



Geospatial data for civil government, cadastre & the environment

ALEX GOW, MANAGER SALES ENGINEERING

See a better world.

Geospatial Governance



Information and relevant insight to answer questions about our changing environments...

to govern – Street, City, Region, Country.....

to manage wants, requirements and needs and better service our people

First Step – Understand what you are governing?

Environment, Infrastructure, People



Digitize parcel boundaries to inform land tenure at scale



LAND TENURE

DISASTER
MANAGEMENT

AGRICULTURE

URBAN PLANNING &
RESILIENCY

CENSUS PROGRAMS



Eliminate costly mistakes caused by out-of-date maps and surveying methods. Execute initiatives efficiently based on current data.

Enable effective disaster preparation and risk reduction as well as emergency response



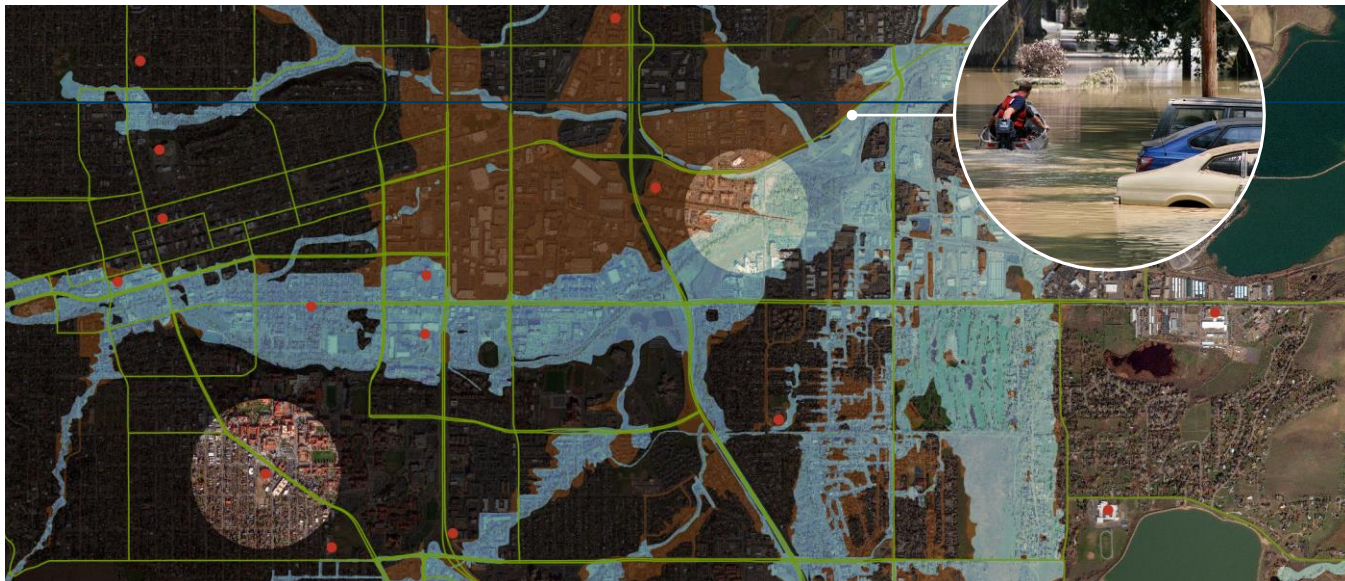
LAND TENURE

**DISASTER
MANAGEMENT**

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CENSUS PROGRAMS



Adapt, respond, and recover quickly. Save lives with advanced mapping of medical facilities, evacuation routes, and critical infrastructure.

Monitor agriculture, forestry and water availability to ensure food & nutrition security



LAND TENURE

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Save time and resources by using satellite imagery to measure cropped areas and evaluate land use rather than costly, time-consuming surveys that are prone to error

Join the era of Smart Cities and build stronger and smarter



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Combining imagery, data layers and elevation models unlocks powerful insights to help cities grow sustainably and ensure equitable access to resources

Streamline census data collection using enumeration from satellite imagery



LAND TENURE

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Leverage population maps alongside demographic and socioeconomic data to inform census programs, minimize costly resources on the ground and expedite information returns.

High quality data is a critical foundation for geospatial governance



Disaster Management

- Risk assessments
- Damaged areas
- Evacuation plans
- Rebuilding plans

Smart Cities

- Settlement maps
- Viewshed analysis
- Planimetric maps
- Infrastructure planning

Land Tenure

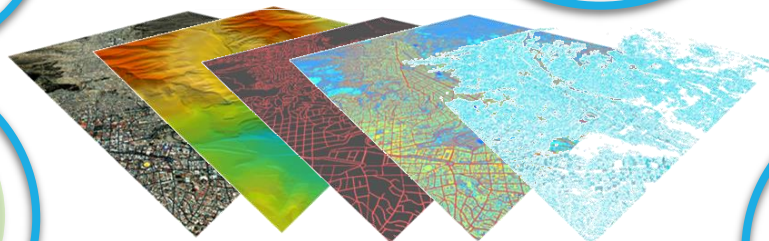
- Parcel boundaries
- Cadastrals
- Encroachment mitigation
- Tax land holdings

National Security

- Monitor borders
- IDP mapping
- Crime hotspots
- Poverty indices

Food Security

- Field boundaries
- Cropped areas
- Crop Inventories
- Crop Health



Core Data Layers

Water Sustainability

- Water bodies
- Watershed analysis
- Irrigation
- Access to water

Census Programs

- Settlement maps
- Population Density
- Demographics & Socioeconomic Data

Natural Resource Management

- Land use/land cover
- Coastal monitoring
- Deforestation
- Mining



How can imagery help maintain cadastral information for infrastructure management?

CADASTRAL INFORMATION MANAGEMENT

Imagery for monitoring change



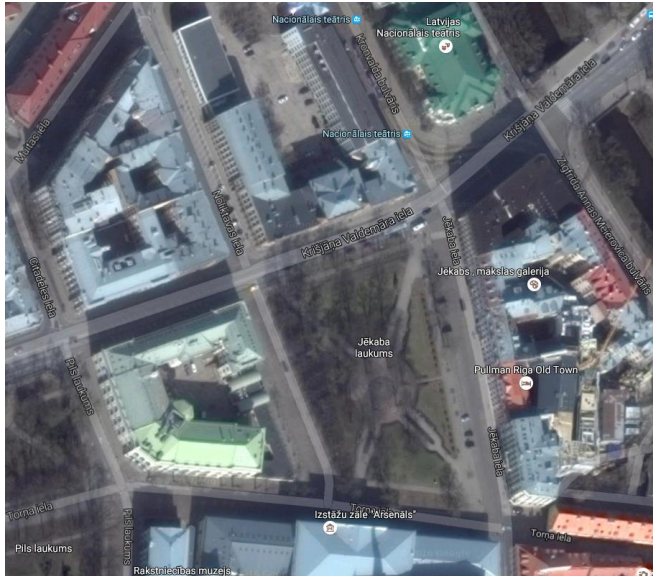
Example: monitoring construction on Kundziņsala island, Riga

The screenshot displays a satellite imagery viewer interface. At the top, there are navigation options: "Map Options", "My Imagery", "Use With", "Supplemental Layers", and "Usage". A search bar contains the text "riga" and shows coordinates: "Lat: 56° 59' 07.34"N, Lon: 24° 7' 10.27"E". The main view is a satellite image of a coastal area with a large body of water and a construction site. A large, light-colored building is under construction, surrounded by dirt and construction equipment. A large ship is docked at a pier. The interface includes a search bar, map controls (zoom in, zoom out, pan, etc.), and a time-series slider on the right. The slider shows a sequence of images from 2015-09-26 to 2015-09-13, with the current image being from 2015-09-27. The Google logo and "Terms of Use" are visible in the bottom right corner.

Resolution makes a difference



Current Google maps imagery



- Limited metadata
- Unknown accuracy
- Variable resolution & image date

DigitalGlobe 30cm Imagery



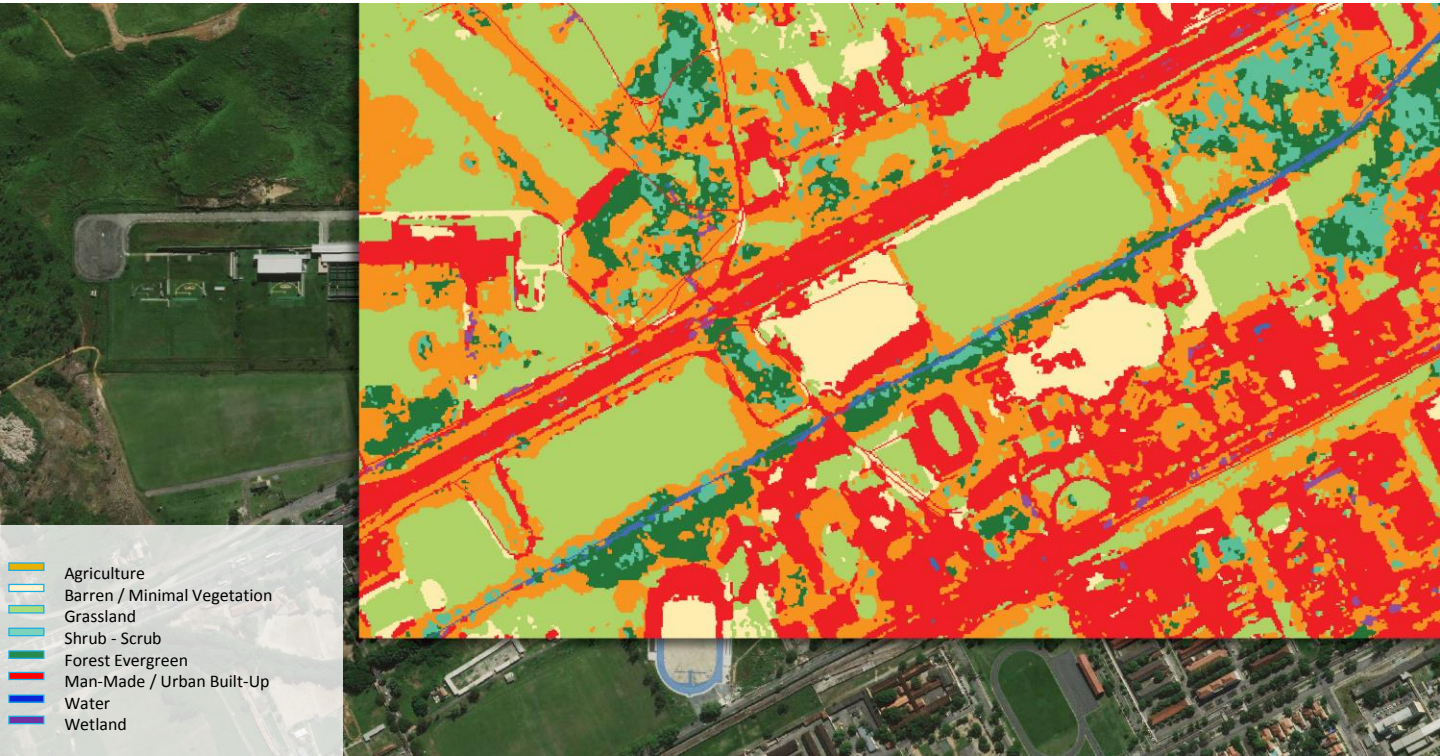
- Full metadata
- Secure viewing
- Consistent resolution, committed refresh

Keep track of changes to your infrastructure & cadastral layers



Keep GIS and mapping data up to date using DigitalGlobe imagery and technology

Land classification to understand change



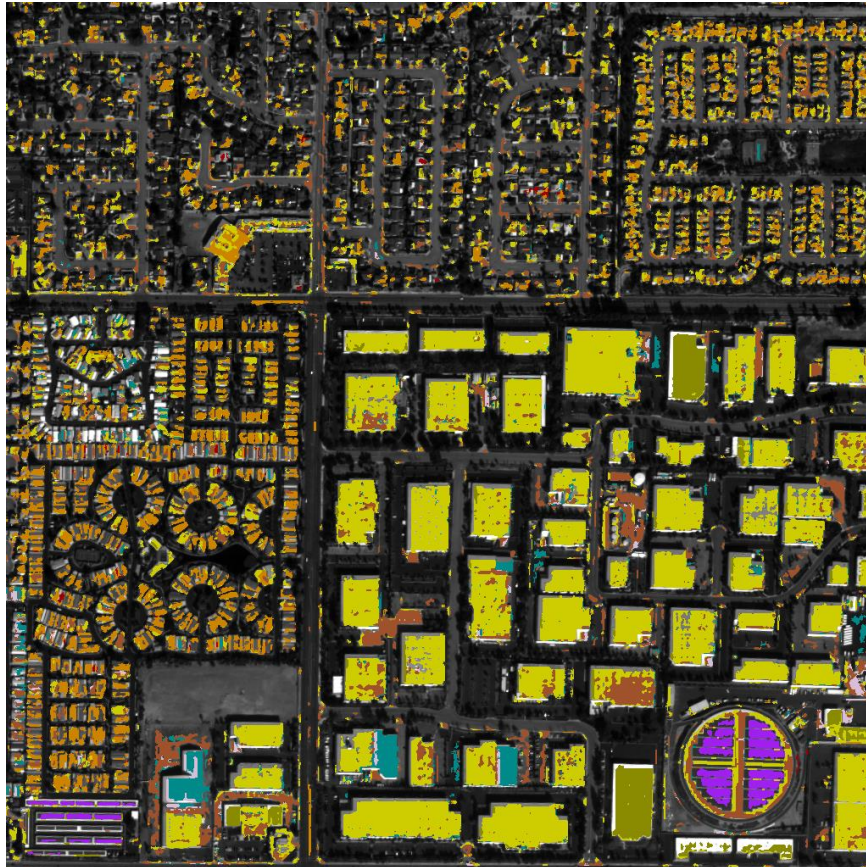
Extract building footprints



Building polygons can be extracted across an entire city's administrative borders



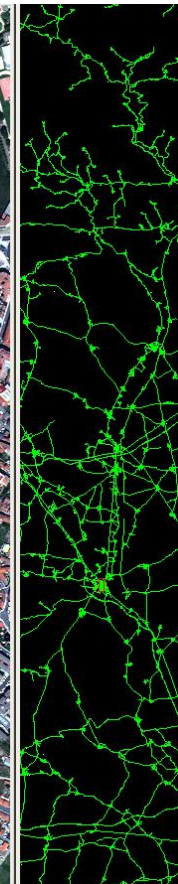
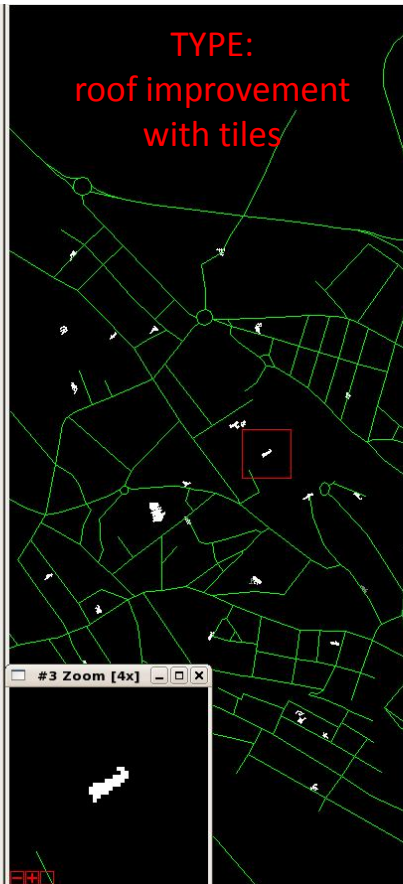
Enhance cadastral information



Roof material identification

-  Solar Panel
-  Steel
-  Rubber + Fiberglass, White
-  EPDM, White
-  Ceramic, Red
-  Tile, Red
-  Paint on Metal
-  Concrete

Automated change detection of new construction work & improvements



Enhance cadastral information using crowdsourcing



How might we quickly analyze this image?

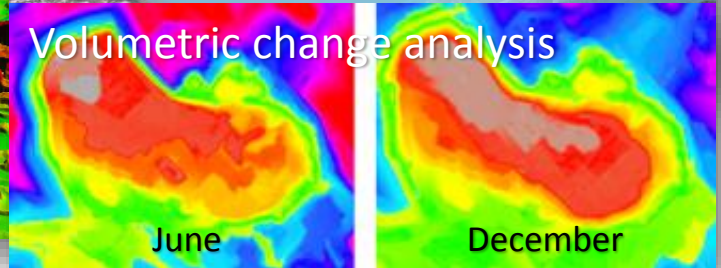
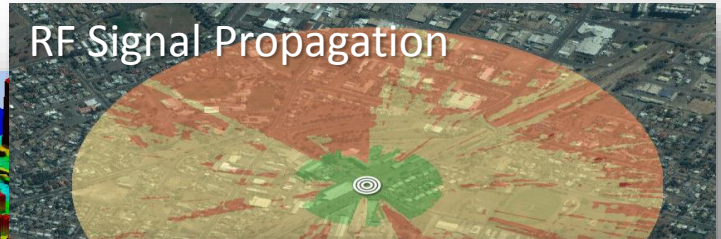
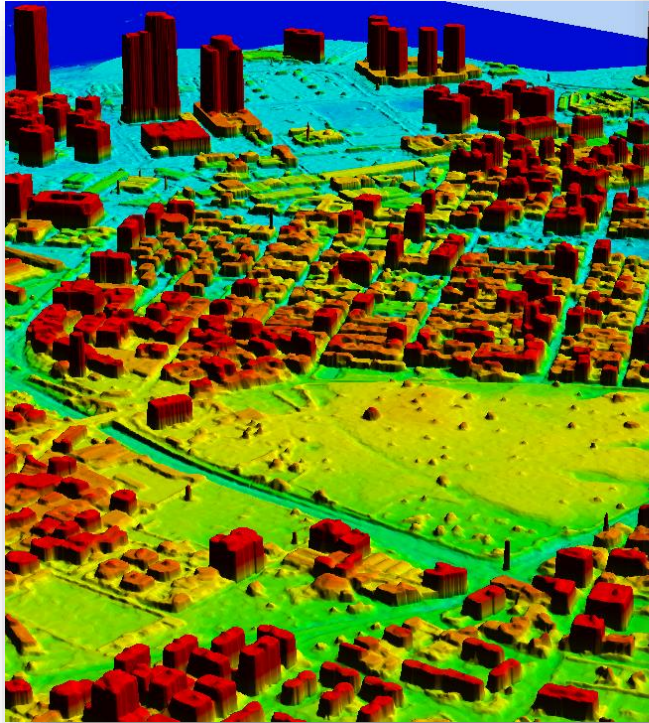


Ask the crowd to...



...show me all houses with solar panels

Integrate with elevation data for enhanced geospatial knowledge





How can imagery be used to monitor complex agriculture & forestry dynamics?

in, morphological field boundary extraction, June 2011

AGRICULTURE & FORESTRY MANAGEMENT

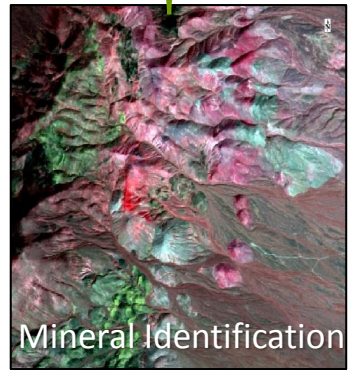
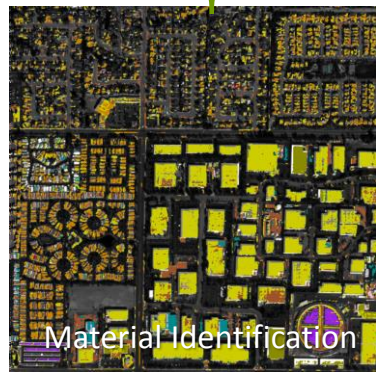
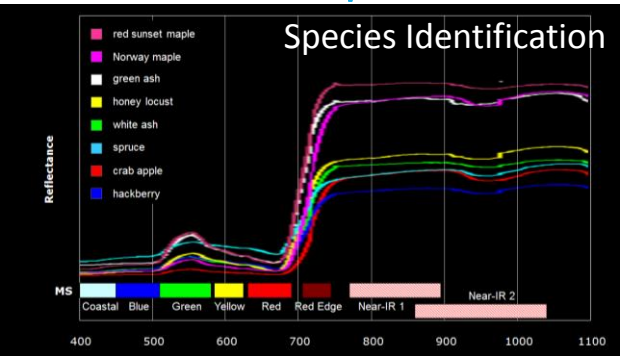
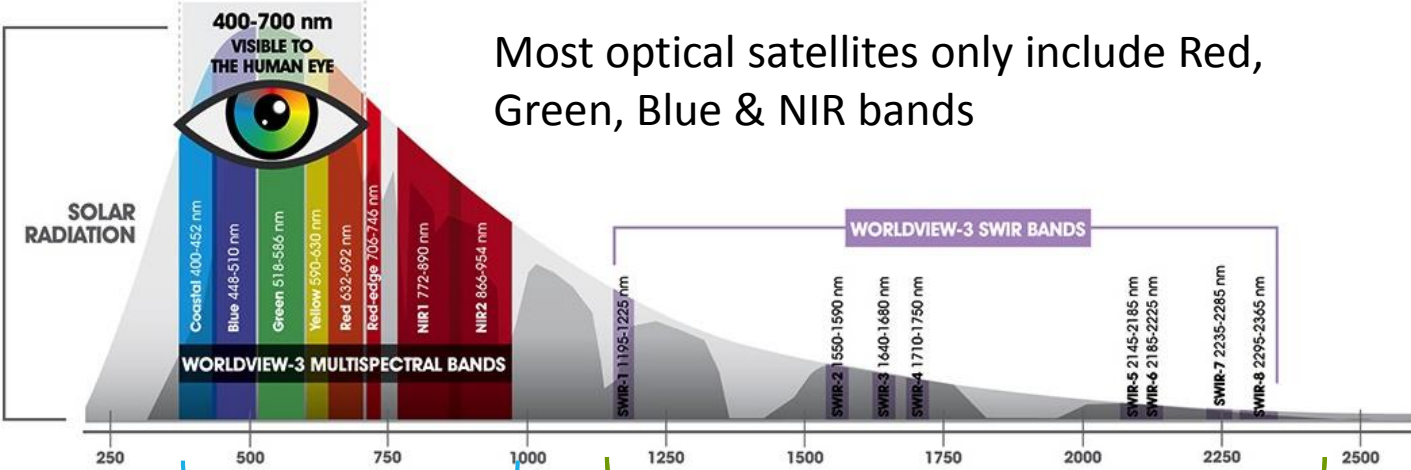
in, morphological field boundary extraction, August 2012

DigitalGlobe Latvia Discovery Day 2016

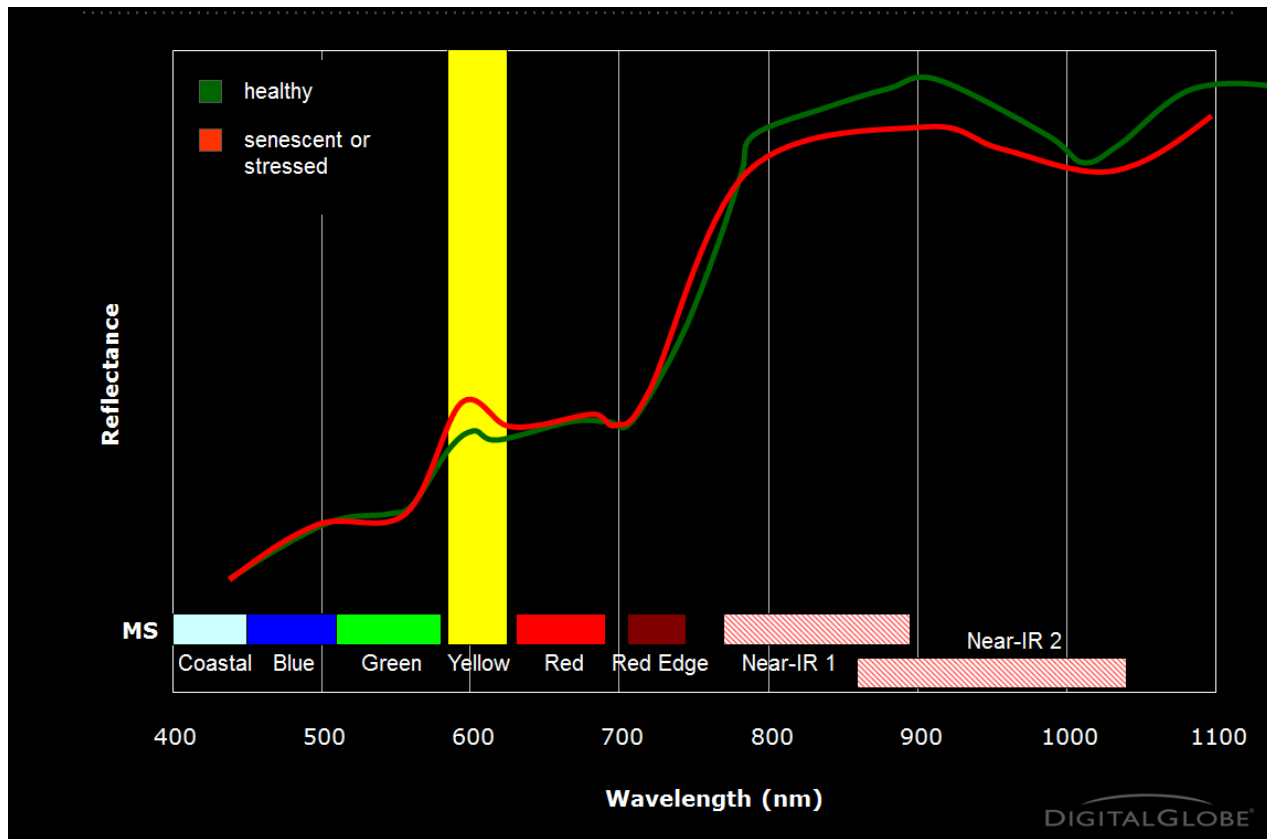
DigitalGlobe's enhanced spectral capabilities



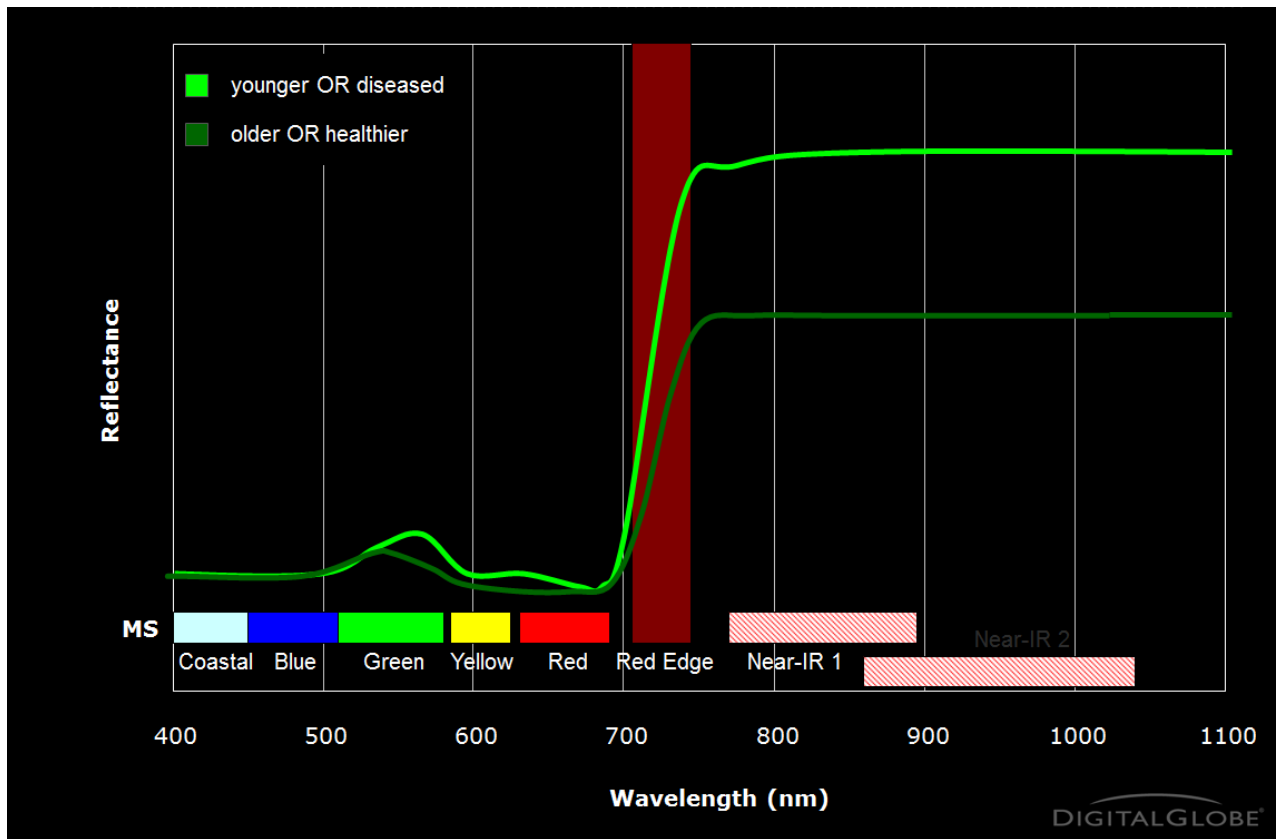
Most optical satellites only include Red, Green, Blue & NIR bands



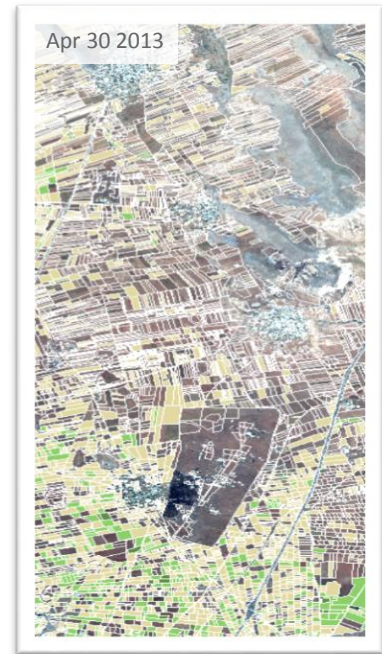
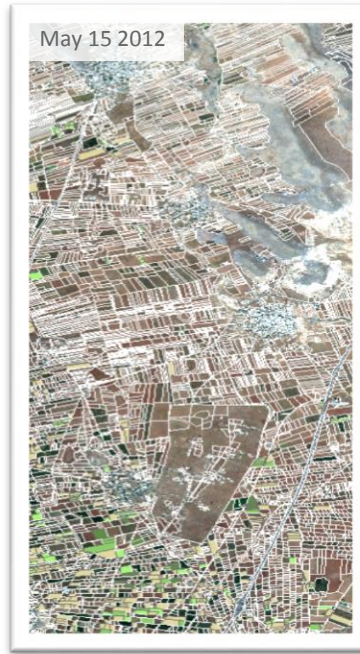
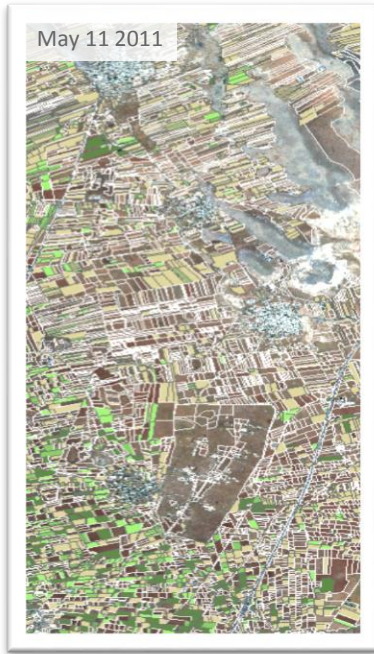
Vegetation health – yellow band



Vegetation health – red edge band



Monitor crop health year on year

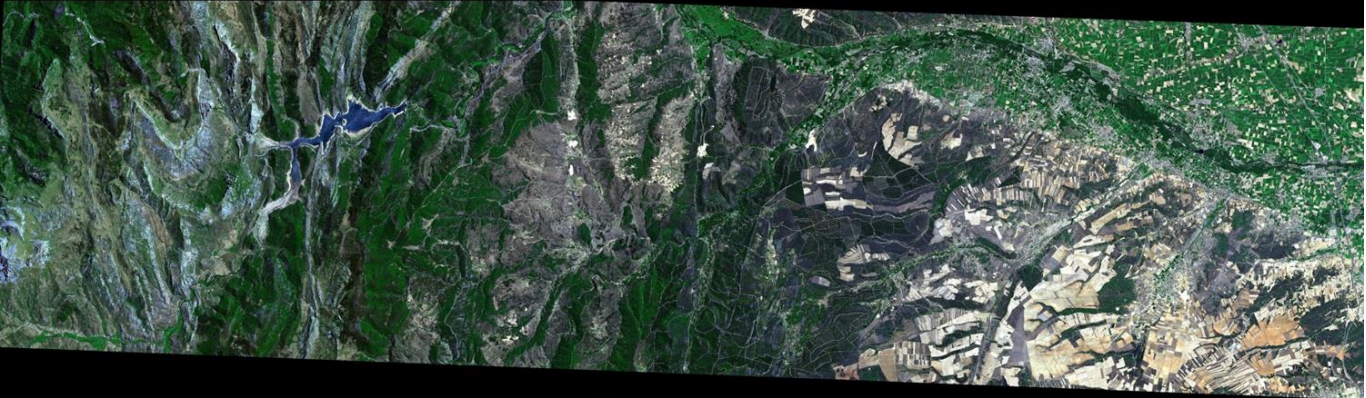


- Predict yield
- Optimise agricultural inputs

Agriculture – crop inventorying

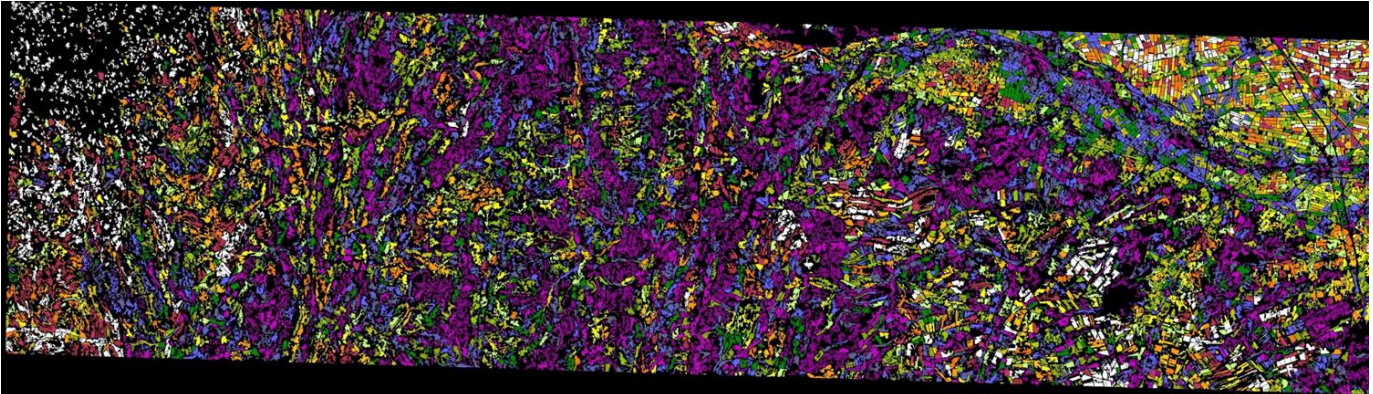


Leon, Spain, WV02 natural color image, June 2011 – 1,200 Km²

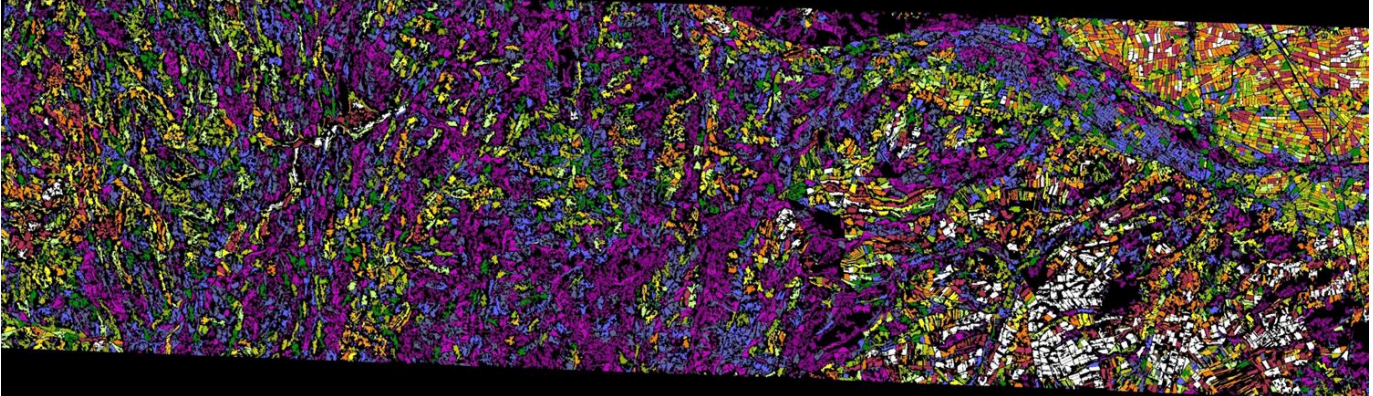


Leon, Spain, WV02 natural color image, August 2012 – 1,200 Km²

Automated extraction of field boundaries

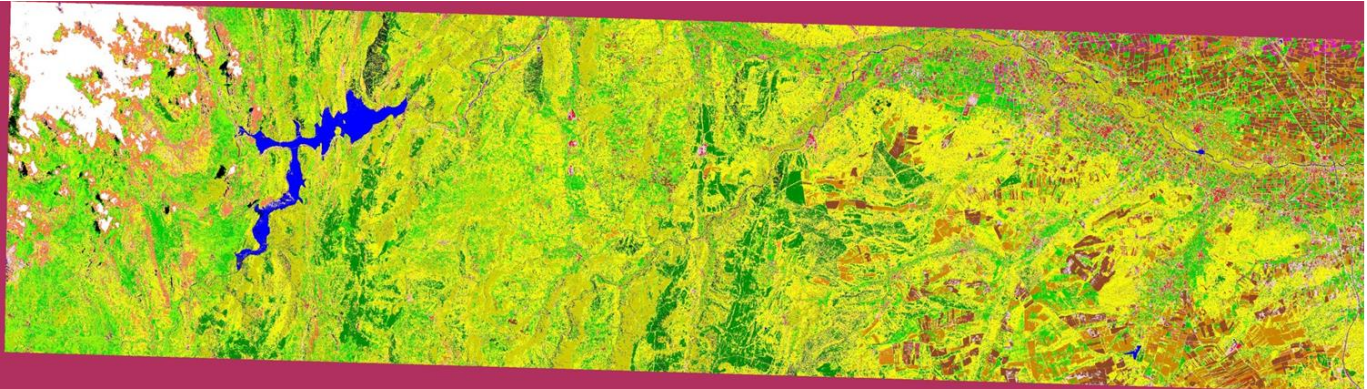


Leon, Spain, morphological field boundary extraction, June 2011



Leon, Spain, morphological field boundary extraction, August 2012

Agricultural land use land cover mapping

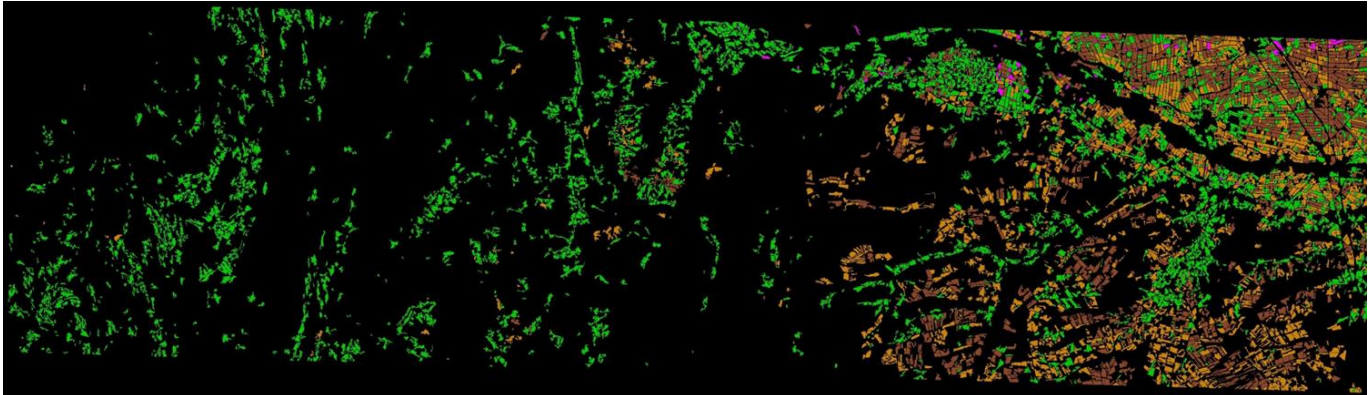


Leon, Spain, 2m land covers, June 2011

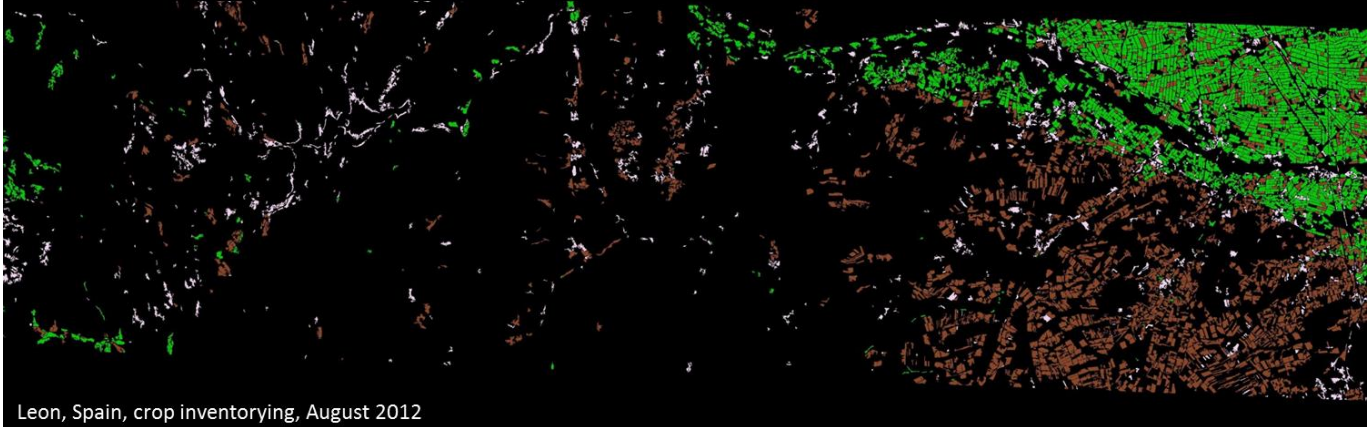


Leon, Spain, 2m land covers, August 2012

Identify crop rotations



Leon, Spain, crop inventorying, June 2011



Leon, Spain, crop inventorying, August 2012

Precision agriculture - crop identification and extracted field boundaries

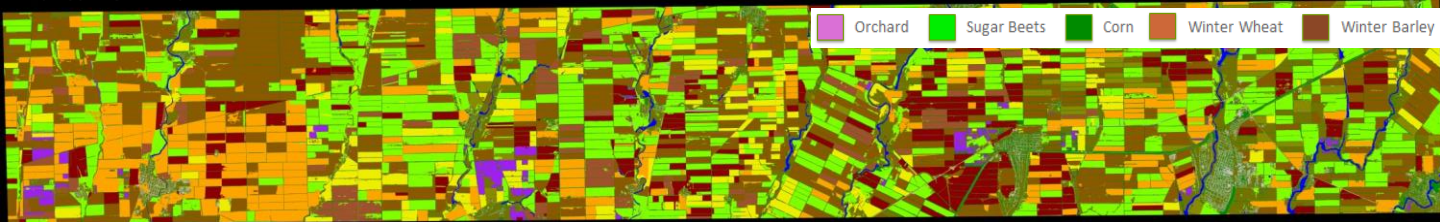


input WV2 image – Krasnodar region



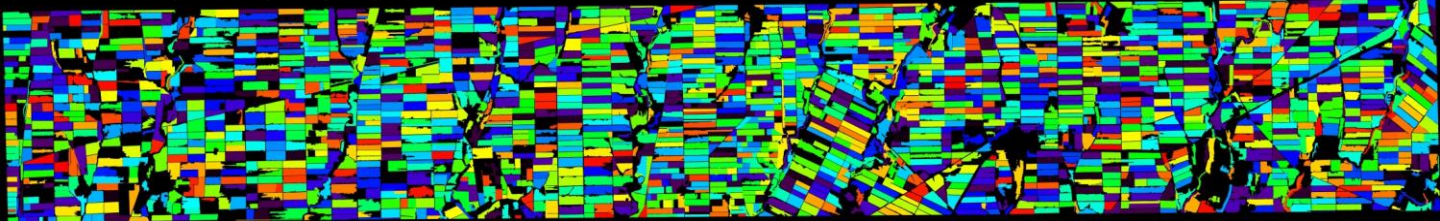
crop types from spectral and textural properties

speed: ~2 days/1,000,000Km² on a single 128 CPU rack



field boundaries from morphological properties

speed: ~10 minutes/1,000,000Km² on a single 128 CPU rack



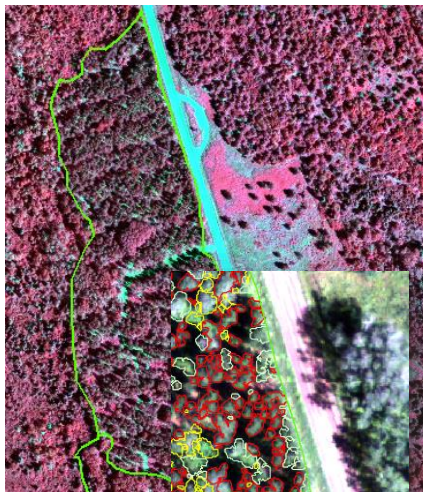
Tree level analytics – forestry inventories



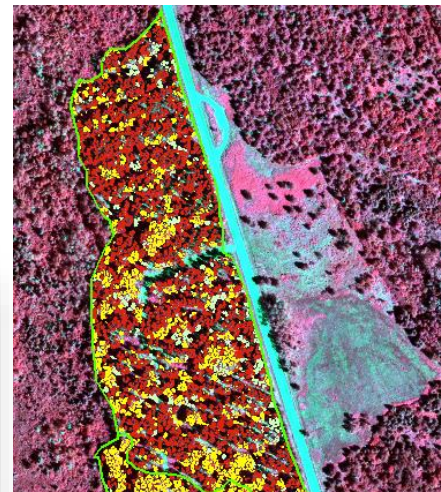
Forest tenure boundaries



Map each tree



Identify tree species



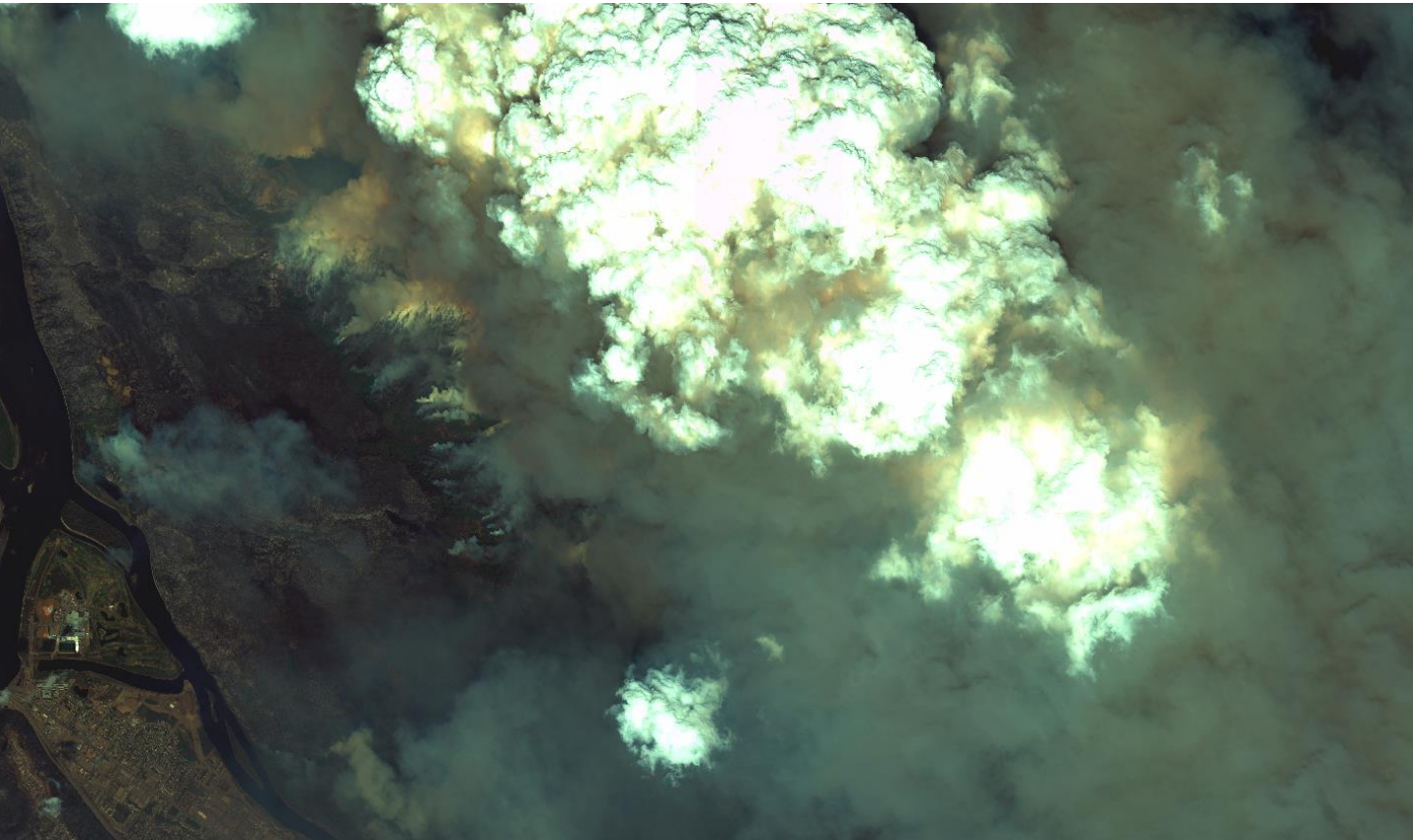
Species	# Trees	Average Height (m)	Average DBH (cm)	Average Age (yrs)
Red Pine	2049	18.5	22.5	59
Poplar	940	19.7	20.2	44
White Spruce	374	12.1	18.6	45
No commercial	229	N/A	N/A	N/A
TOTAL	3592	BA = 12.4m²/ha		



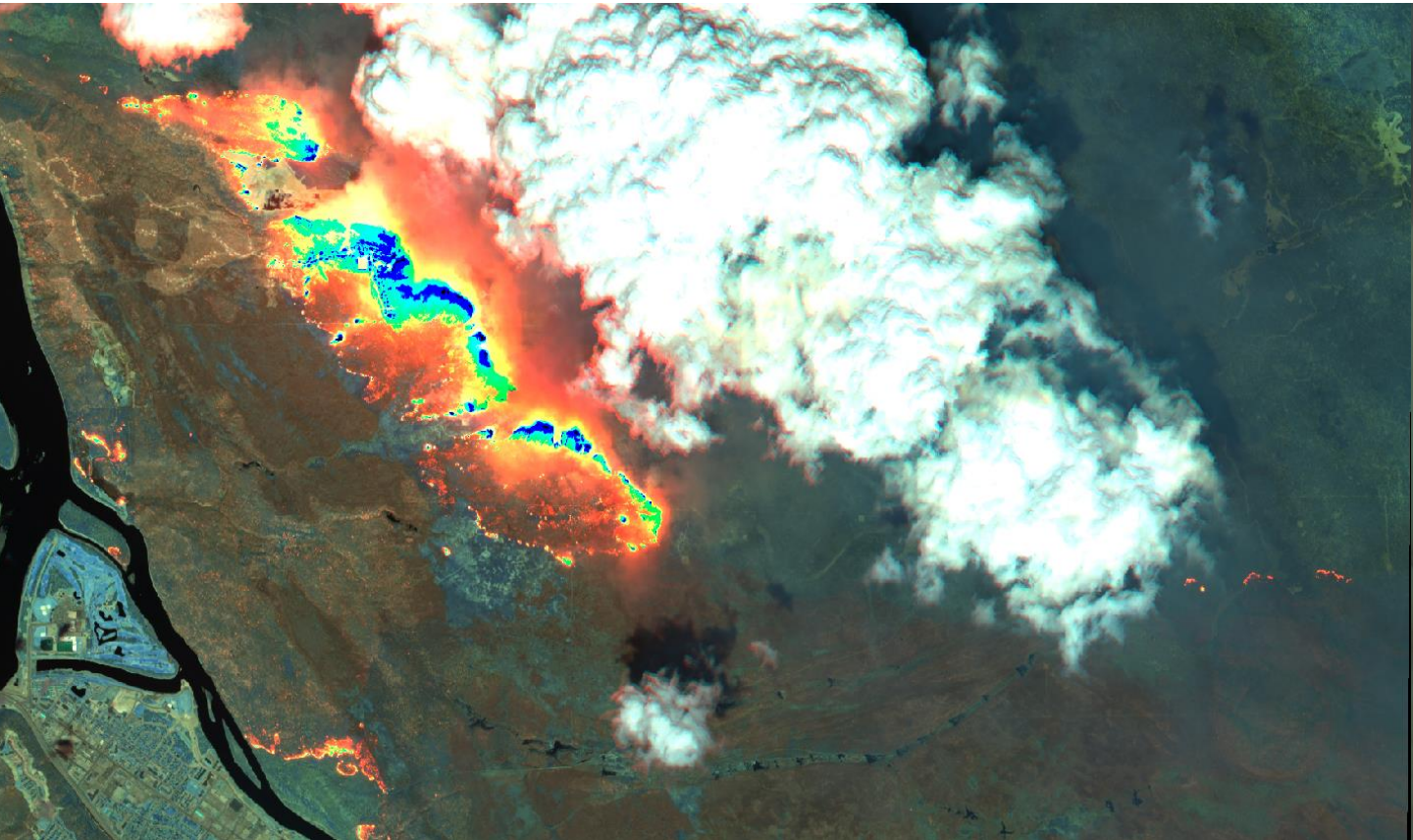
What information can be extracted to aid disaster response?

FOREST FIRE DISASTER MANAGEMENT

Forestry risk management – forest fire monitoring



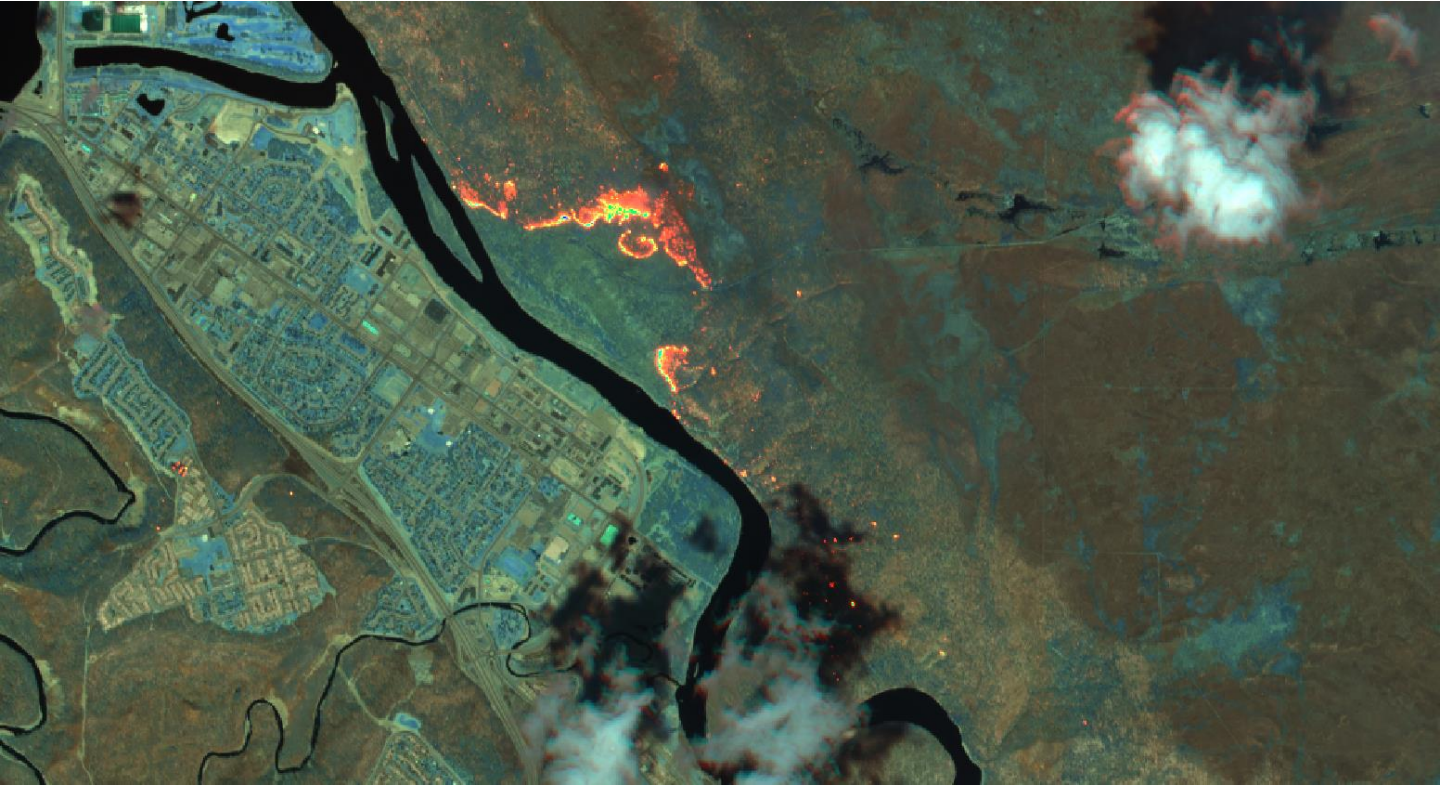
Forestry risk management – forest fire monitoring



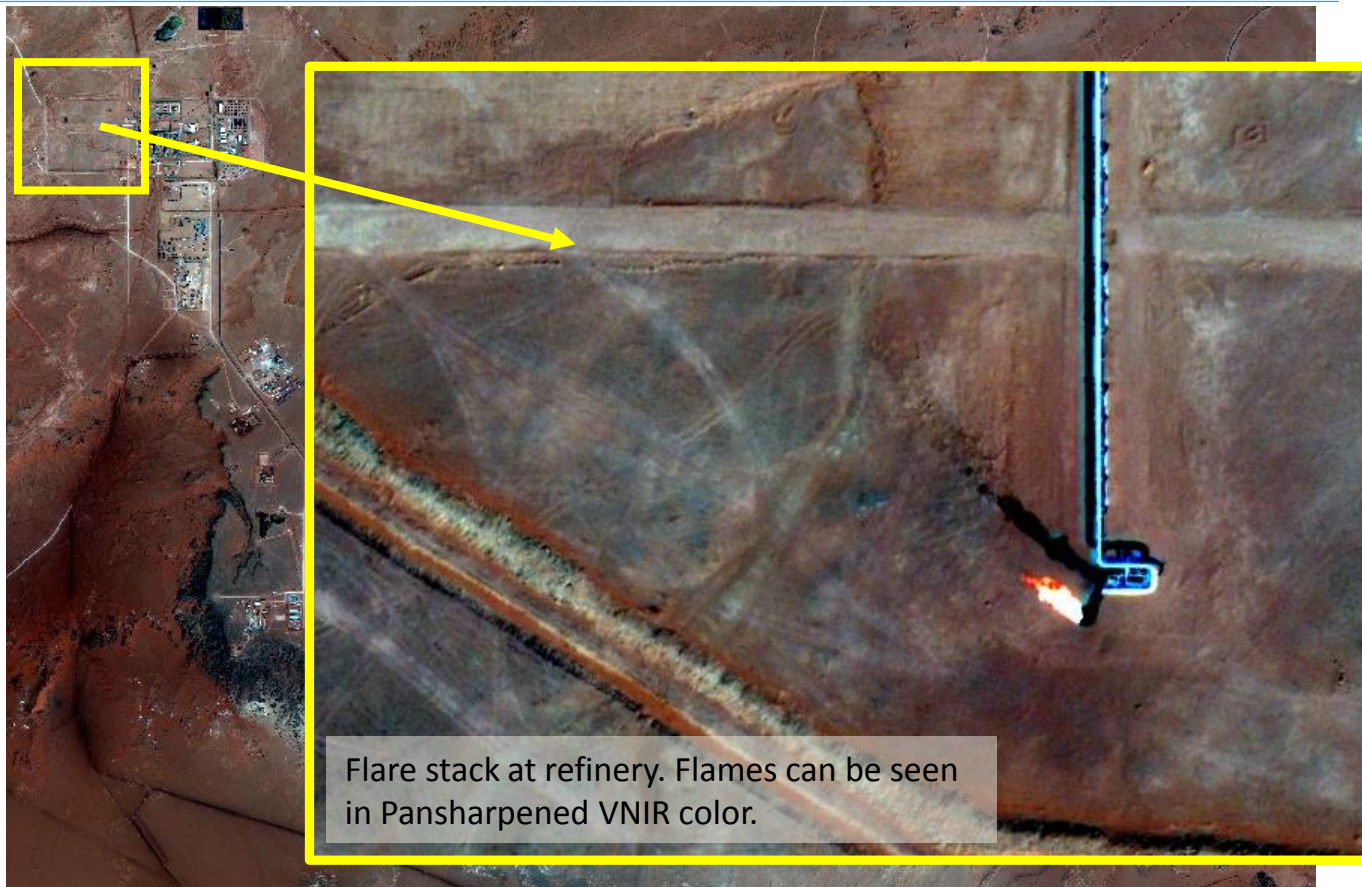
Forestry risk management – forest fire monitoring



Forestry risk management – forest fire monitoring



Thermal detection – gas flaring



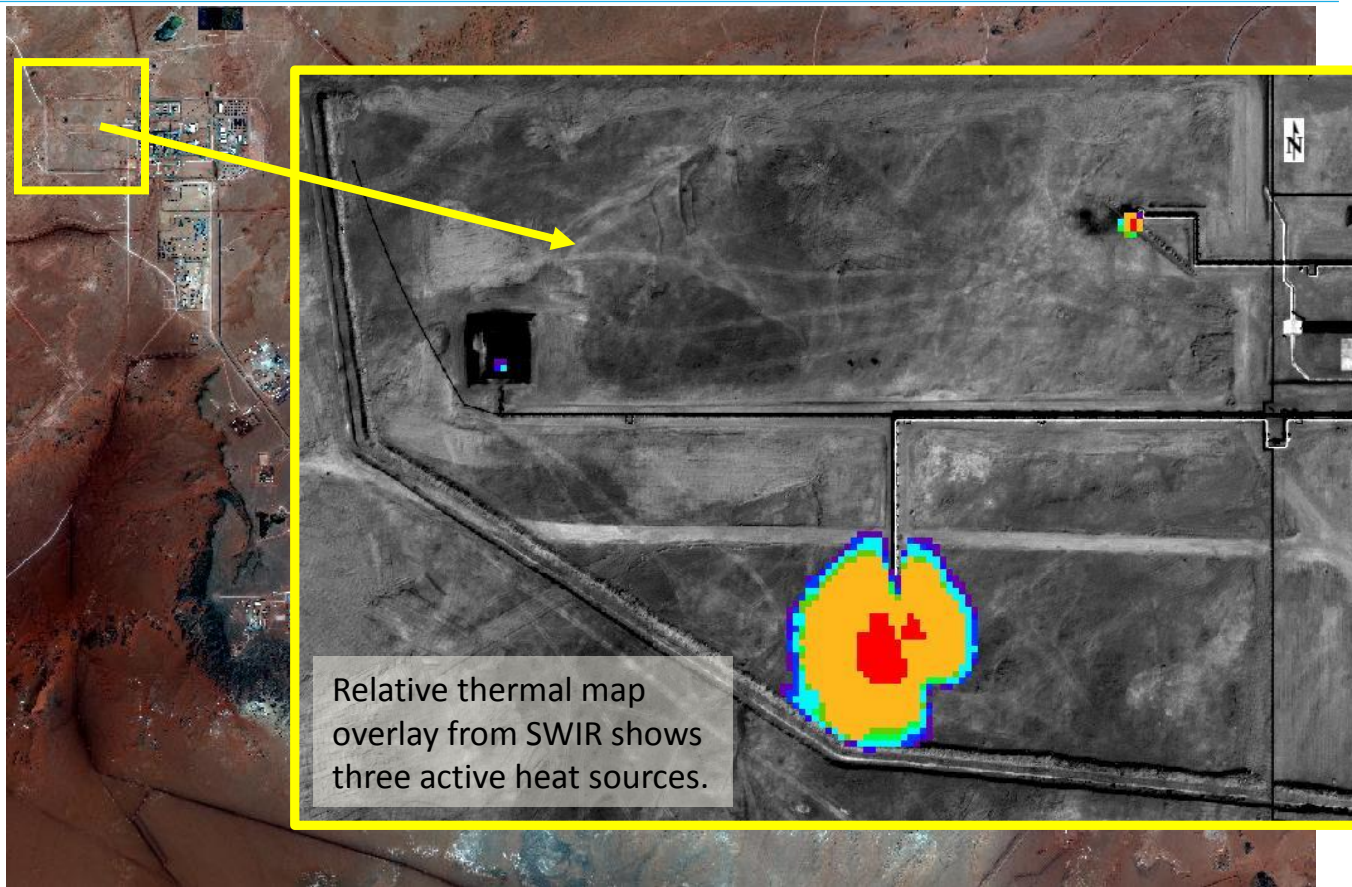
Flare stack at refinery. Flames can be seen in Pansharpenerd VNIR color.

Thermal detection – gas flaring



Zooming out, we can still see the one flame only.

Thermal detection – gas flaring





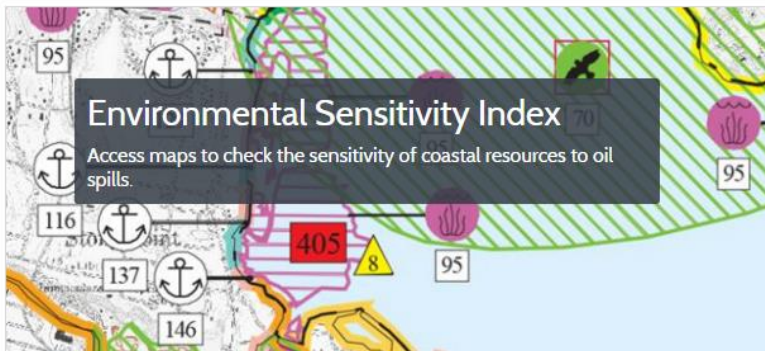
How can we help map environmentally sensitive areas?

ENVIRONMENTAL SENSITIVITY MAPPING

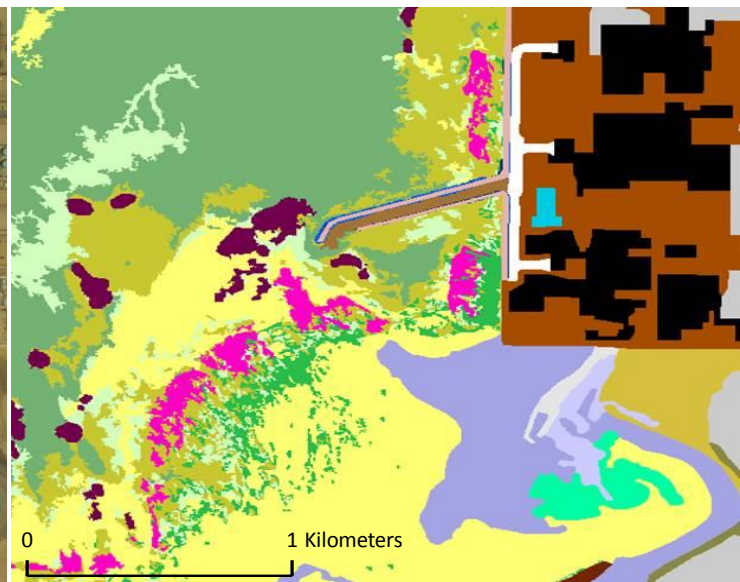
Project Example: UAE Land Use & Habitat Mapping



- Emirate-wide habitat map production
- Terrestrial and marine
- 1:10,000 Scale output
- Provide a baseline for future larger scale, focused ecological surveys



Project Outputs: Land Use Land Cover Analysis



Project Output: Satellite vegetation mapping, species identification & health indication

