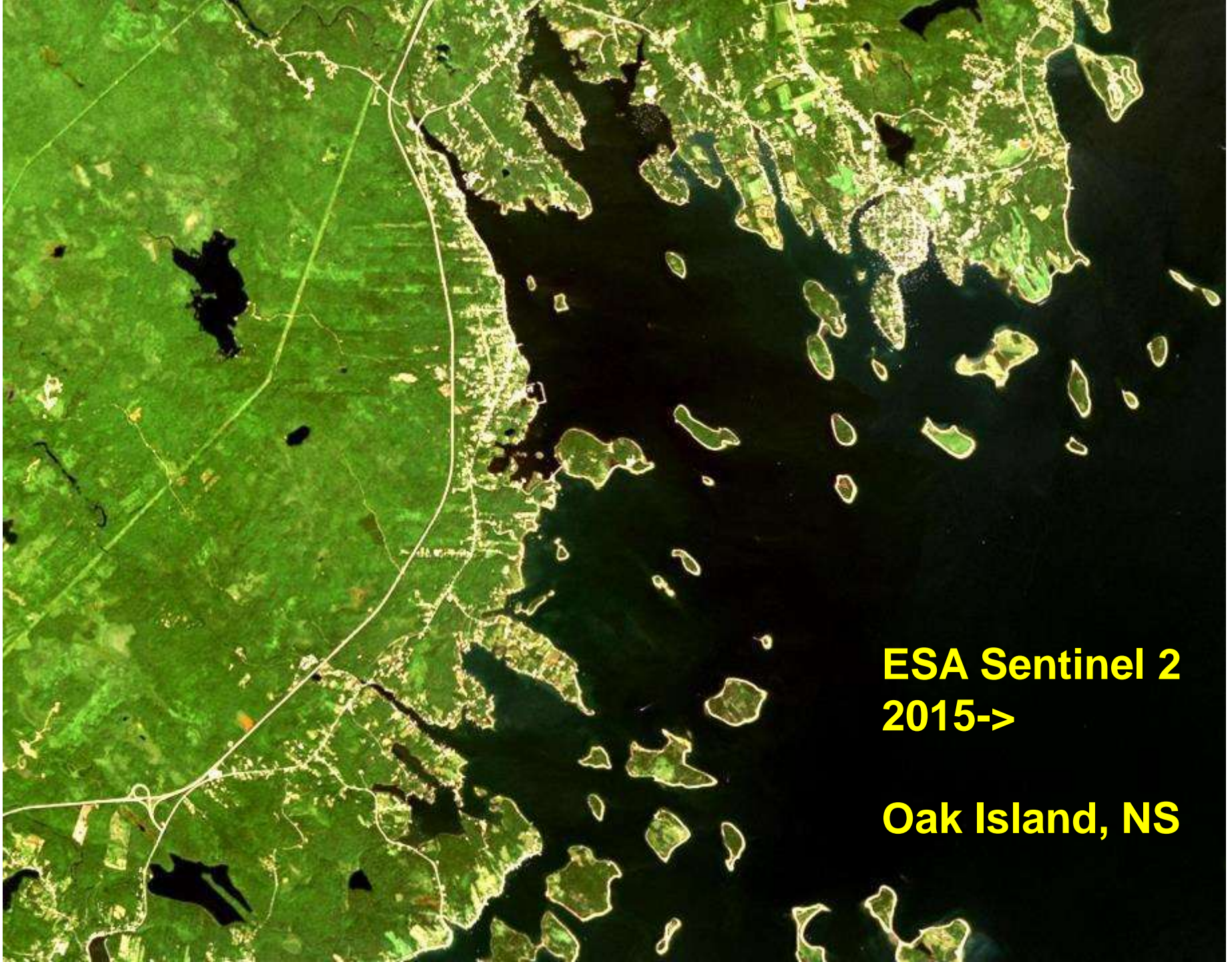




2013







**ESA Sentinel 2  
2015->**

**Oak Island, NS**

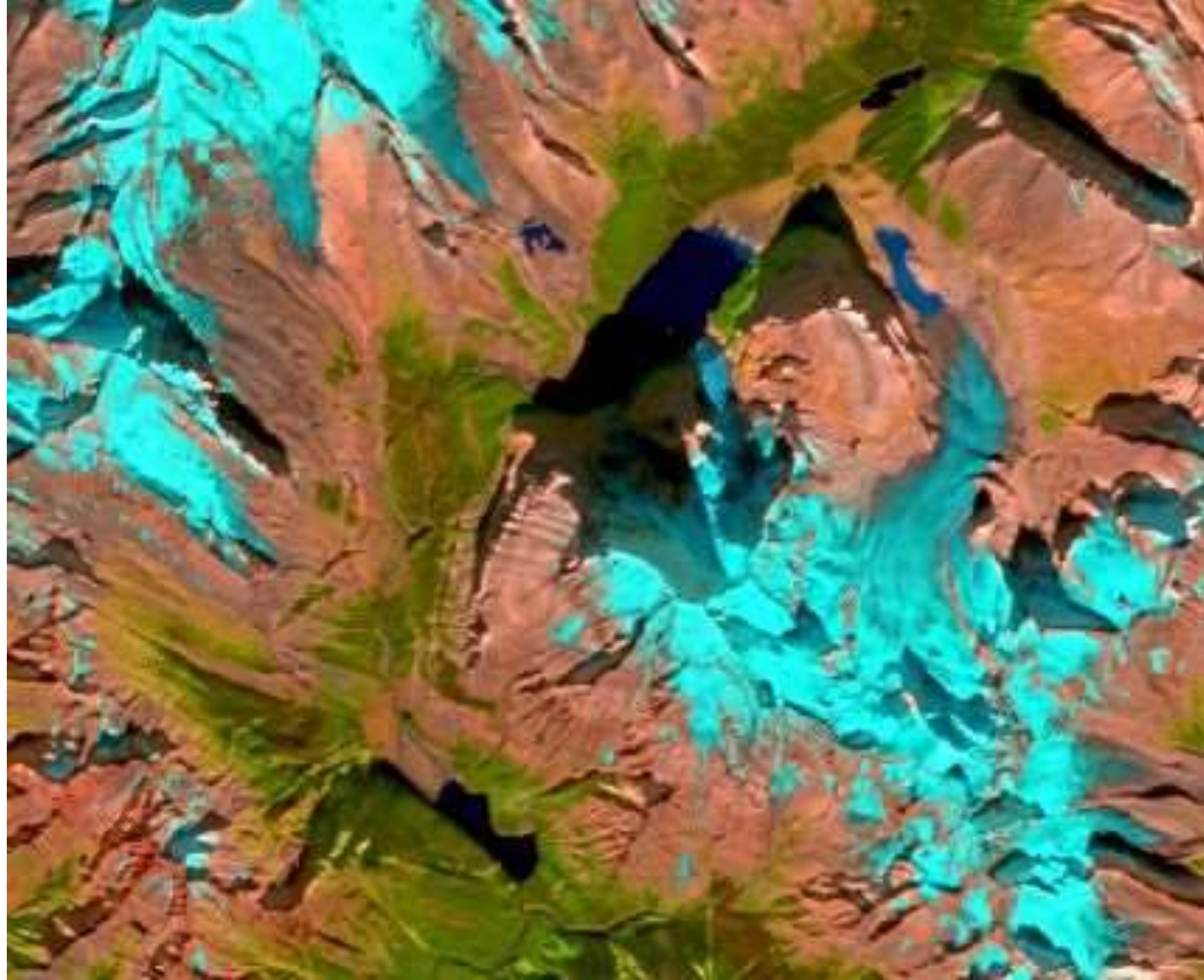
<b>Sentinel-2 Bands</b>	<b>Central Wavelength (µm)</b>	<b>Resolution (m)</b>
Band 1 - Coastal aerosol	0.443	60
Band 2 - Blue	0.490	10
Band 3 - Green	0.560	10
Band 4 - Red	0.665	10
Band 5 - Vegetation Red Edge	0.705	20
Band 6 - Vegetation Red Edge	0.740	20
Band 7 - Vegetation Red Edge	0.783	20
Band 8 - NIR	0.842	10
Band 8A - Vegetation Red Edge	0.865	20
Band 9 - Water vapour	0.945	60
Band 10 - SWIR - Cirrus	1.375	60
Band 11 - SWIR	1.610	20
Band 12 - SWIR	2.190	20

This week's labs use Sentinel-2 images



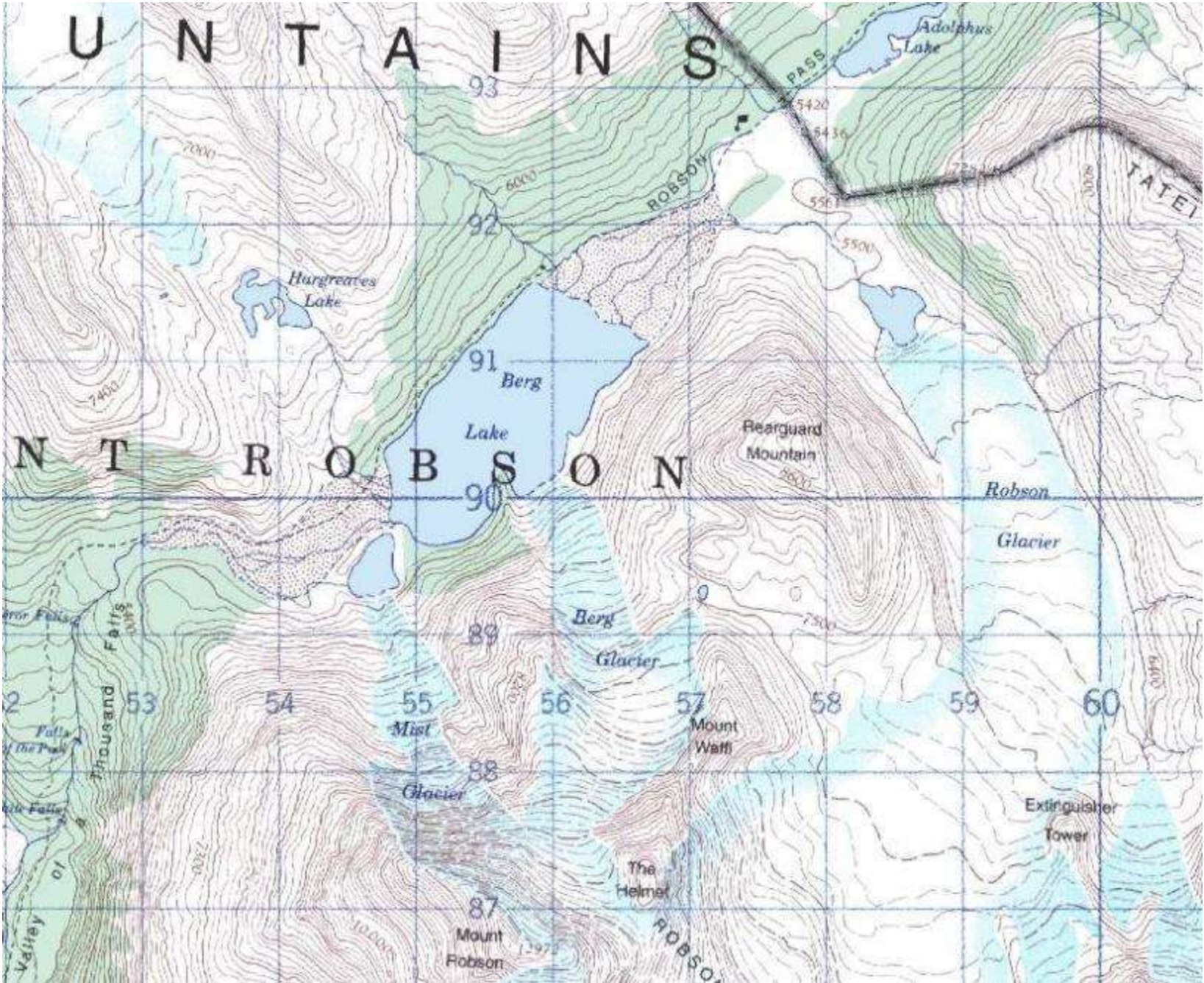




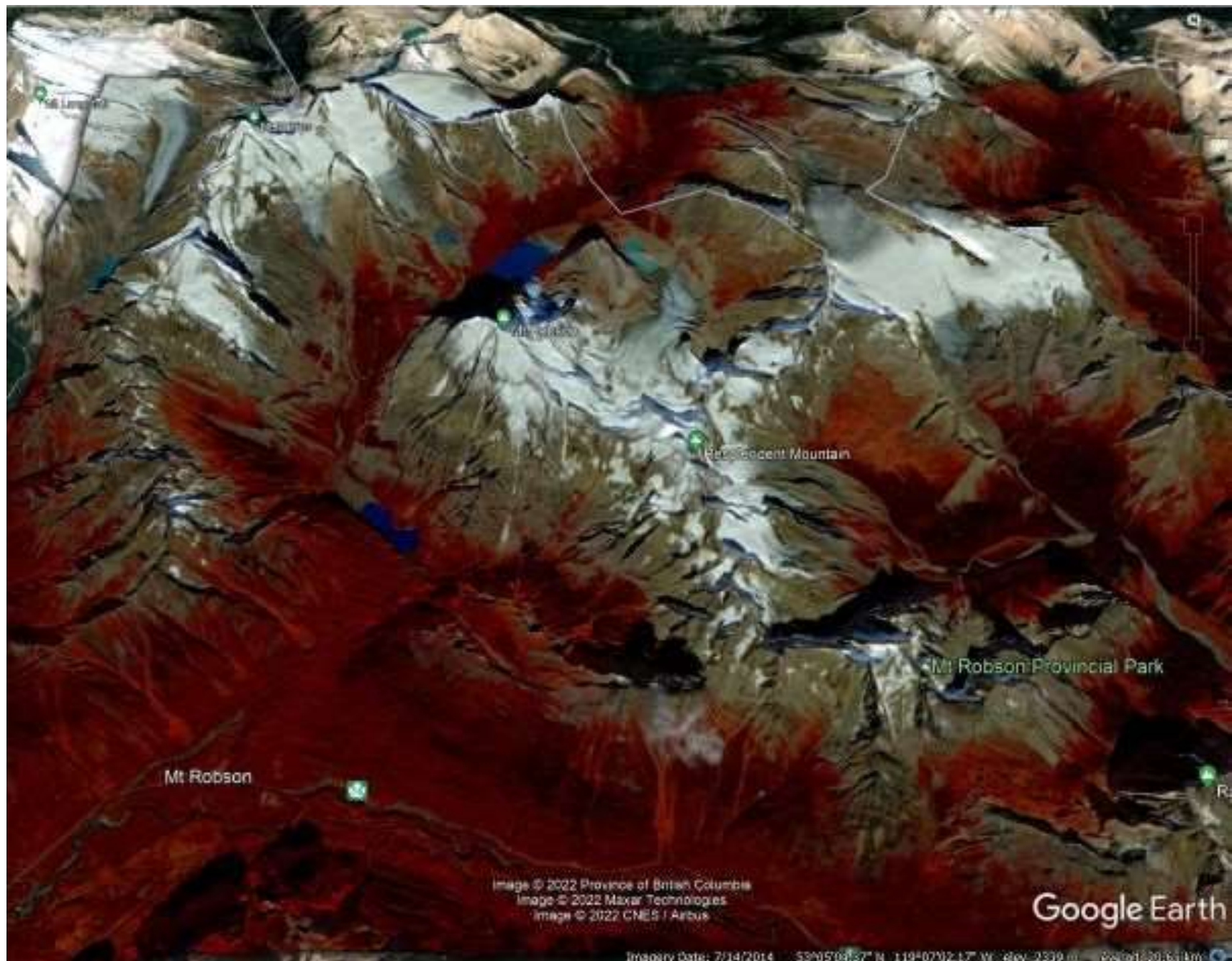




1995 NTS map sheet – glaciers from 1975

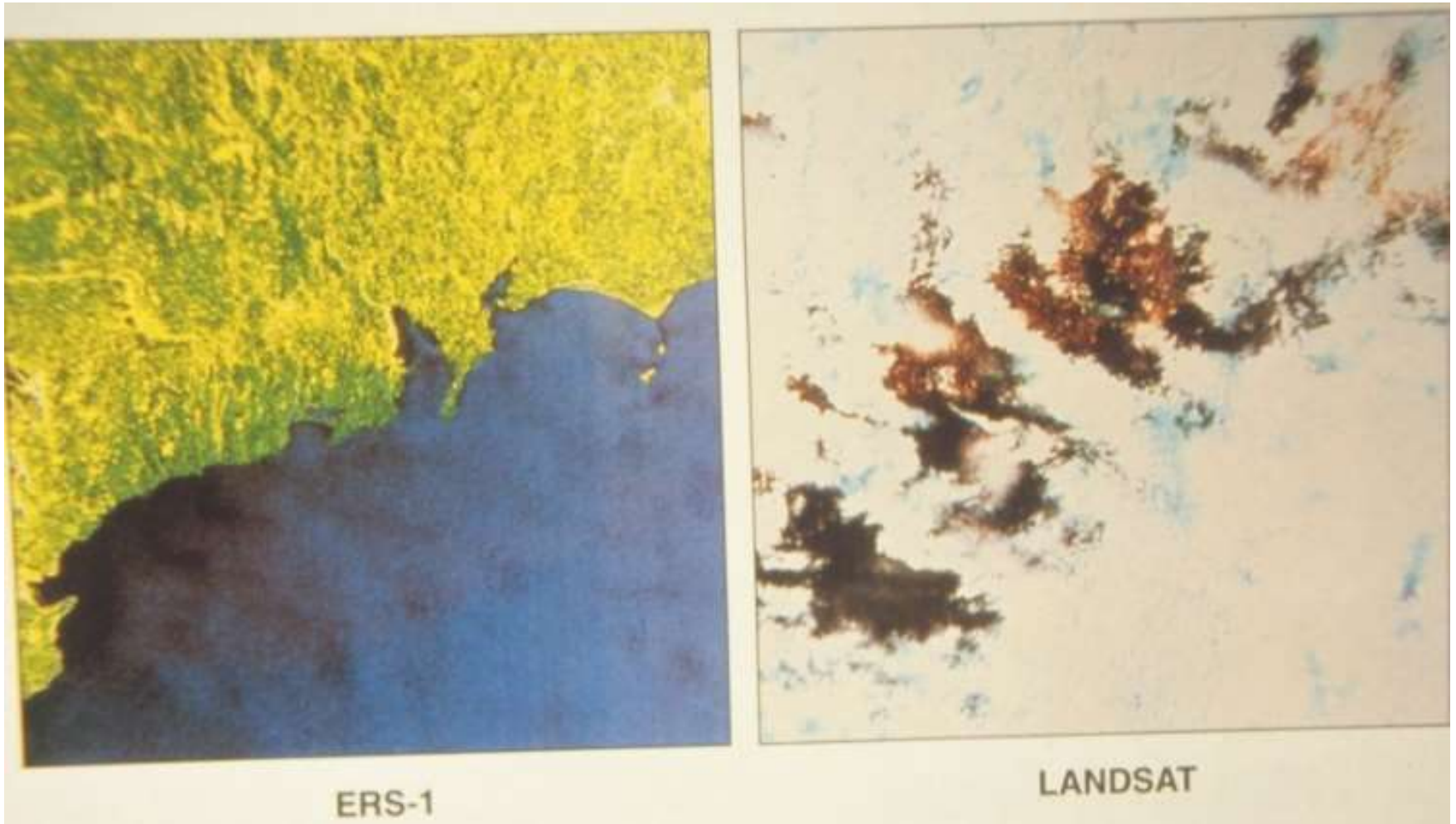








**RADAR** .. As it is not affected by darkness or weather, it is especially useful in **arctic regions for mapping ice**; and tropical areas, which are often **cloud covered** and other areas



European Radar Satellite

Ireland, 1991: Radar and Visible/ Optical image

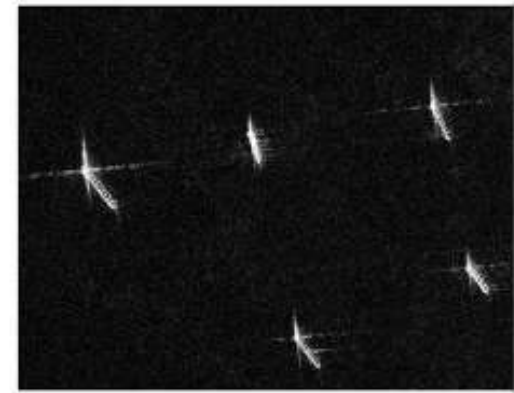
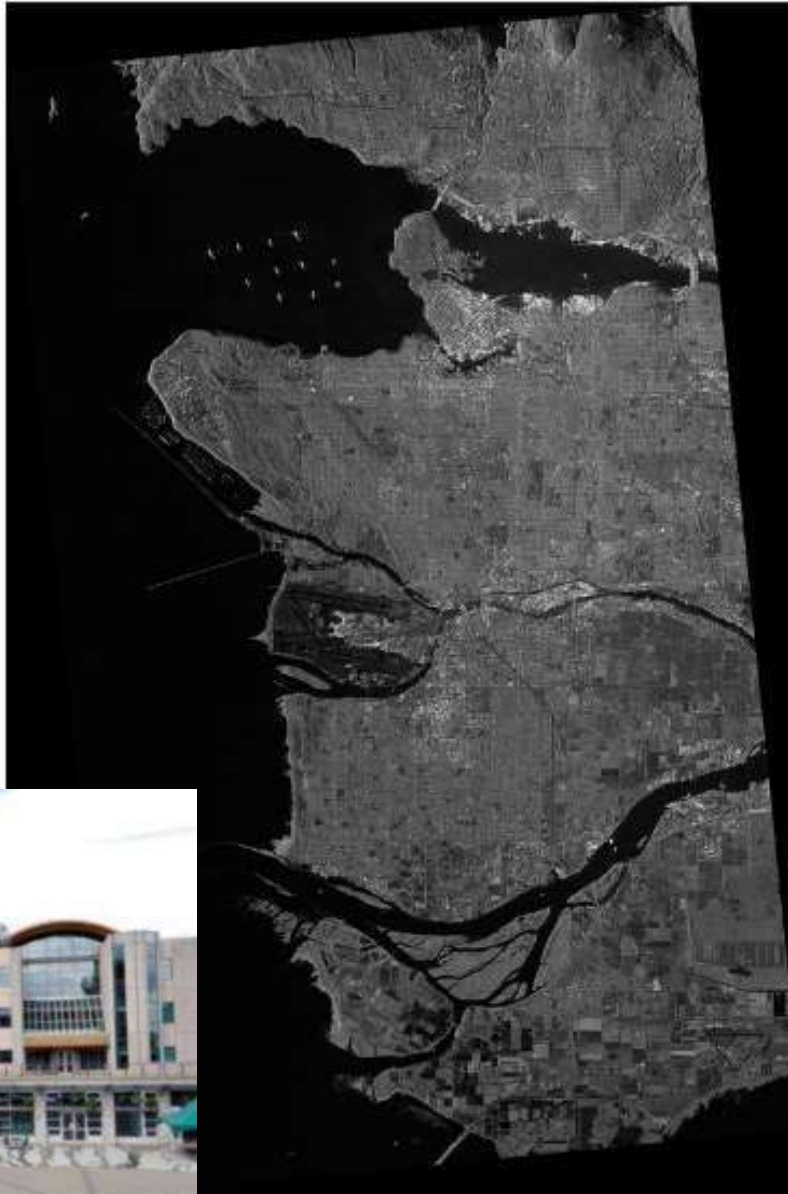


# Radar image, Vancouver RADARSAT 2

Radarsat 1 - 2 are the only Canadian satellite systems in space for mapping

Built by MacDonald-Dettwiler, Richmond, BC

John MacDonald, UNBC Chancellor 2010-15





# TOPOGRAPHIC DATA BASE PRODUCTION

Figure 12 illustrates the evolution of the Northern mapping project that began in 2004 up to 2010 (light green to dark green). Complete map coverage will be achieved with the 2011-2012 production plan utilizing SPOT5/HRS and Radarsat-2 data sources (Figure 13)

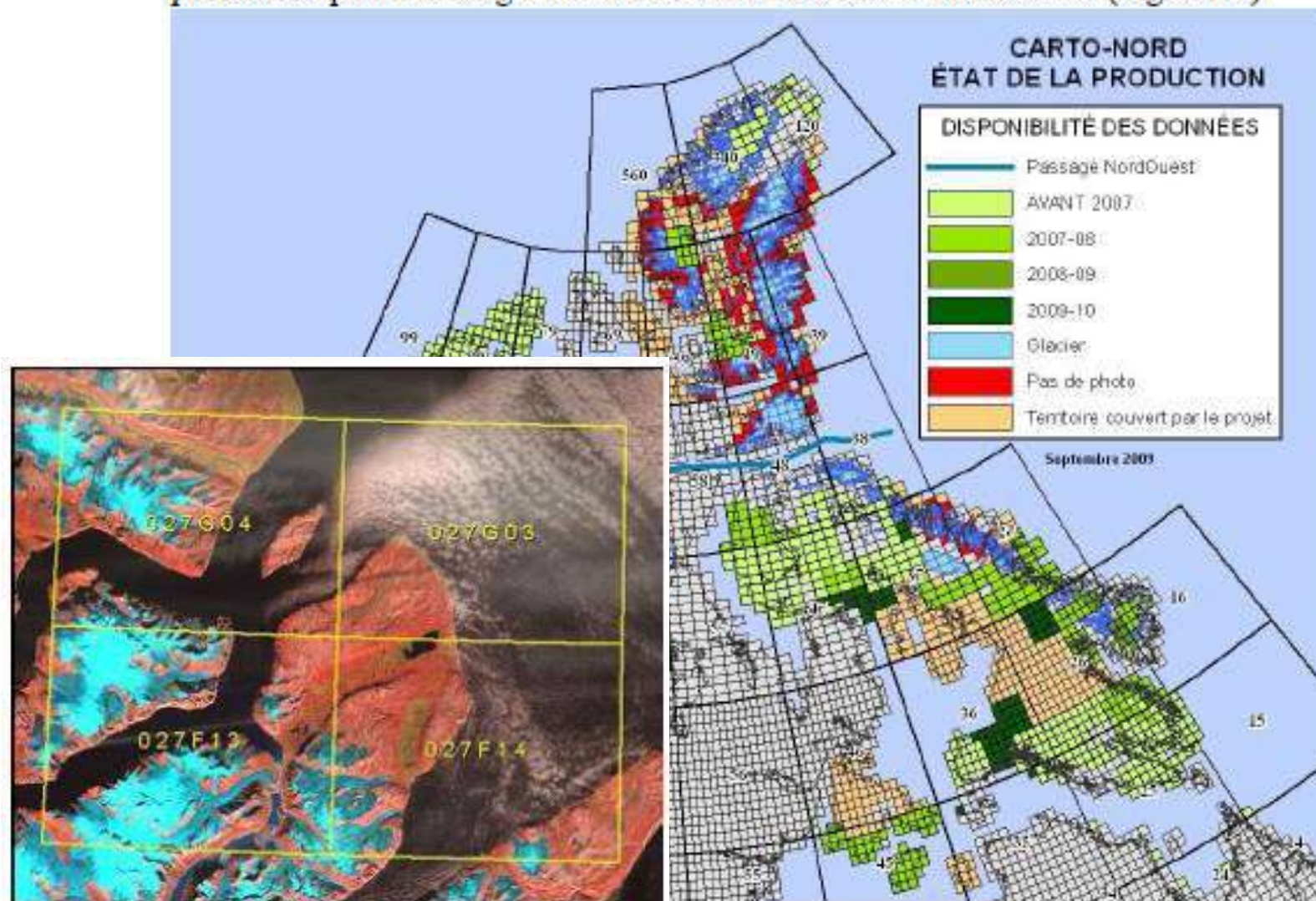


Figure 12 Northern Mapping project



# SRTM (Shuttle RADAR Topographic Mission) Feb 2000

30/90 metre pixels, 56°S - 60°N latitude

e.g. Google Earth DEM





# Very high resolution satellites

First corporate satellites 2000

Ikonos: 1m image resolution

Whistler, 2012





# Quickbird, 2001

60 cm pixels  
- from 800km in space





# GeoEye – 1: Obama inauguration, Jan 20, 2009; Resolution: 40 cm



GeoEye-1 satellite launch | September 6, 2008 at exactly 11:50:57 a.m. (Pacific Time) Close

Myth #2: “...its so big you can see it from space”



**Worldview3**  
**2014** Rainbow  
Range Chilcotin,  
BC 31cm



Myth #2: “...its so big you can see it from space”



# The giant dog you can see from space

Monday, June 9, 2008 BORIS the bull mastiff is so big that he can be seen lounging in his favourite position in the garden - from space. The 89kg dog has been captured on Google Earth's satellite images. 'He was in his favourite place,' said Fran Milner, from Bournemouth. 'We knew he was big but didn't think he was big enough to be seen from space.'





# India successfully launches 104 satellites

Launch sets a record for most satellites launched at once

'doves'

The Associated Press | Posted: Feb 15, 2017 9:18 AM ET | Last Updated: Feb 15, 2017 11:54 AM ET



This photograph released by Indian Space Research Organisation shows its polar satellite launch vehicle lifting off from a launch pad at the Satish Dhawan Space Centre in Sriharikota, India, Wednesday, Feb. 15, 2017. (Indian Space Research Organization)

<https://www.planet.com/> ..... Map planet every day at 1-5m resolution

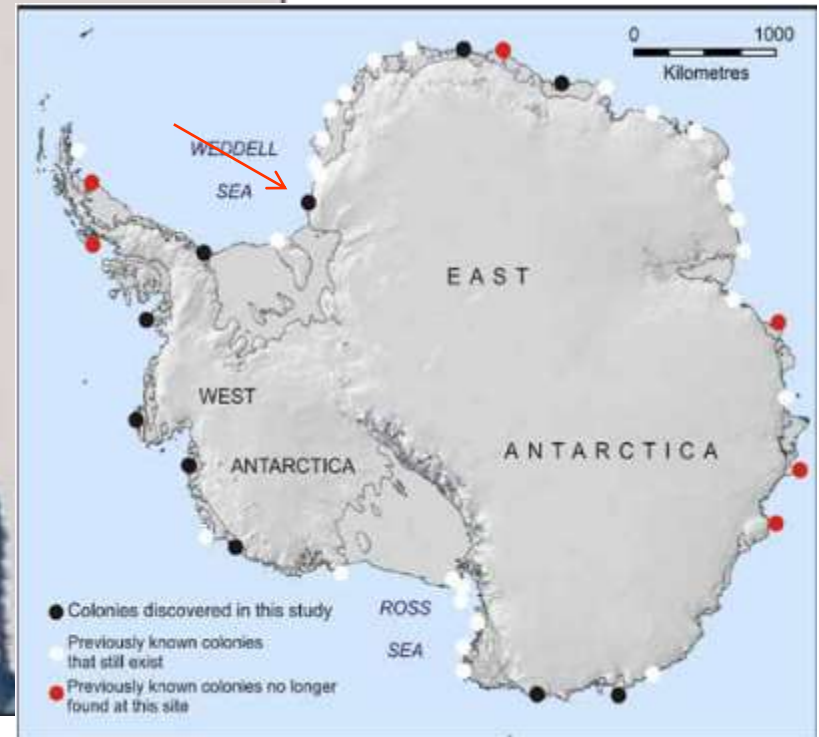
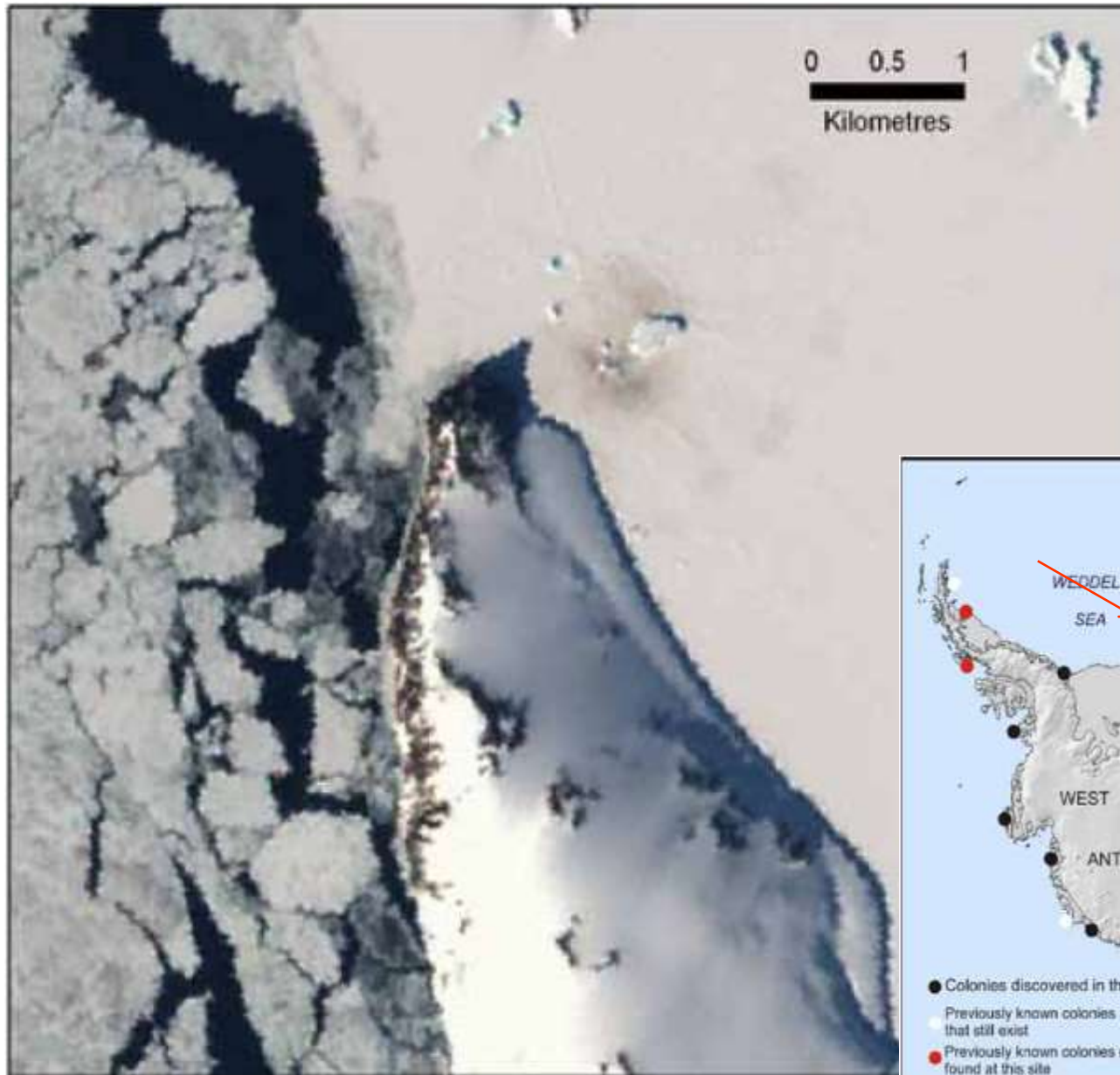
<https://www.maxar.com/> .... 285 Maxar-built satellites



# Mapping Penguins from space - using penguin poop



Pan-sharpened Landsat TM image showing guano stains of an emperor penguin colony in Halley Bay, Antarctica





# **Review: Remote sensing developments from wars**

**US Civil War:      Photography from Pigeons and kites 1860s**

**World War I:      Aerial photography – photogrammetry 1910s**

**World War II:      RADAR- RAdio Detection And Ranging 1940s**

**Korean War:      Infra-red photography 1950s**

**Cold War:          Satellite imagery – originally for espionage 1960s**

**Gulf Wars:          3D imagery -> Google Earth (2005)**

**‘War on Terrorism’: Unmanned Aerial Vehicles (drones) 2010s**