

EEEK!
WATCH THE
PAINT JOB!

TANG!



RADARSAT-1

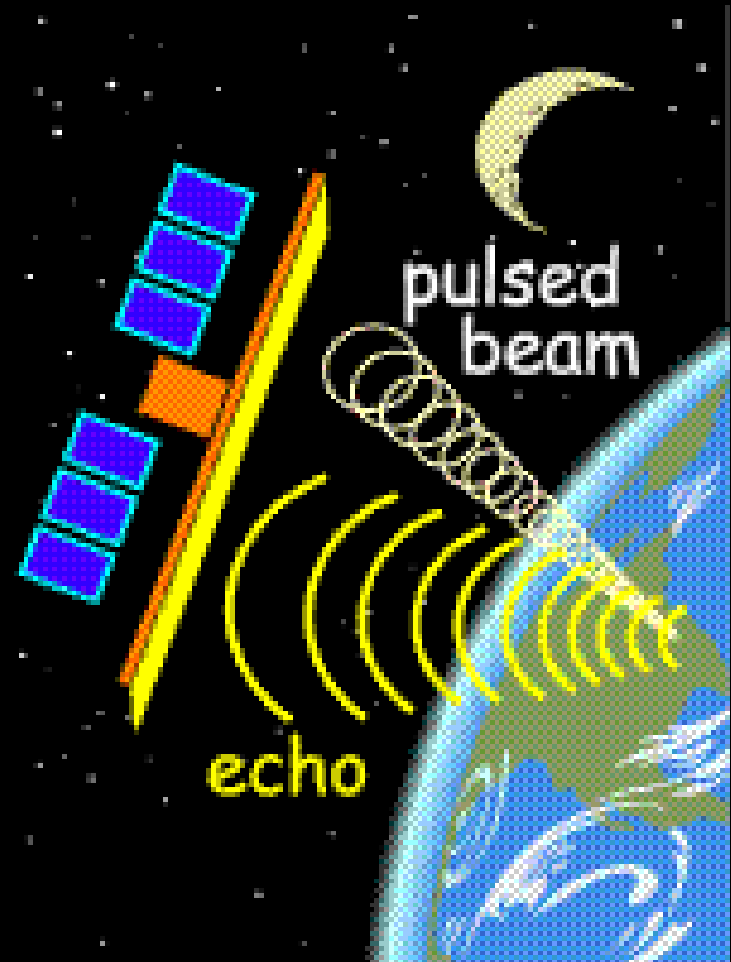


A project in cooperation with
School District 16 and
the Canadian Space Agency

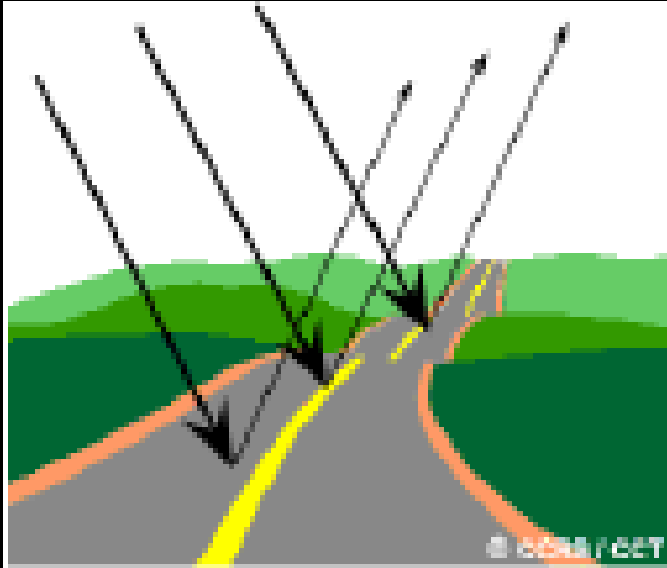
What is RADARSAT



Remote sensing is the science of acquiring information about the Earth's surface without actually being in contact with it. This is done by sensing and recording reflected or emitted energy and processing, analyzing, and applying that information."

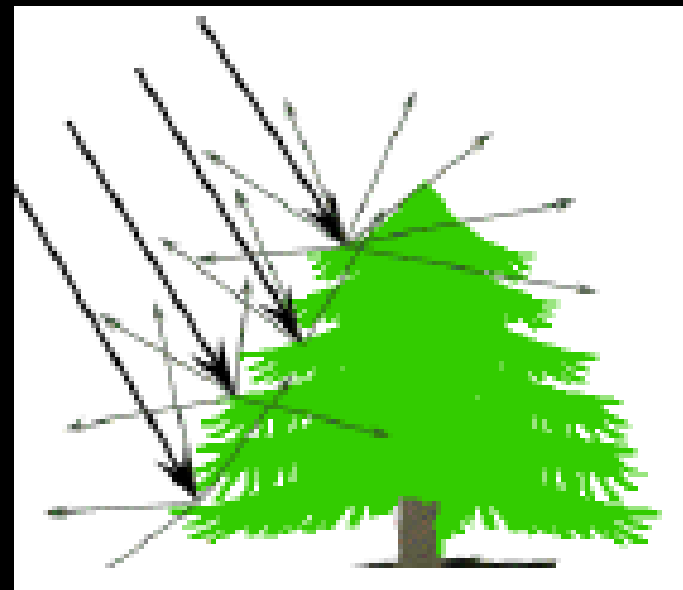


Reflection

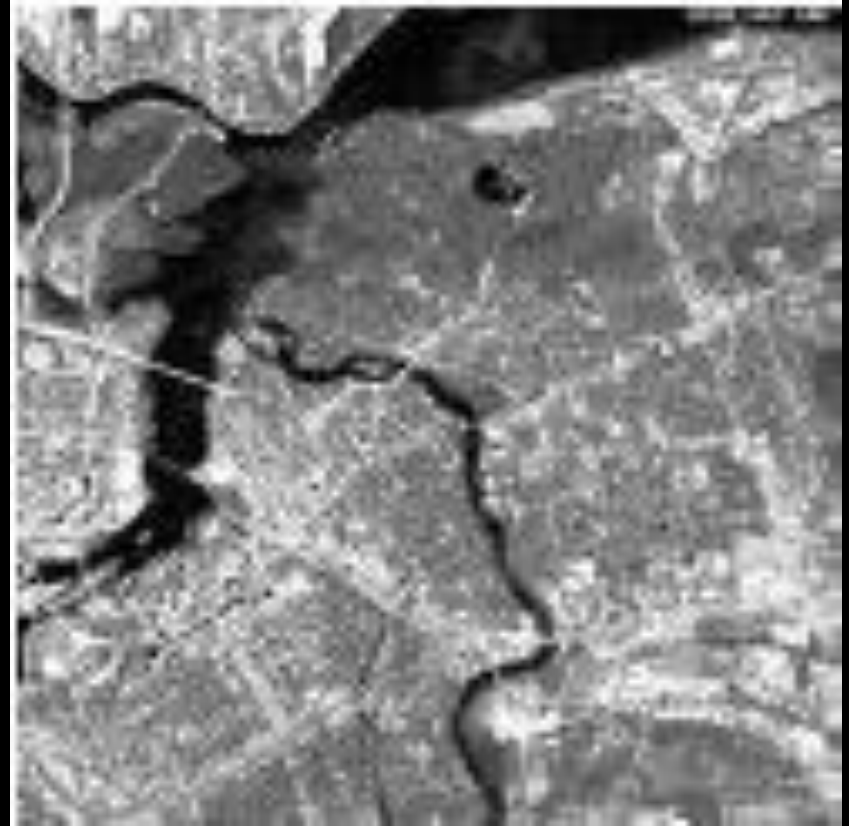


Specular

Diffuse



Bright areas indicate high specular reflectivity, whereas darker areas are indicative of high absorption or diffuse reflectivity.

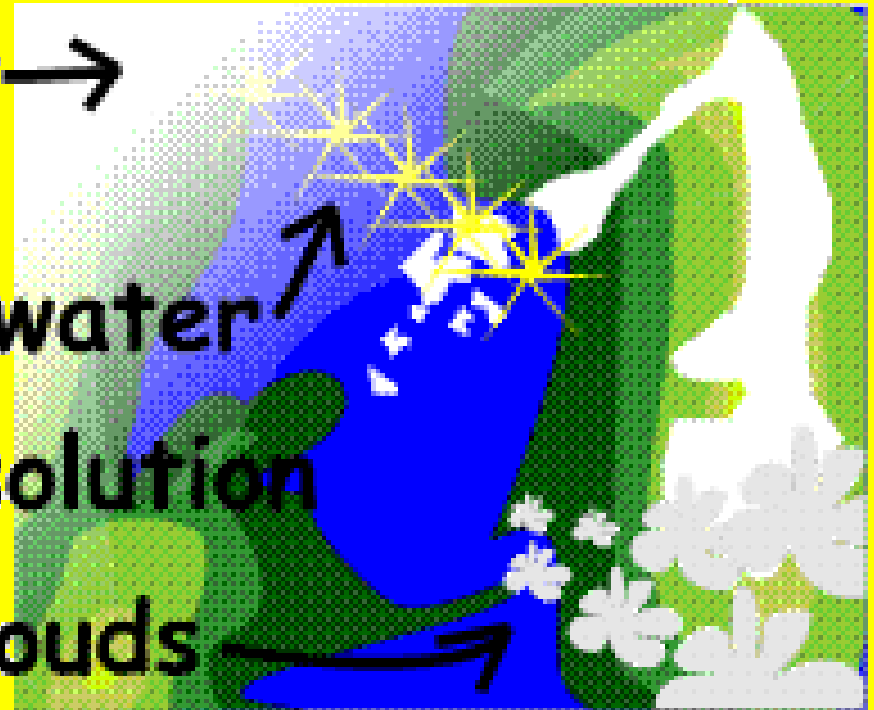


Advantage of using Radar over Visible spectrum

overcast →

sun "glints" off water
about 1000m resolution

cumulus clouds →

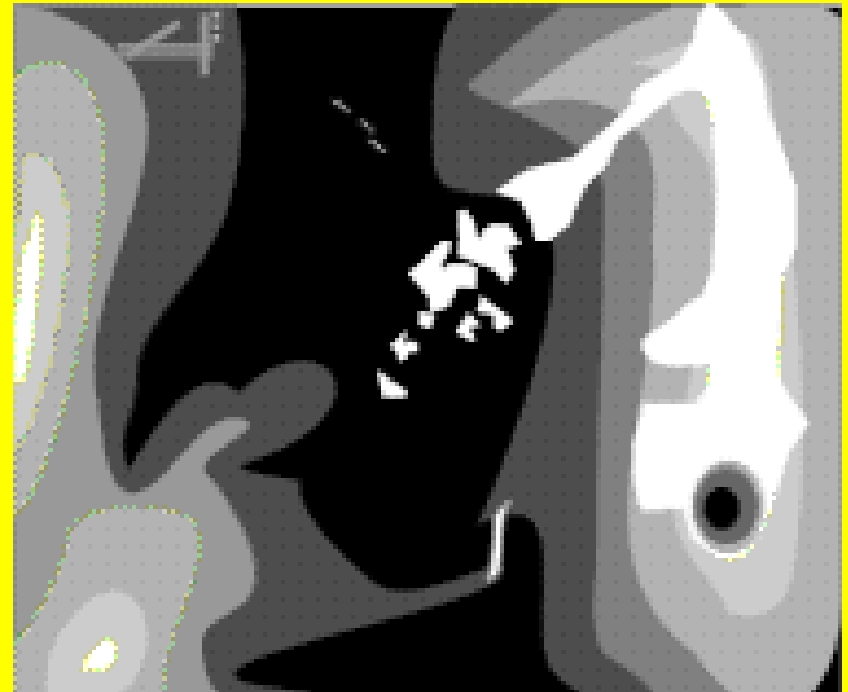


Advantage of using Radar over Visible spectrum

all cloud cover
is transparent

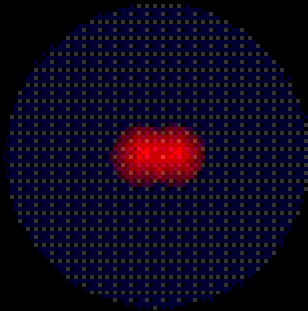
no image artifacts
from sunlight

up to 8m
resolution

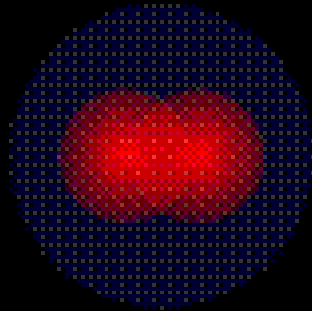


Resolution?

Low Resolution

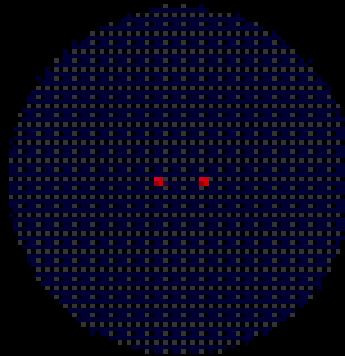


magnification = 50

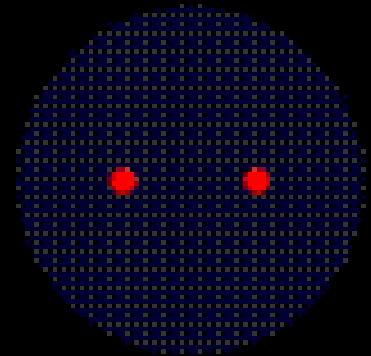


magnification = 100

High resolution



magnification = 50

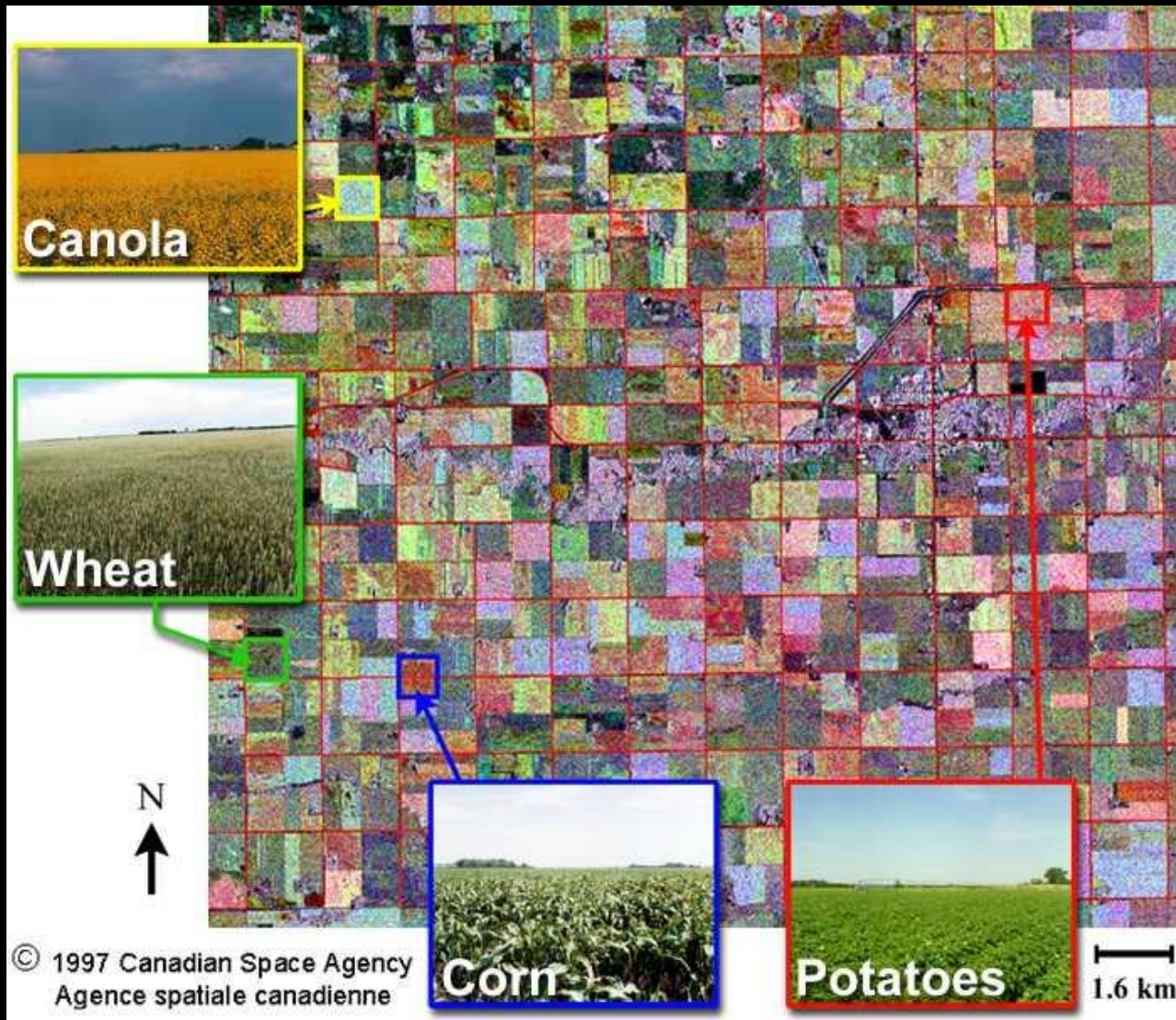


magnification = 100

Applications

- Agriculture
 - Crop Type Mapping
 - Crop Monitoring
- Forestry
 - Clear cut Mapping
 - Species identification
 - Burn Mapping
- Geology
 - Structural Mapping
 - Geologic Units
- Hydrology
 - Flood Delineation
 - Soil Moisture
- Sea Ice
 - Type and Concentration
 - Ice Motion
- Land Cover
 - Rural/Urban change
 - Biomass Mapping
- Mapping
 - Planimetry
 - DEMs
 - Topo Mapping
- Oceans & Coastal
 - Ocean Features
 - Ocean Colour
 - Oil Spill Detection

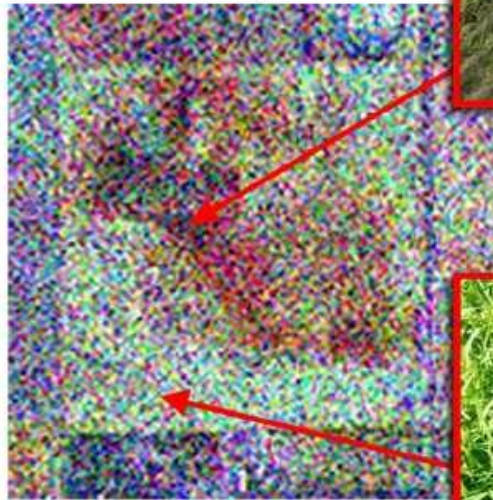
Crop Information



© 1997 Canadian Space Agency
Agence spatiale canadienne

Crop Variability

**RADARSAT-1
Colour Composite**



© 1997 Canadian Space Agency
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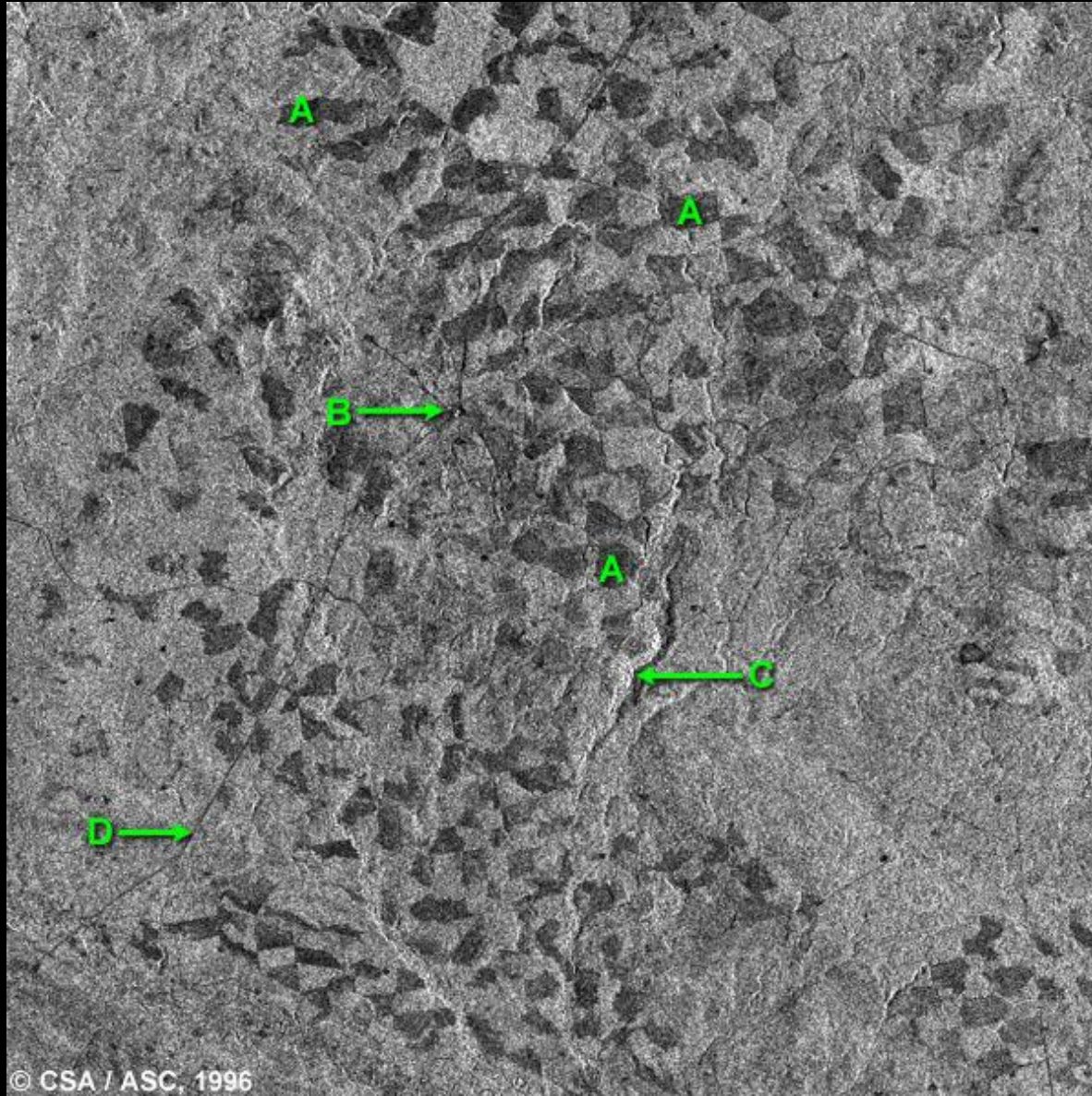


Poor Growth
(soil showing)

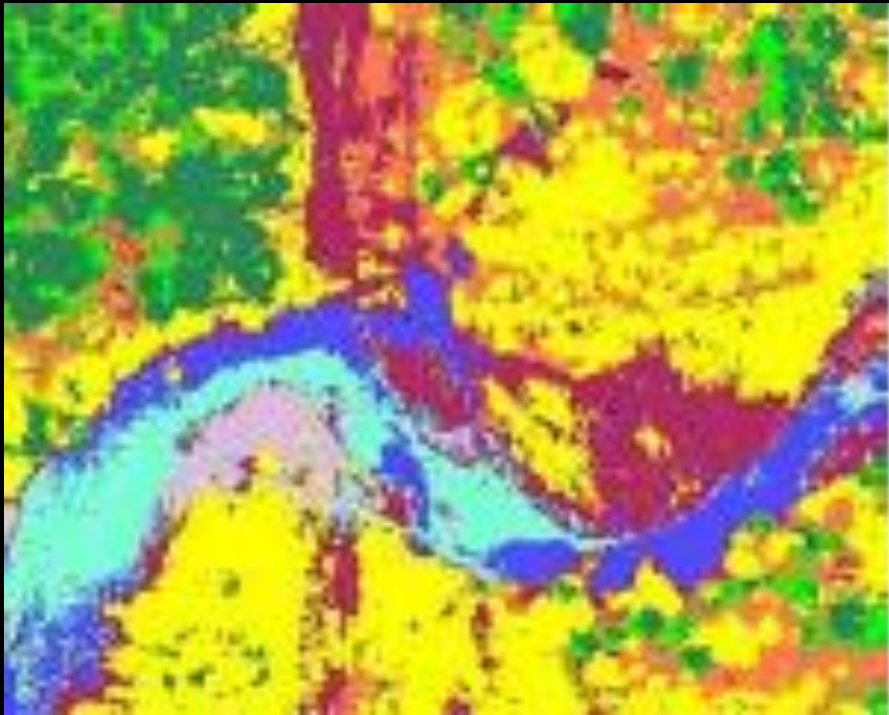


Good Growth
(no soil showing)

Forest Cover

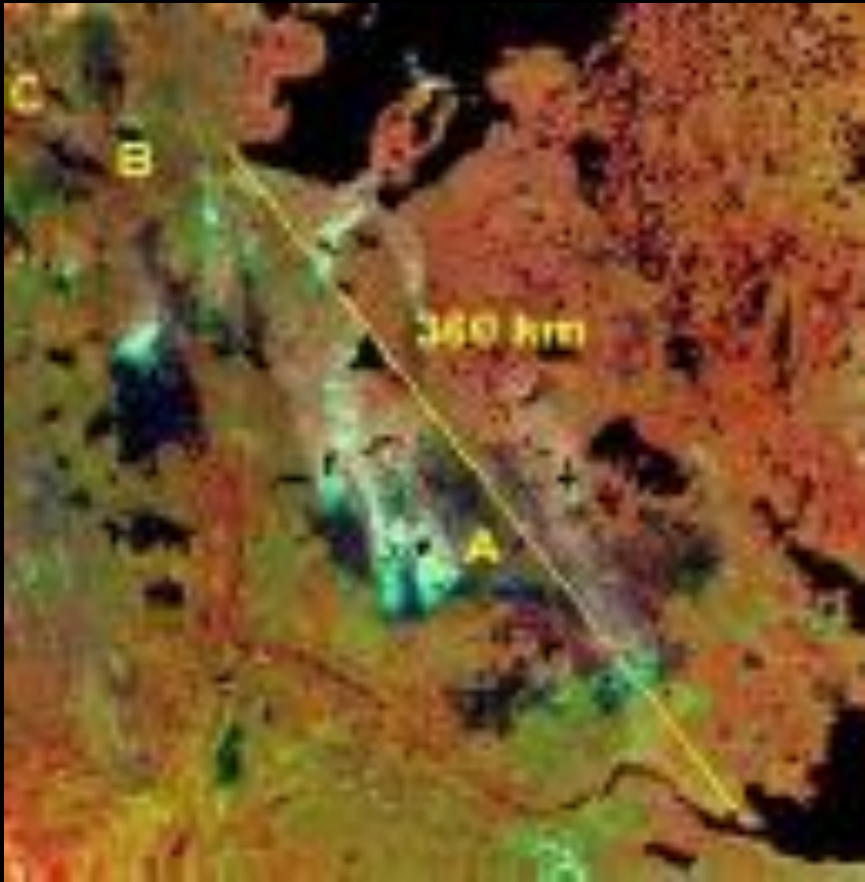


Species Identification



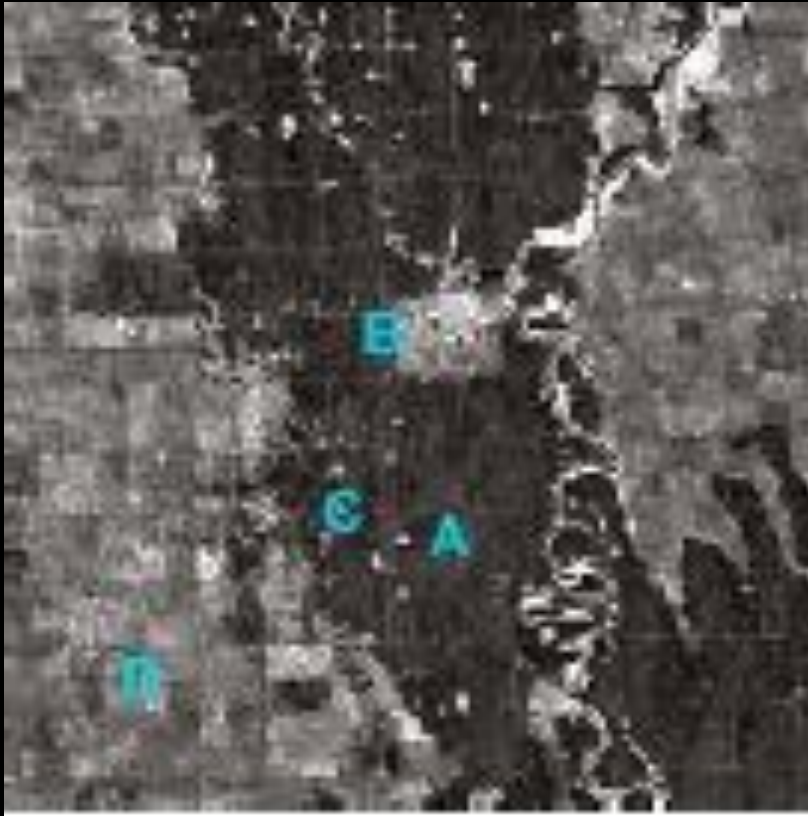
- **Dark green:** conifers
- **Green:** lower branches
- **Light purple:** gravel
- **Yellow:** deciduous
- **Orange:** dry ground cover
- **Red:** wet ground cover
- **Blue (light):** water
- **Blue (dark):** deep or clear water

Burn Mapping



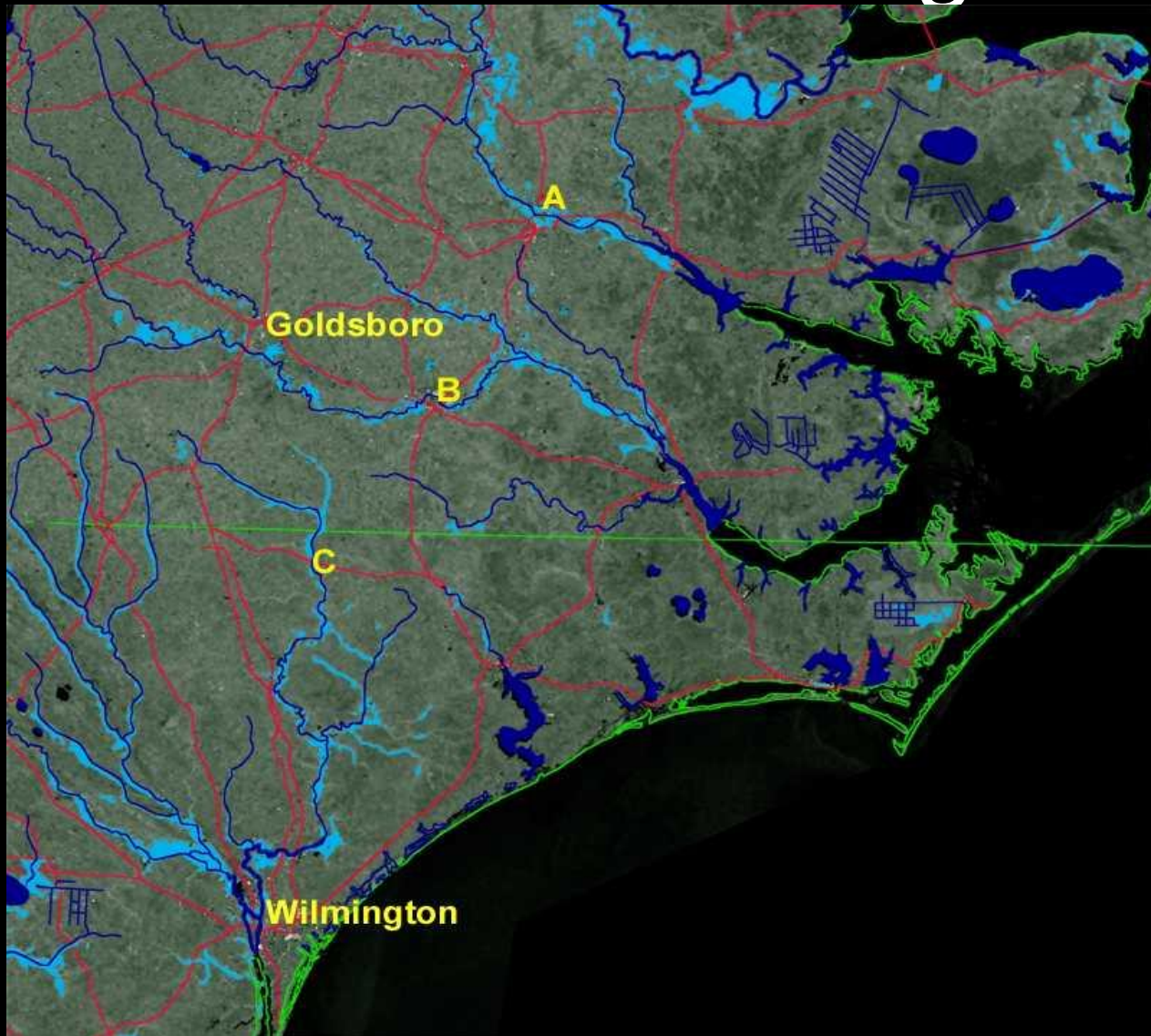
The extent of the burned area, and the areas still burning, can be identified on this NOAA scene, as dark regions (A) Fort Norman (B) is located at the junction of the Mackenzie River and Great Bear River, leading out of Great Bear Lake. At that location, the fire is on both sides of the river. Norman Wells (C) is known as an oil producing area, and storage silos, oil rigs, homes, and the only commercial airport in that part of the country were threatened.

Flood Delineation

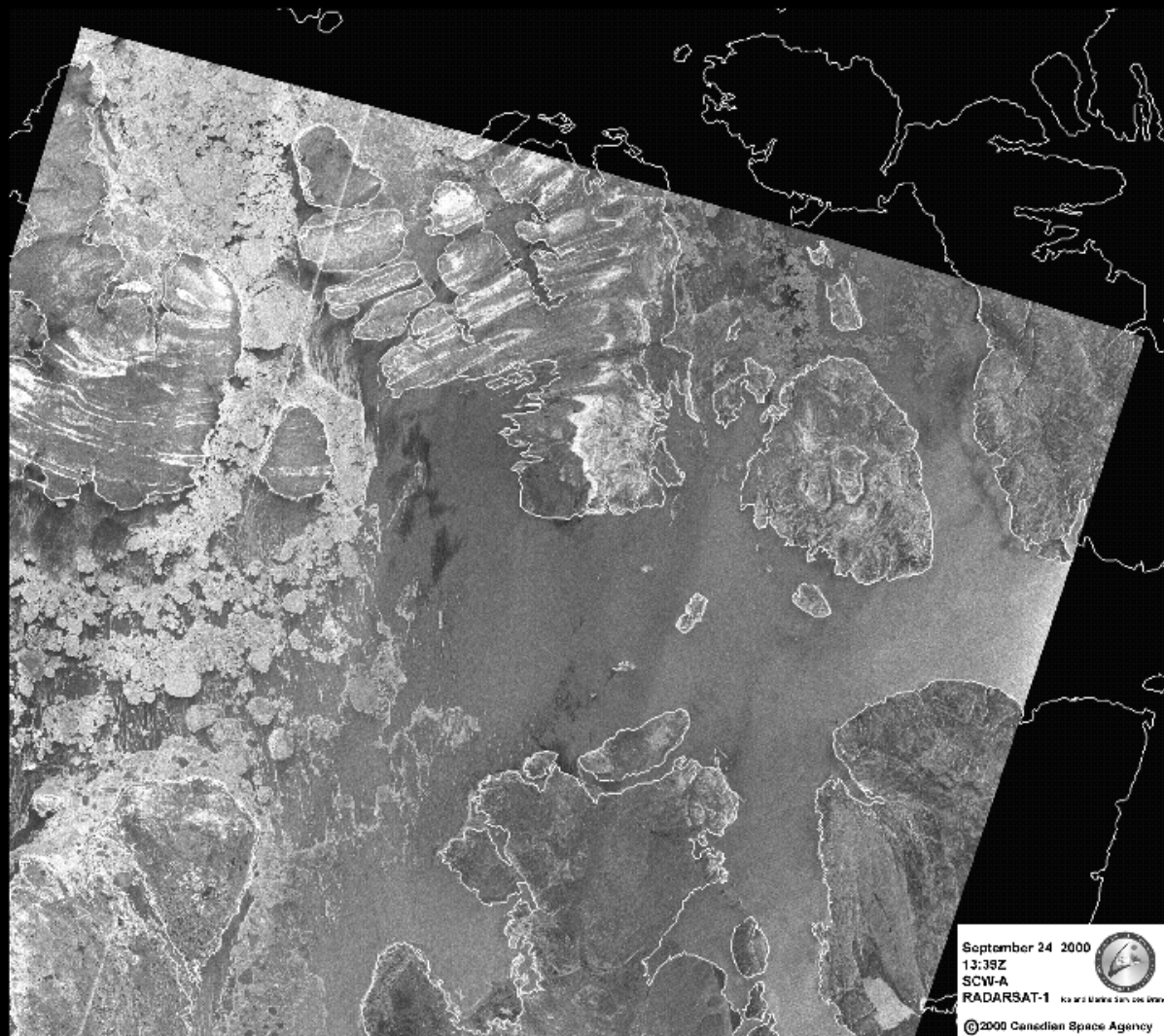


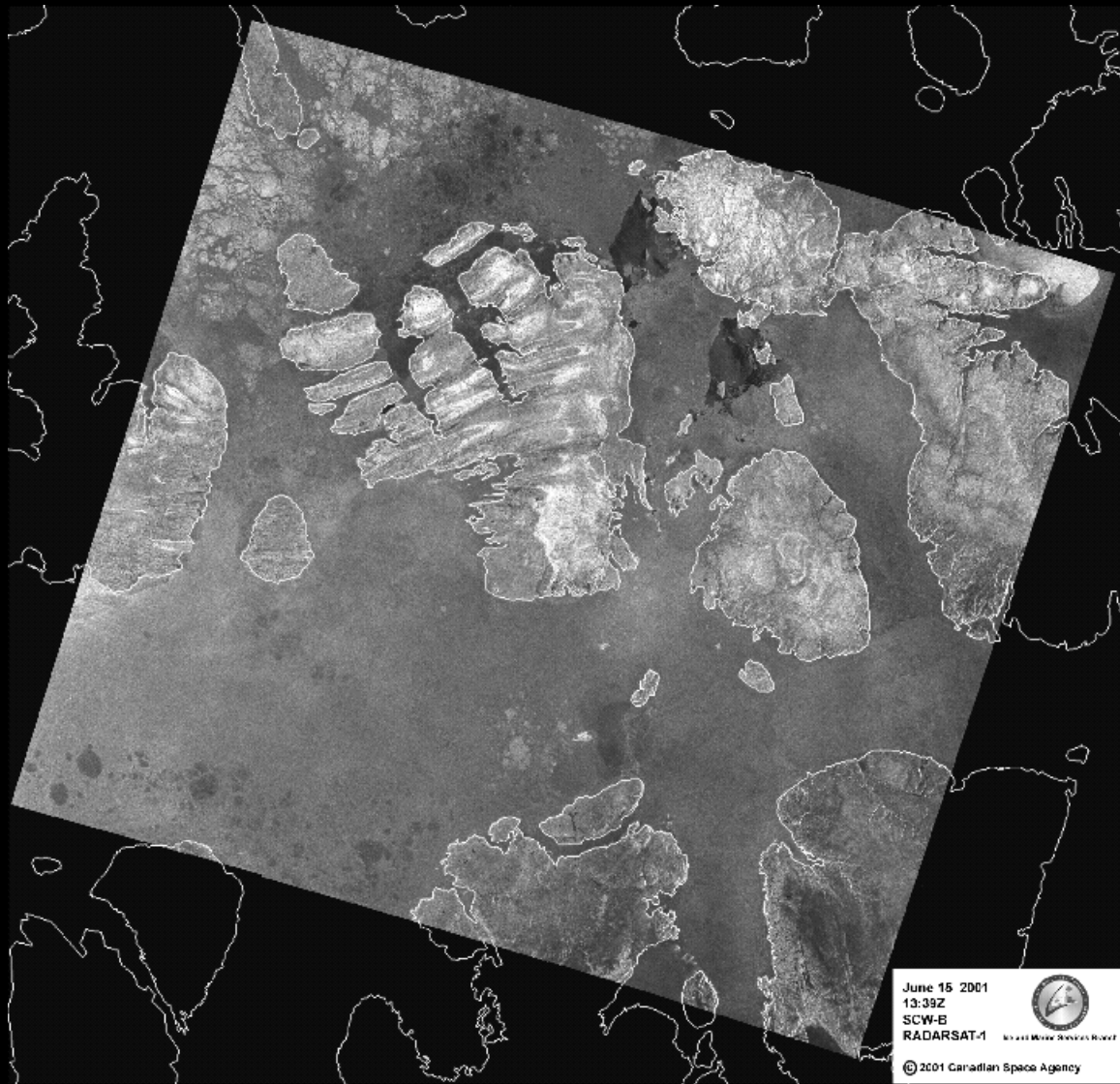
In this image, the flood water (A) completely surrounds the town of Morris (B), visible as a bright patch within the dark flood water. The flooded areas appear dark on radar imagery because very little of the incident microwave energy directed toward the smooth water surface returns back to the sensor. The town however, has many angular (corner) reflectors primarily in the form of buildings, which cause the incident energy to "bounce" back to the sensor. Transportation routes can still be observed. A railroad, on its raised bed, can be seen amidst the water just above (C), trending southwest - northeast. Farmland relatively unaffected by the flood (D) is quite variable in its backscatter response. This is due to differences in each field's soil moisture and surface roughness.

Flood Monitoring



Monitoring Ice Conditions



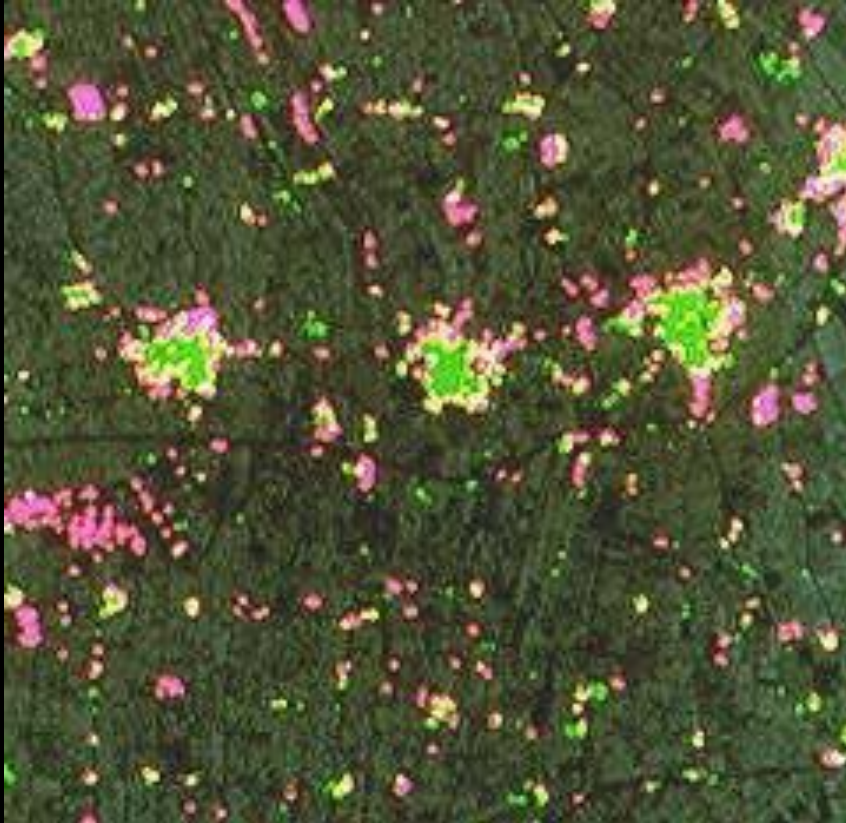


June 15 2001
13:39Z
SCW-B
RADARSAT-1



© 2001 Canadian Space Agency

Land Use/Cover



The colours represent urban land cover for two different years. The green delineates those areas of urban cover in 1973, and the pink, urban areas for 1985. This image dramatically shows the change in expansion of existing urban areas, and the clearing of new land for settlements over a 12 year period.

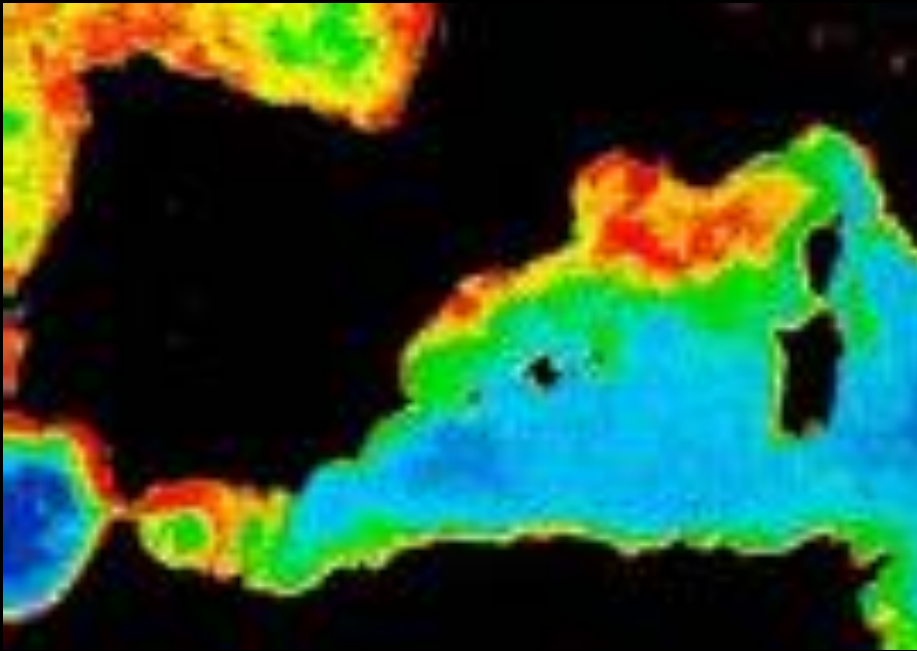
Winnipeg



Truro

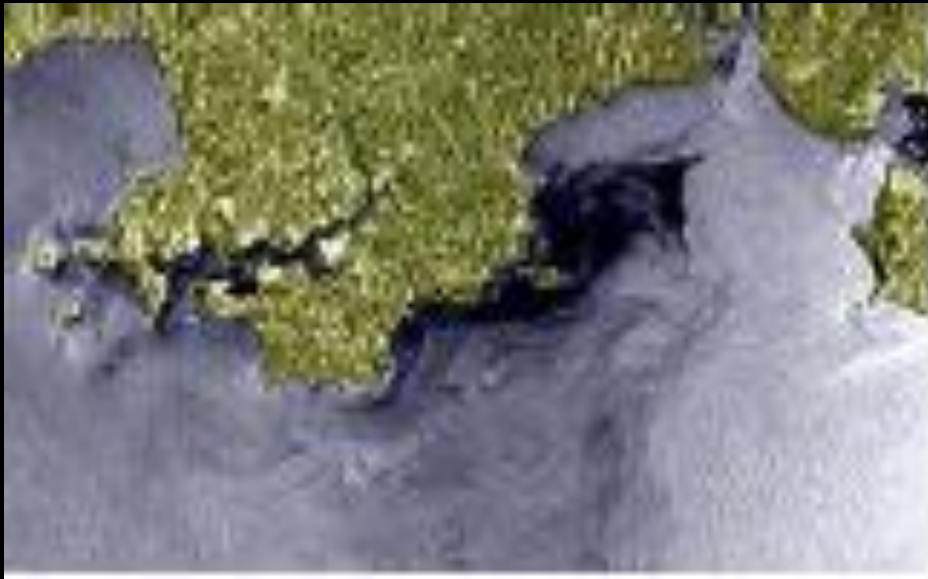


Ocean Features



Phytoplankton, are significant building blocks in the world's food chain and grow with the assistance of sunlight and the pigment chlorophyll. Chlorophyll, which absorbs red light (resulting in the ocean's blue-green colour) is considered a good indicator of the health of the ocean

Oil Spill Detection



In this RADARSAT image taken a week after a spill near Milford Haven, off the coast of Wales, the extent of the oil is visible. The dark areas off the coast represent the areas where oil is present and areas of lighter tone directly south are areas where dispersant was sprayed on the oil to encourage emulsification.

Your Turn

Crop Circles?



These crop circles have been observed by a remote sensing device! Landsat TM captured this view while over southern Alberta. Look at the green circles on the image - how could they have been caused, other than by alien activity?

The "crop circles" are in fact, healthy crops irrigated using a pivot irrigation system - not the result of alien tricks.

Alberta Lines?



Why are lines being cut out of this forested area in northern Alberta?

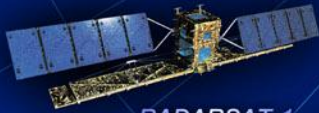
In northern Alberta, forests are being cut for pulp and paper mills, but they are also being cut for another reason. Exploration and infrastructure for gas wells requires that forests be cut for seismic lines, pipeline routing, access to sites, and pumping stations.

More Crop Circles?



These are even stranger circles than the ones we first encountered. The outer circles are tens of kilometers across. What could have created this shape, and other than being a landing target for UFOs, what possible land use could it serve?

The circles are part of a military base in southern Alberta. The land is used for practice maneuvers and is "protected" from the ranging and farming on nearby dry grassland. The circles identify radial distances from 'ground zero', where various real and simulated explosions were conducted by the military.







RADARSAT-1

Canada

Seen from space Vu de l'espace



-  Trans-Canada Highway designation / Indicateur de la route Transcanadienne
-  Major road / Route principale
-  Provincial and territorial boundary / Limite provinciale et territoriale
-  International boundary / Frontière internationale

This product was created by CCRS, in partnership with CSA.
Ce produit a été réalisé par le CCT, en collaboration avec l'ASC.

Kilometres 0 100 200 300 400 500 600 700 Kilometres

You are here