

The Future of Very High Resolution EO Data: Possibilities and Solutions for Water Resource Management

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DigitalGlobe

Agenda

- WorldView-3 and Technology Trends
- Analytics and Use Cases
- Summary

Commercial Space based High Resolution Imagery Trends

FOUR ELEMENTS OF SUCCESS FOR THE RESOURCE MANAGEMENT

1st Era: Resolution

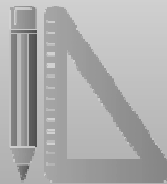
Customer needs evolve beyond aerial



Increasing Spatial Resolution
More Spectral Bands
Frequent Global Revisit

2nd Era: Accuracy

Emergence of map making industry and greater accuracy drives growth



Increasing Positional Accuracy

3rd Era: Speed

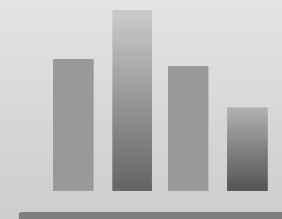
Reliance on imagery at an all-time high and customer priority becomes speed and relevancy



Near Real Time Download
Collaborative Information

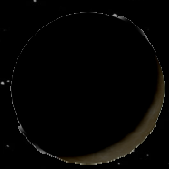
4th Era: Analytics

New valuable problem-solving uses emerging tools and priority becomes measuring on surface and below water

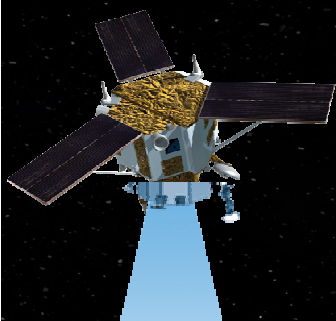


Mapping
Predictive Insight

The DigitalGlobe Constellation

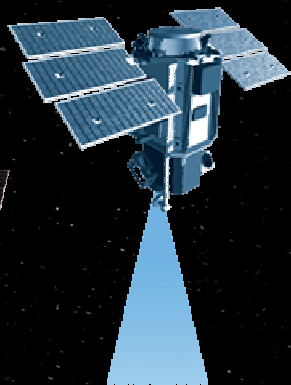


IKONOS



82 cm GSD
150,000 km² /day

QuickBird



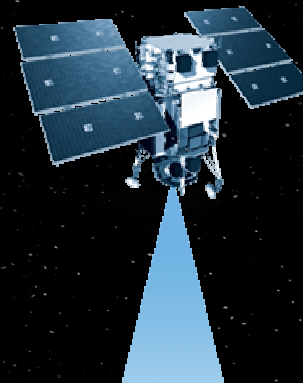
61 cm GSD
200,000 km² /day

GeoEye-1



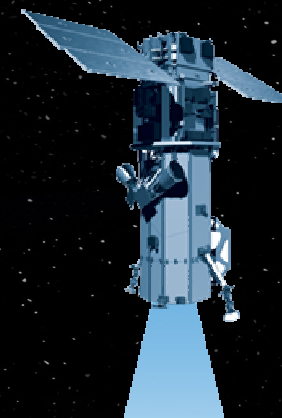
41 cm GSD
350,000 km² /day

WorldView-1



50 cm GSD
1,300,000 km² /day

WorldView-2



46 cm GSD
1,000,000 km² /day

WorldView-3



2014
30 cm GSD
680,000 km² /day

WorldView-3 Successfully Launched in Aug 2014!

Introducing the 1st multi-payload, super-spectral, high-resolution commercial satellite.



WorldView bus:
High-agility platform

Instrument:
Panchromatic + 8 Multispectral

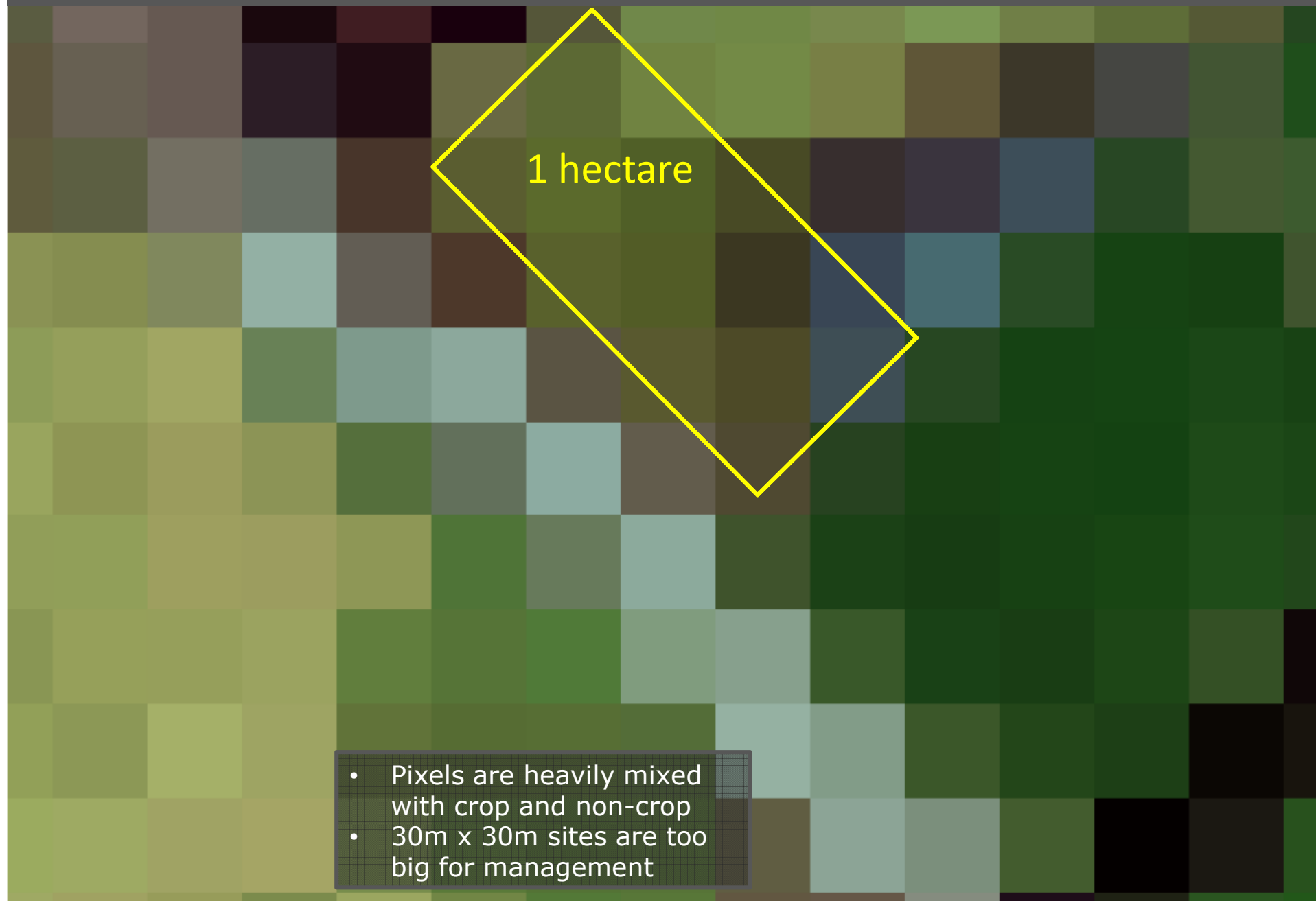
8 SWIR + 12 atmospheric correction bands (CAVIS)

Resolution:
.30 meter, < 3.5 m CE90



30 cm

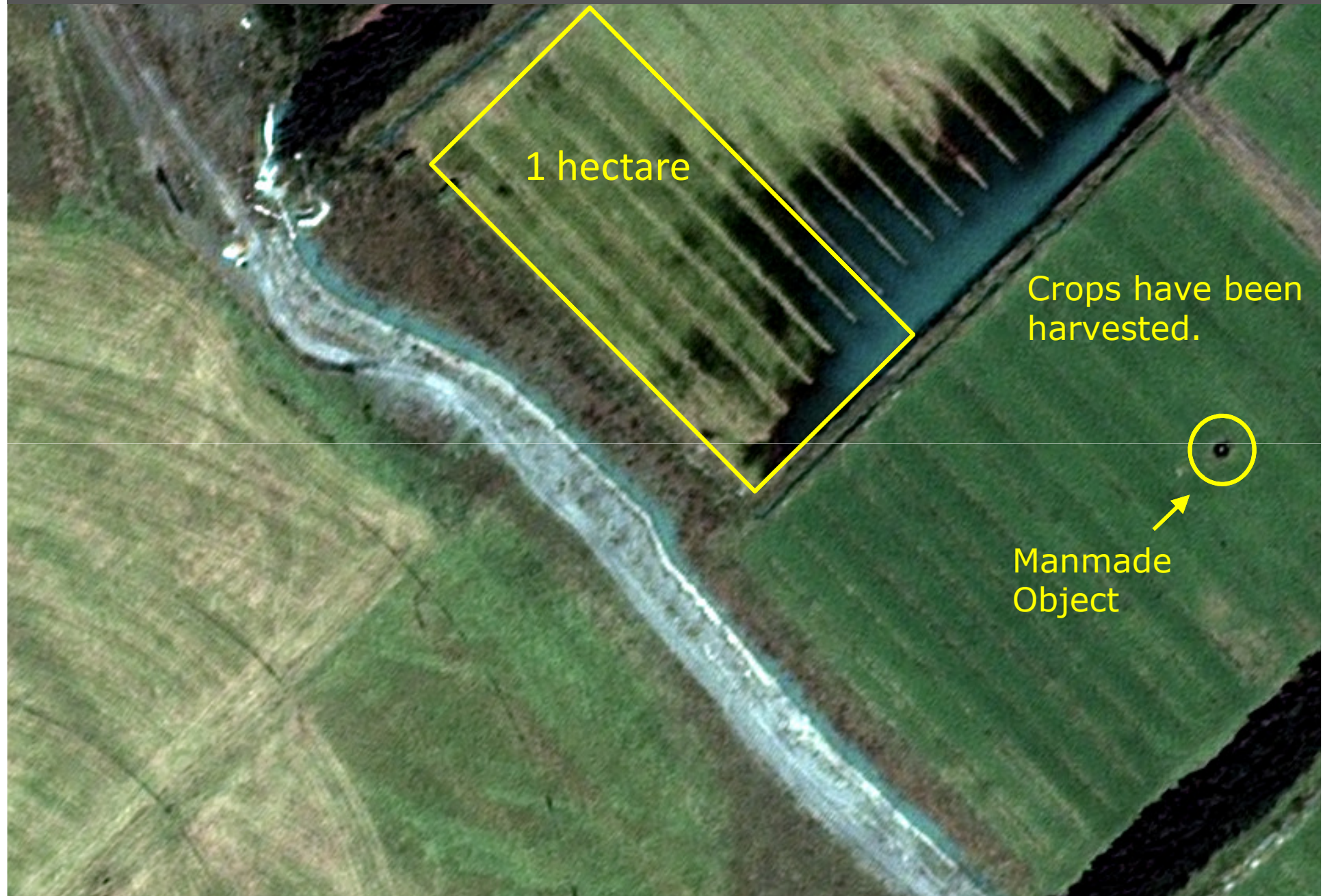
30m GSD of Rakaia River, New Zealand (a la Landsat MS)



6m GSD of Rakaia River, New Zealand (MR-HR)

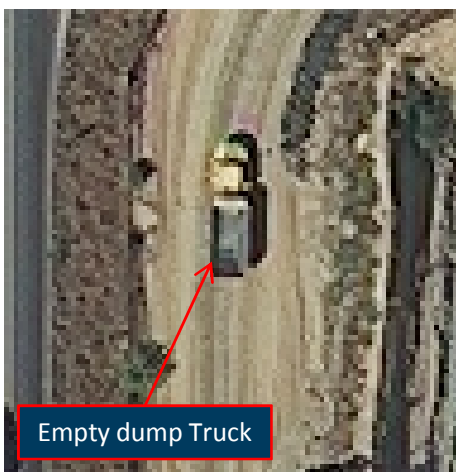
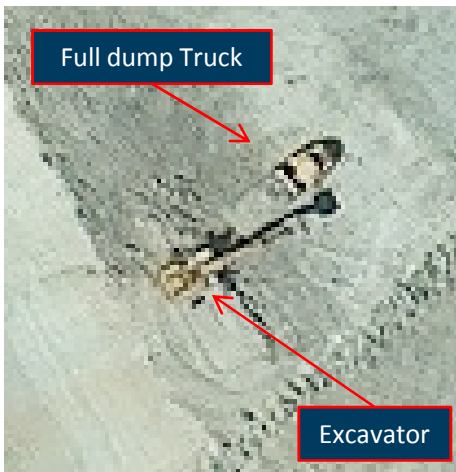


50cm GSD of Rakaia River, New Zealand (VHR, pan sharpened)



30cm imagery allows to discern airport features such as runway/apron conditions, and identify various signs.

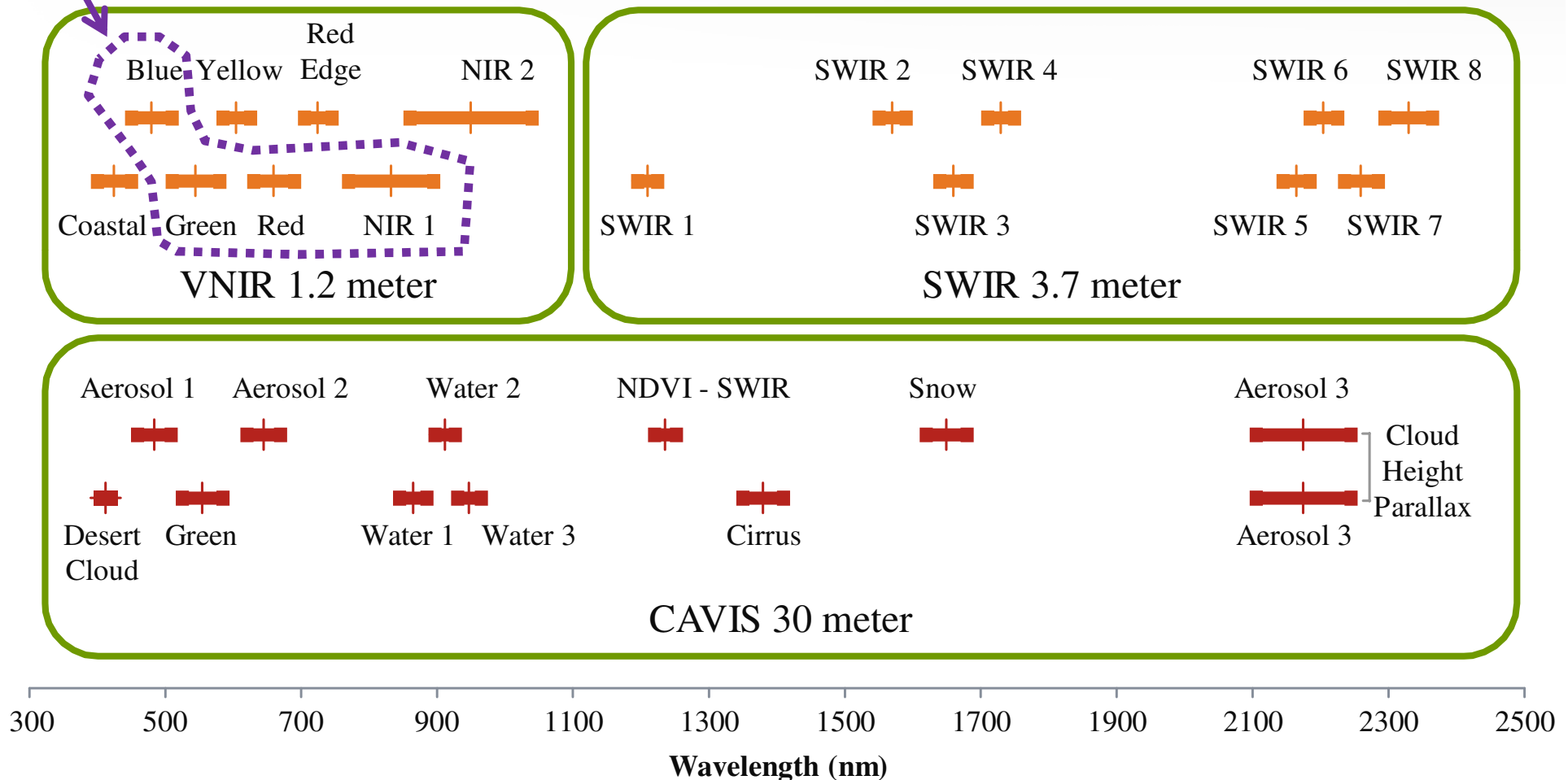
Notice the finer details of soccer fields, vents on roof tops, and road conditions.





WorldView-3 Bands: VNIR, SWIR and CAVIS

Most commercial imagers only have B, G, R, N1

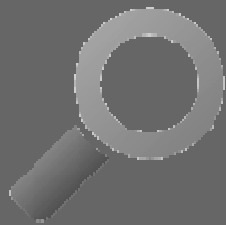


Commercial High Resolution Imagery Trends

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1st Era: Resolution

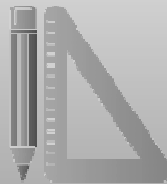
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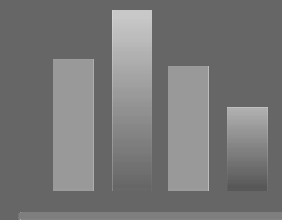
Reliance on imagery at an all-time high and customer priority becomes speed and relevancy



Near Real Time Download
Collaborative Information

4th Era: Analytics

New valuable problem-solving uses emerging and priority becomes measuring on surface and below water



Mapping
Predictive Insight



100m CE90

50m CE90

12m CE90

5m CE90

3.5m CE90

Detailed WorldView DSM Extraction Testing Results

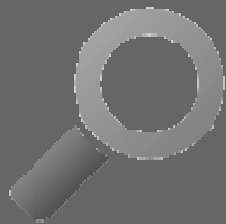
Test Area (250-300km ²)	Horizontal CE90 (m)	Vertical LE90 (m)
Dunedin, NZ (In-track, ID 101)	1.98	0.74
Dunedin, NZ (In-track, ID 105)	2.04	1.19
Cape Town, SA (X-track, ID 106)	2.34	1.34
Cape Town, SA (X-track, ID 107)	2.06	1.34
Longmont, CO (X-track)	2.54	1.11
Salt Lake City, UT (In-track)	2.89	1.33
Salt Lake City, UT (X-track)	2.35	0.99

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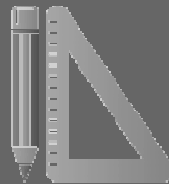
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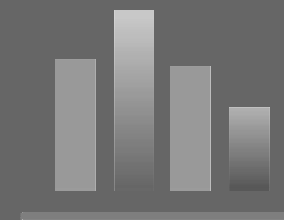
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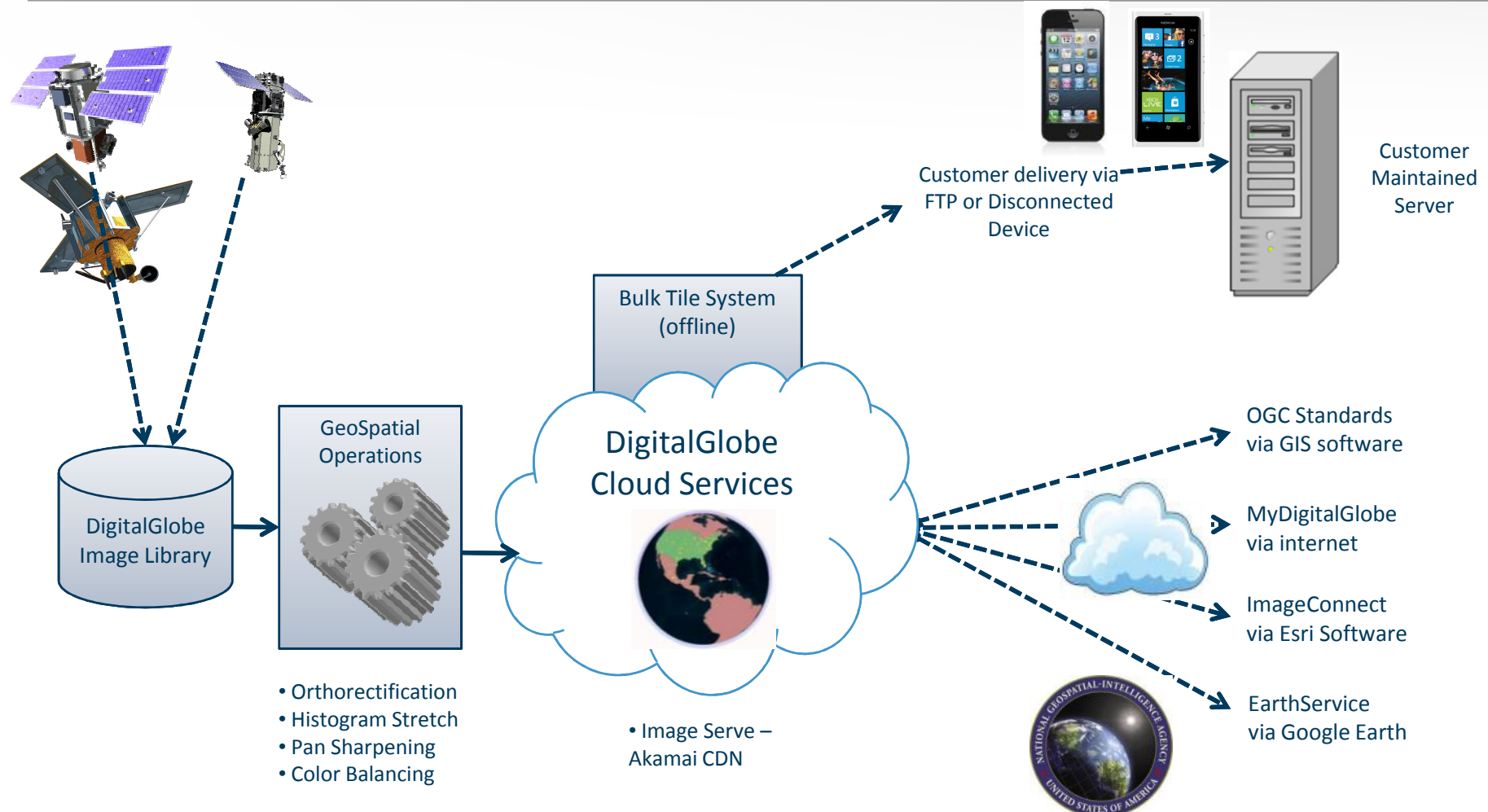
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Mapping
Predictive Insight

DigitalGlobe Cloud Service provides rapid access



My DigitalGlobe

https://services.digitalglobe.com/myDigitalGlobe/#13/25.1102/46.8536

Imagery Available My Imagery Map View Use With Supplemental Layers

Search by location name or coordinates...

Lat: 25° 5' 4.81"N - Lon: 46° 55' 41.16"E Grid Off

Layer Details

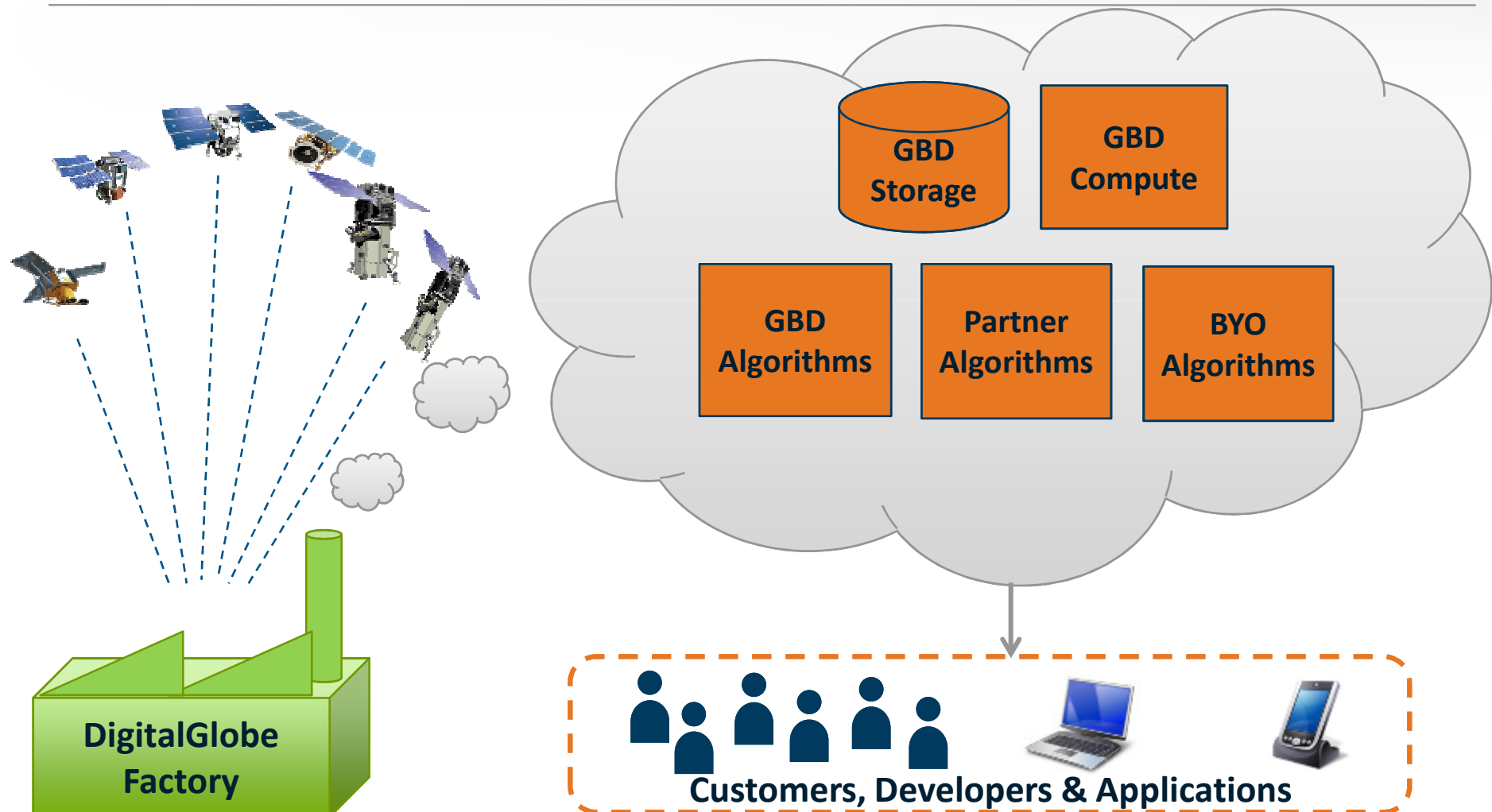
source	VV02
sourceUnit	Strip
sunAzimuth	166.3739
sunElevation	47.125736
offNadirAngle	21.805876
niirs	NA
dataLayer	country_coverage
isMosaic	false
isPreciseGeometry	true
assetName	FINISHED
legacyId	103001000F049AC0
factoryOrderNumber	053631405 30
perPixelX	0.5
perPixelY	-0.5
crsFromPixels	EPSG:32638
ageDays	1190
CE90Accuracy	8.4
RMSEAccuracy	3.91425908667288
ingestDate	2014-05-20 05:20:06 UTC

Close

With Selected...

Archive 2014-12-06 Archive 2014-12-06 Archive 2014-12-18 Archive 2014-12-18 Archive 2014-12-18 Archive 2014-12-18 2008-05-27 2010-07-14 2010-07-14 2010-07-14 2010-12-12 2010-12-12 2011-01-02 2011-02-27 2011-02-27

Geo Big Data Platform as a Service (PaaS)

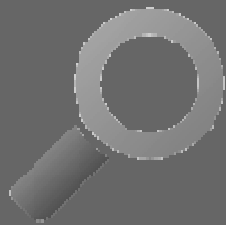


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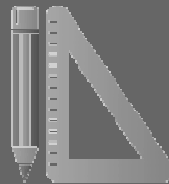
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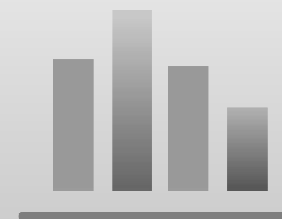
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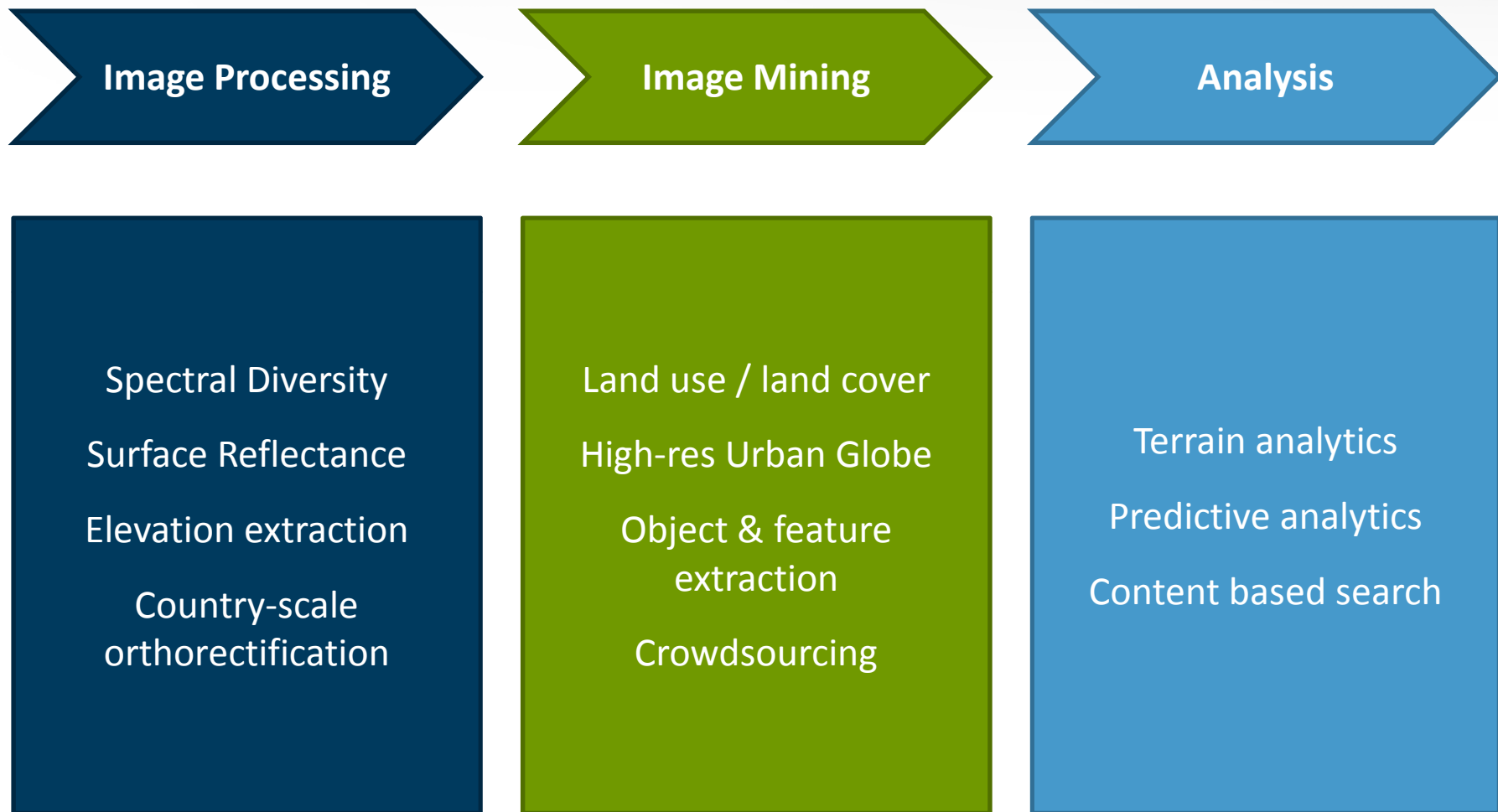
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Mapping
Predictive Insight

Key technologies enable us to use this imagery to create and exploit Geospatial Big Data



What color is this roof?





Tripoli. Libya

DigitalGlobe Basemap +Vivid provides unique ability to create a country wide mosaic

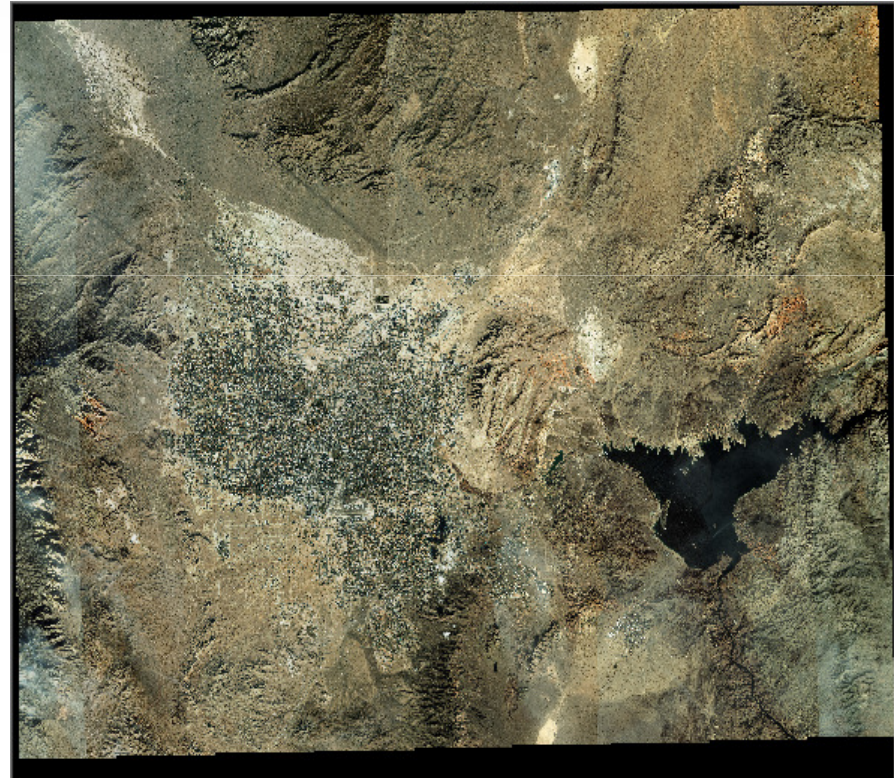


- Smart selection of imagery from the Archive
- Hidden seamlines
- Color and tonally balanced
- Optimized for consistency

Resulting high resolution mosaic is much more consistent than input “raw” images

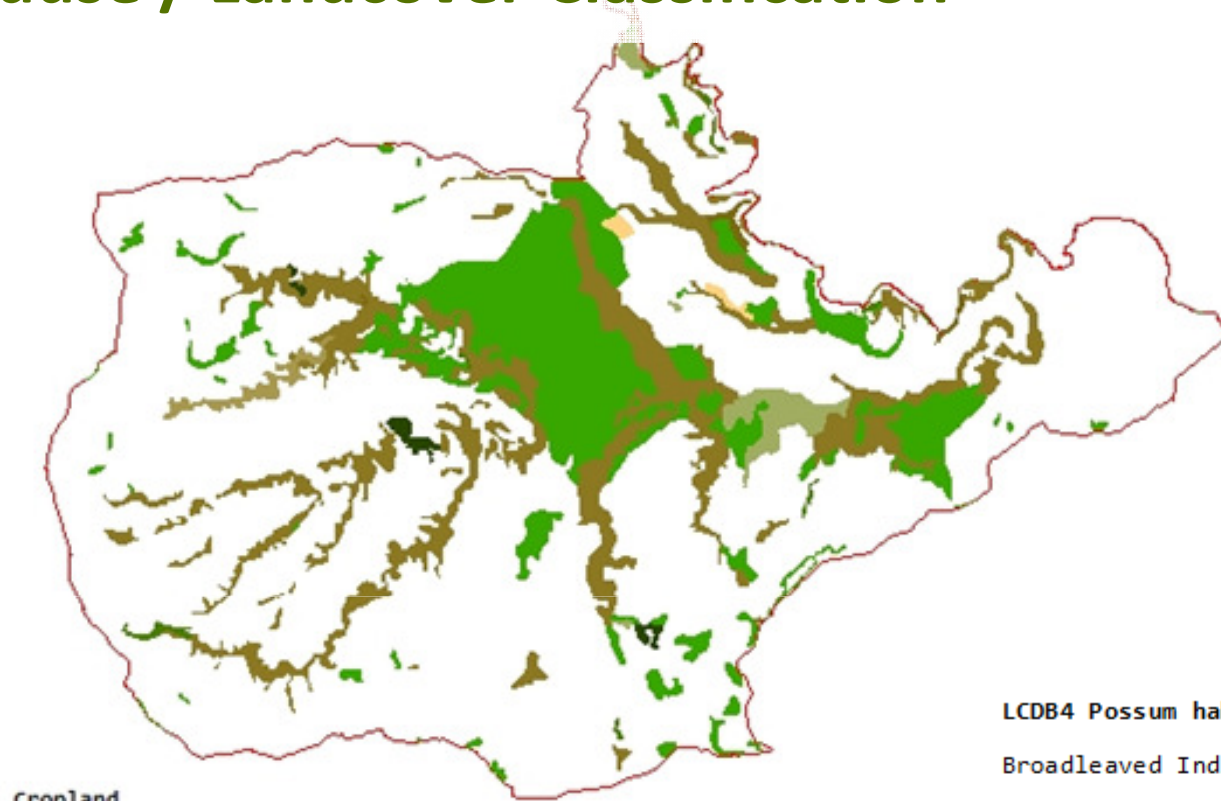


Before Radiometric Normalization



After

Landuse / Landcover Classification

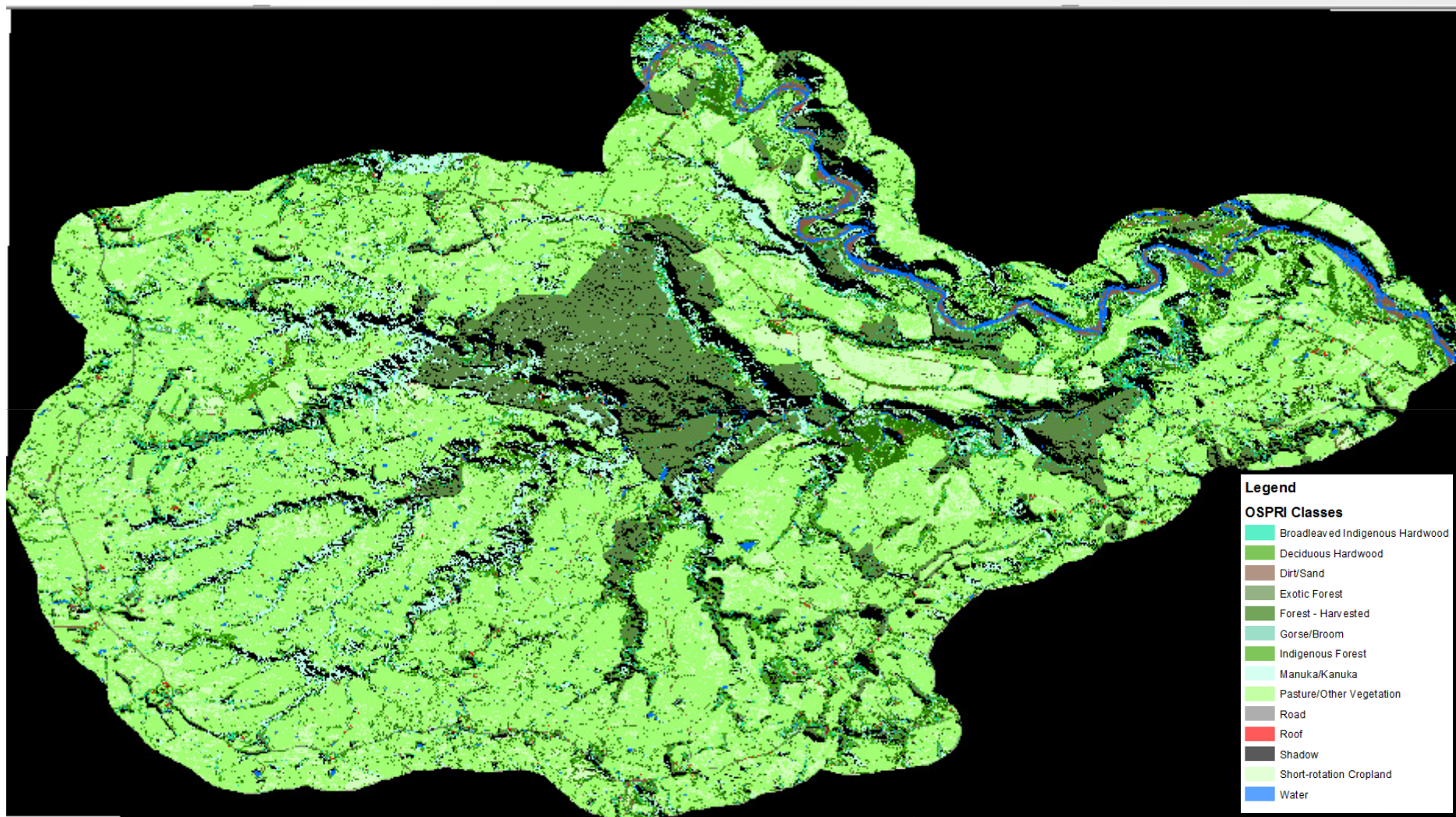


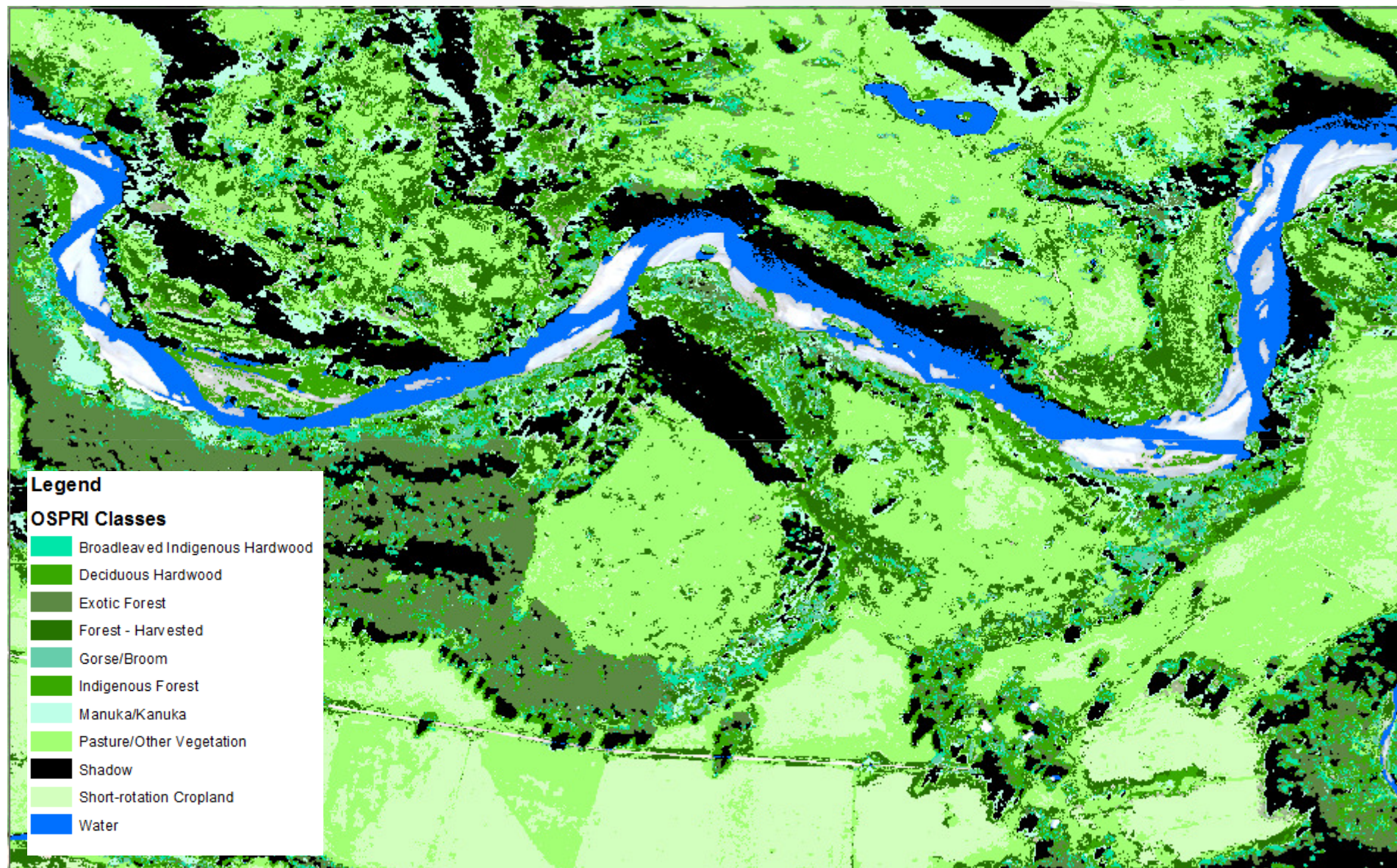
- Cropland**
- Short-rotation Cropland
- Scrub and Shrubland**
- Gorse and/or Broom
 - Manuka and/or Kanuka
 - Broadleaved Indigenous Hardwoods
- Forest**
- Forest - Harvested
 - Deciduous Hardwoods
 - Indigenous Forest
 - Exotic Forest

LCDB4 Possum habitat components

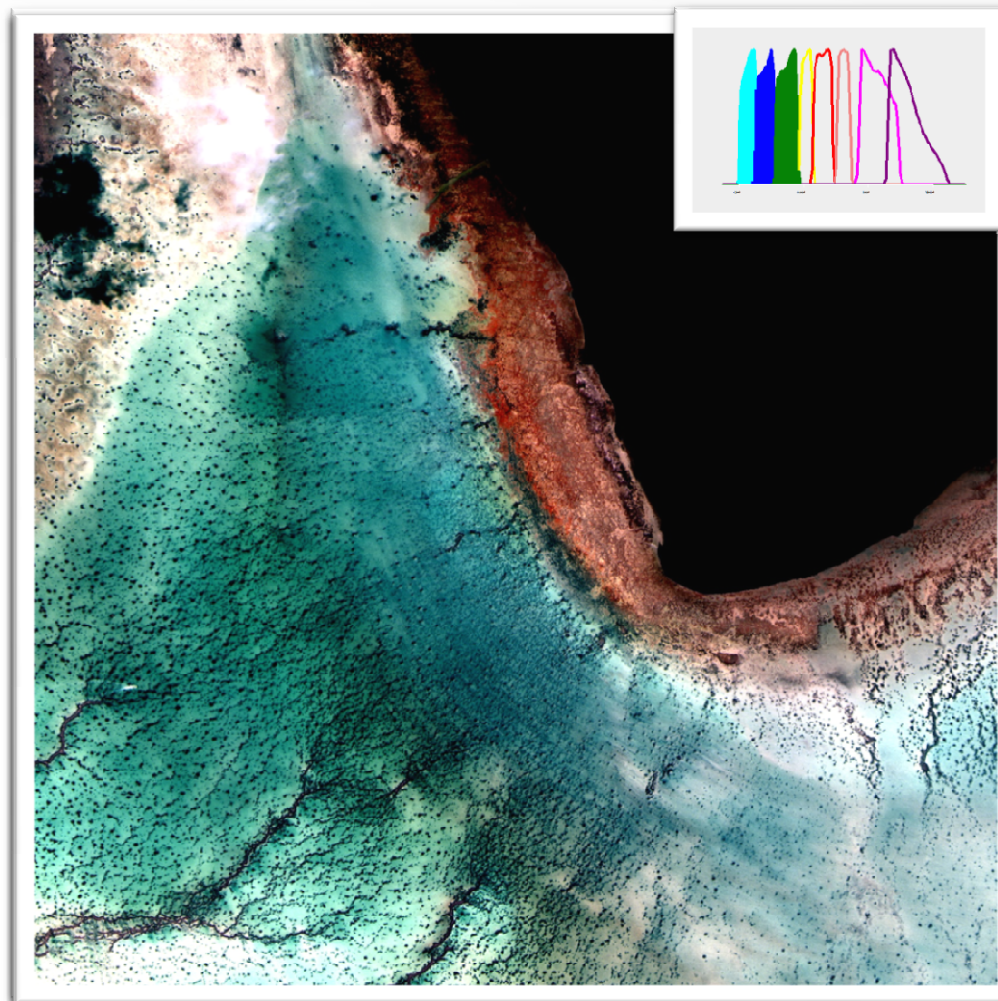
Broadleaved Indigenous Hardwoods:	30ha
Deciduous Hardwoods:	17ha
Exotic Forest:	788ha
Forest - Harvested:	69ha
Gorse and/or Broom:	15ha
Indigenous Forest:	19ha
Manuka and/or Kanuka:	787ha
Short-rotation Cropland:	11ha

Landuse / Landcover Classification



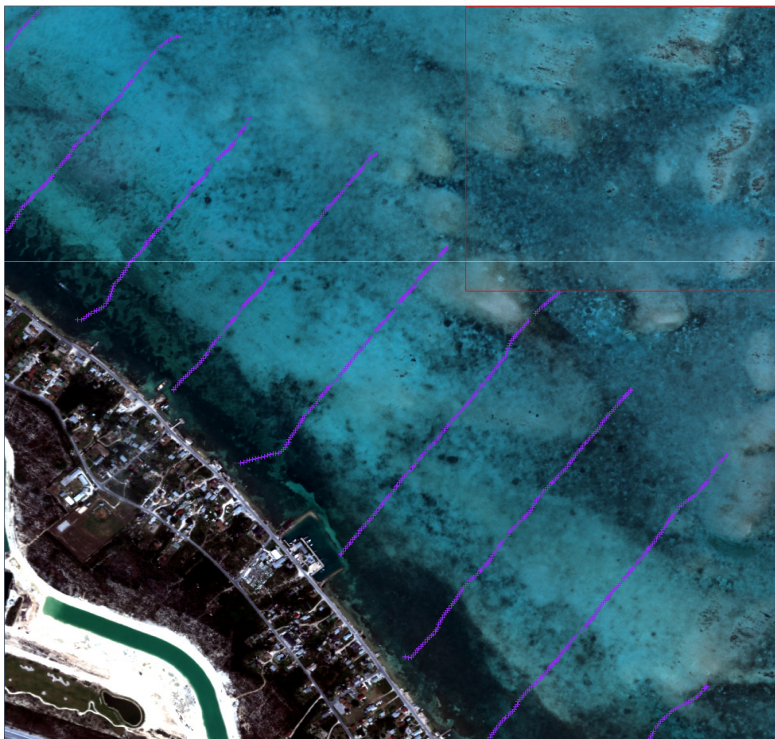


Increasing Spectral Resolution (8 VNIR Bands)

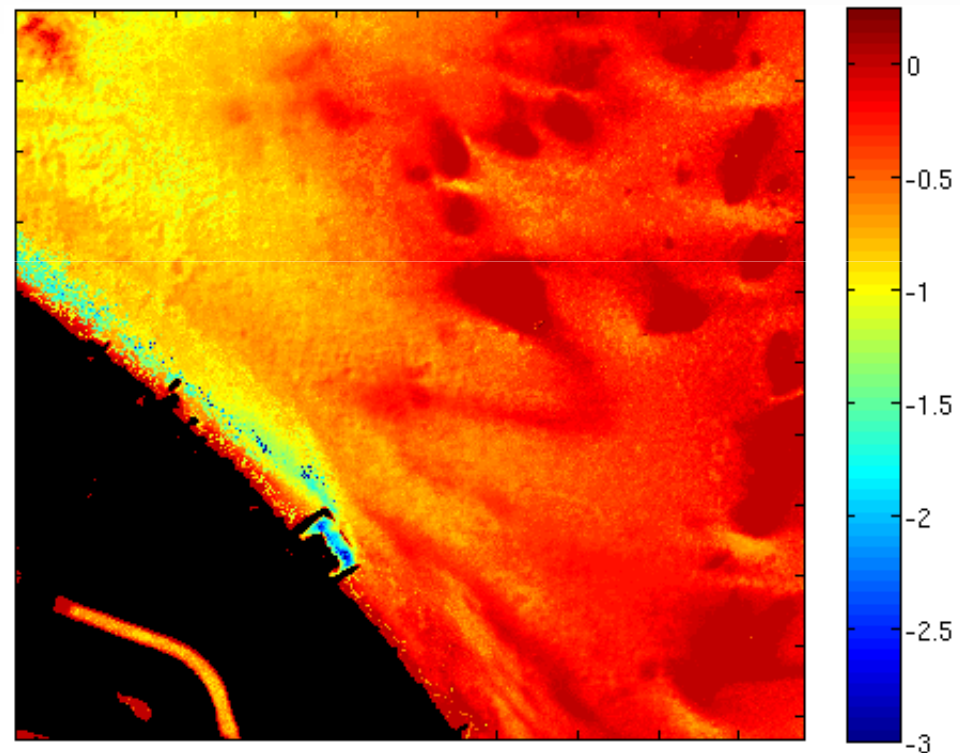


Enabling automated information extraction...

WV02 image overlaid with boat track (for validation)

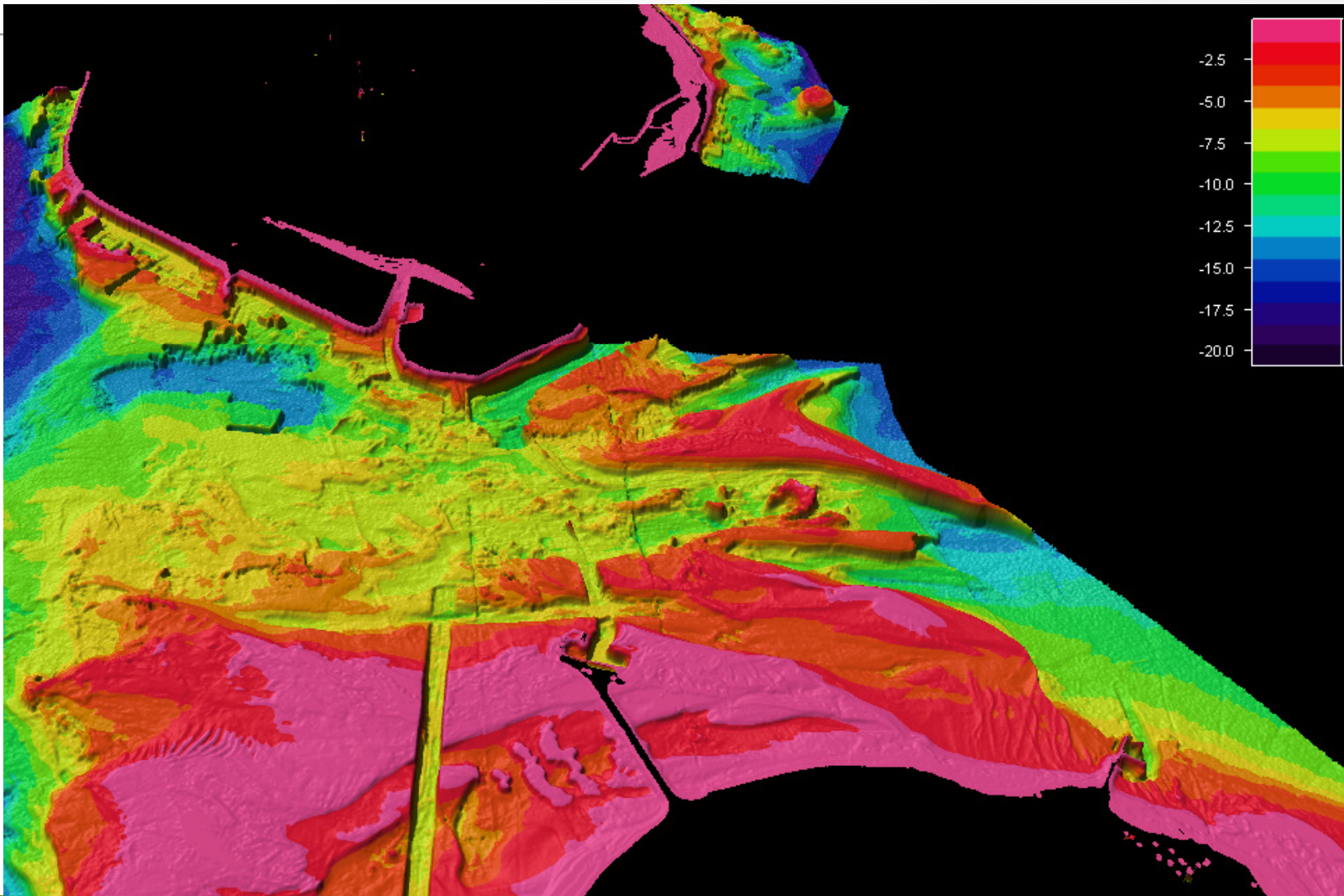


Bottom depth (m)



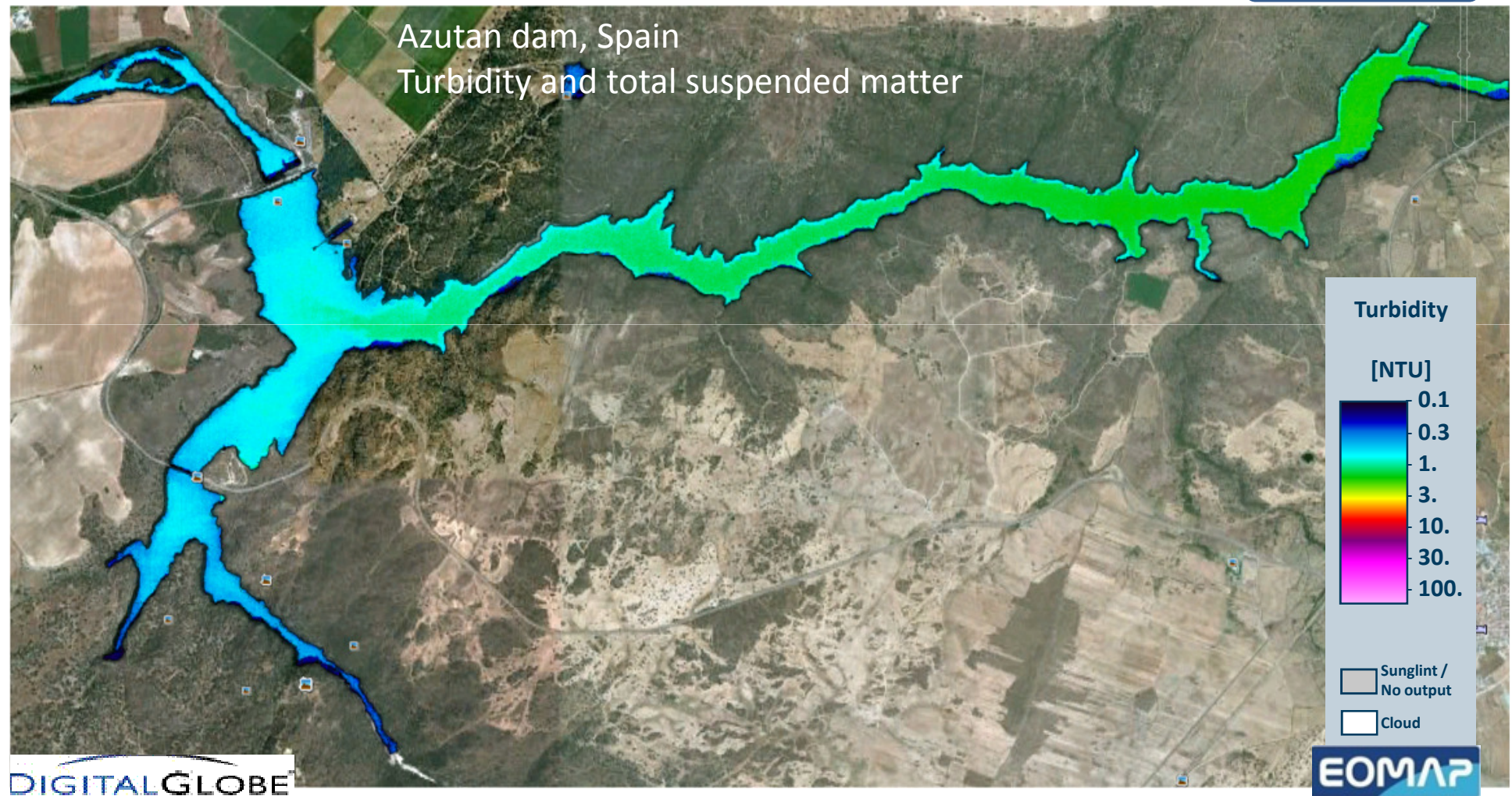
Imagery and benthic products are provided at 2x2m horizontal grid

Example of EOMAP Satellite-Derived Bathymetry, Sir Bani Yas Island, Abu Dhabi



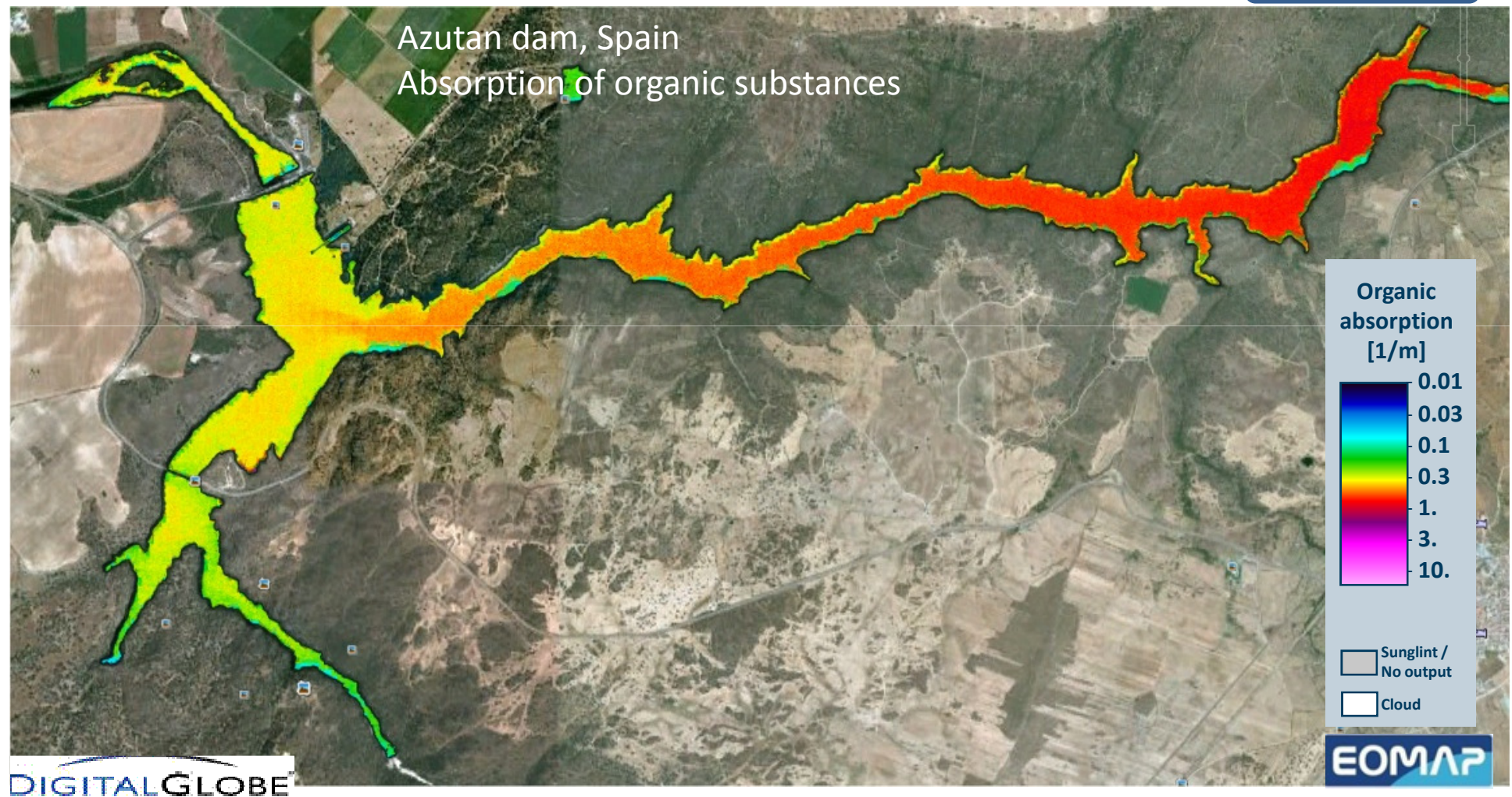
2-10m products: On demand provision of products for inland waters.

Spain

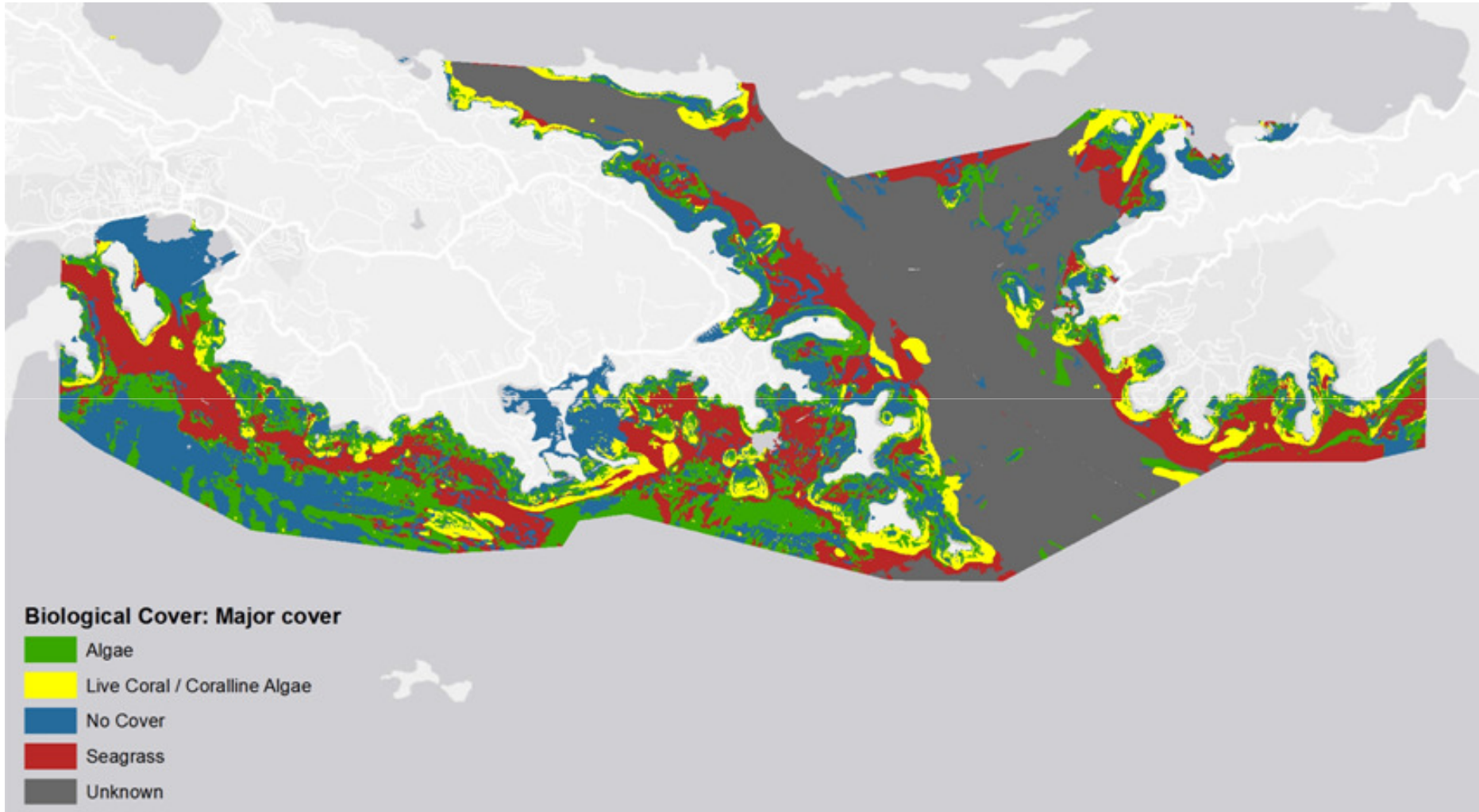


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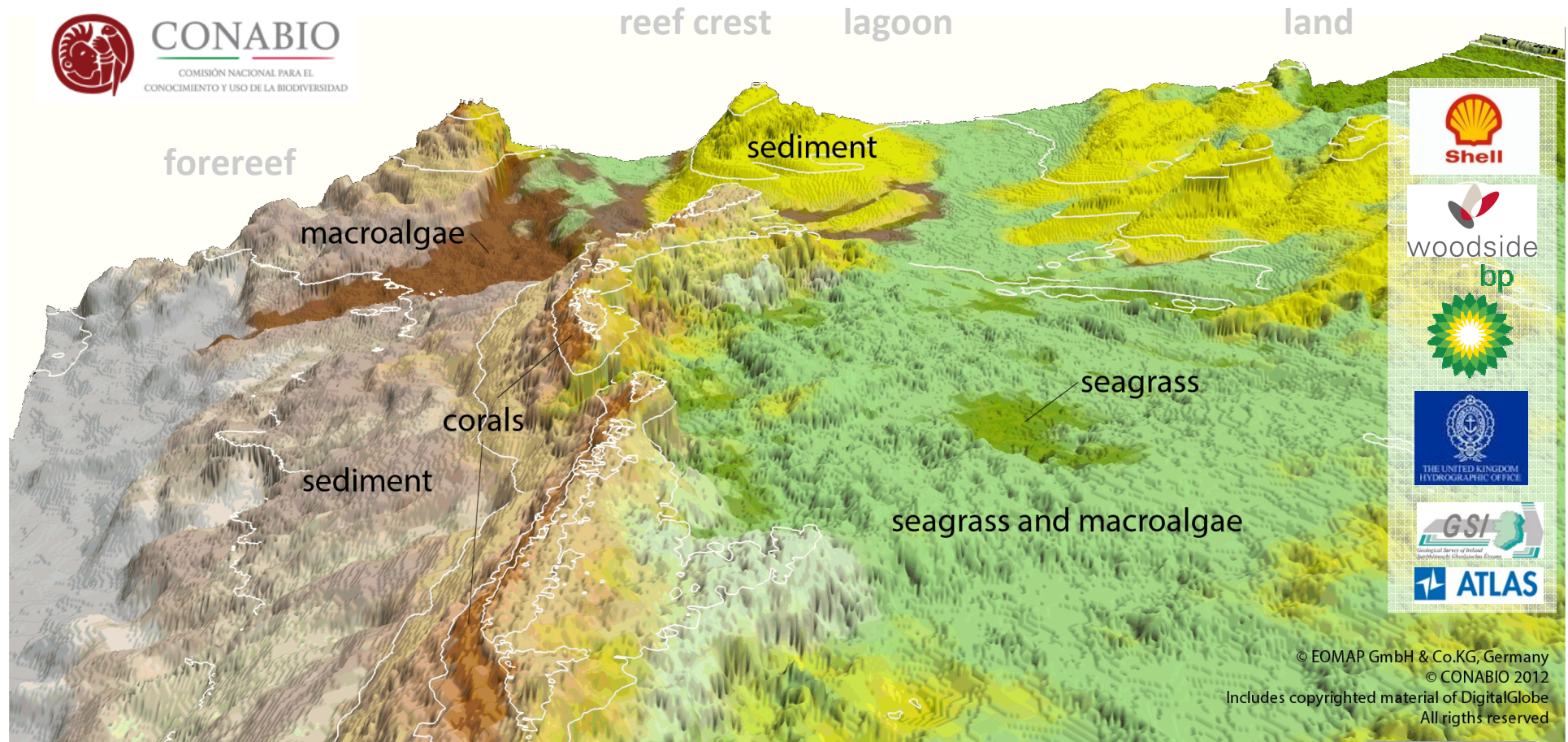
Spain



Example of EOMAP Benthic Habitat map U.S. Virgin Islands

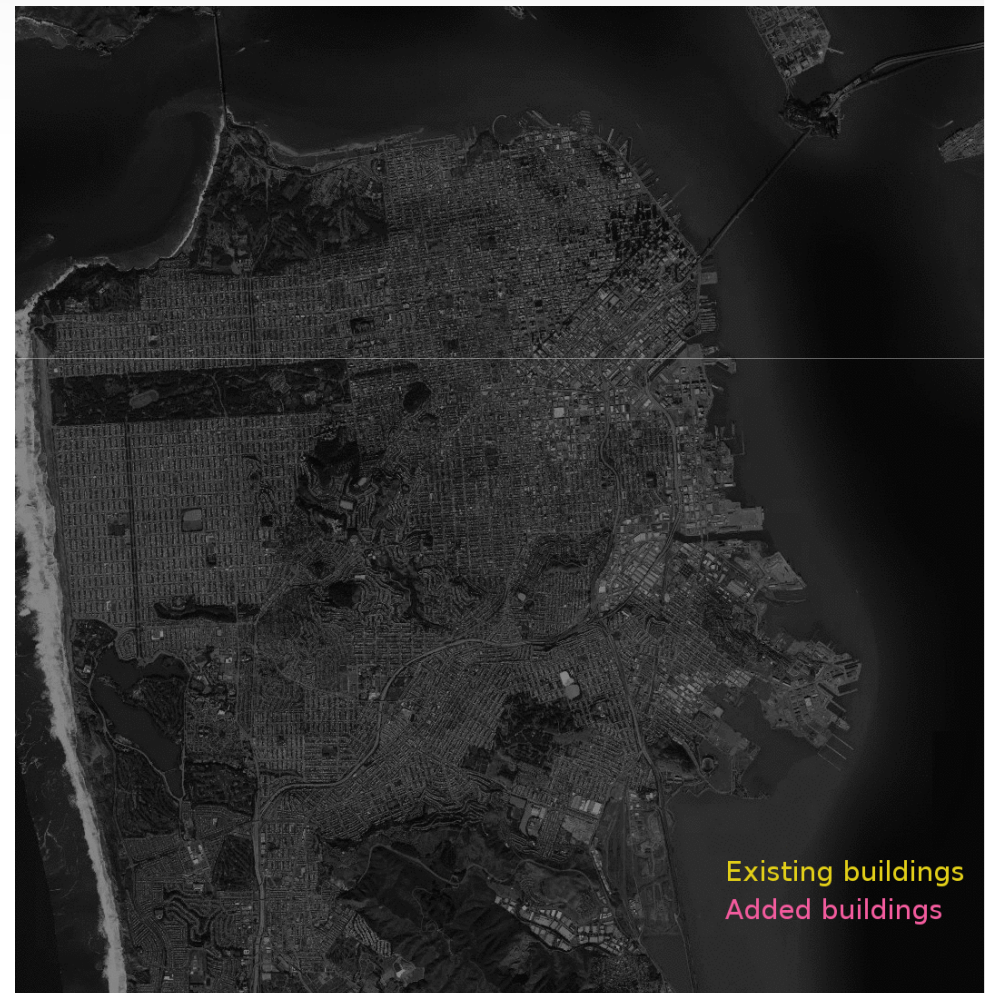


Example of EOMAP Benthic Habitat map, 2m Mexico, Riviera Maya coast mapping

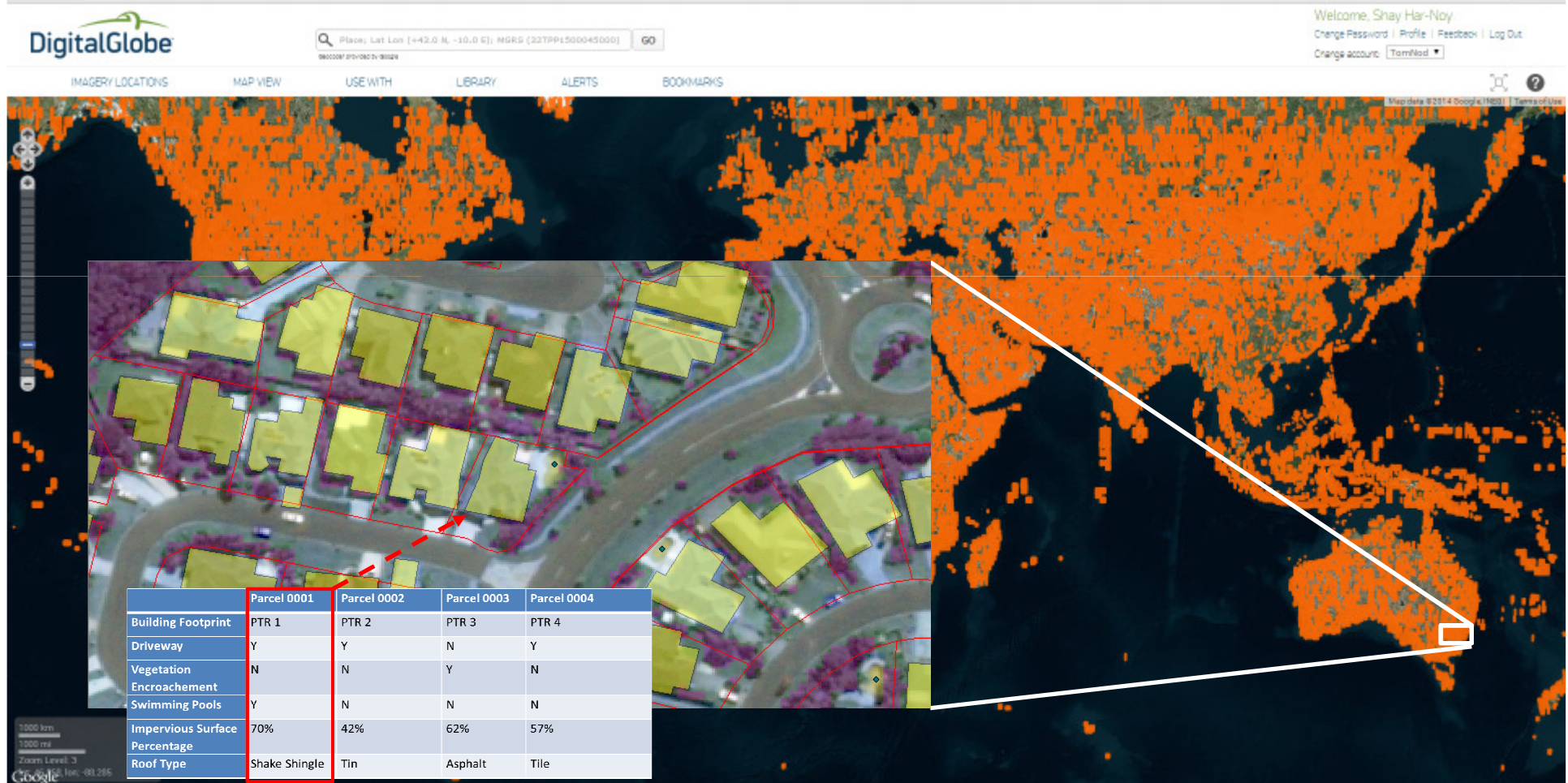


Vector extraction and Publishing

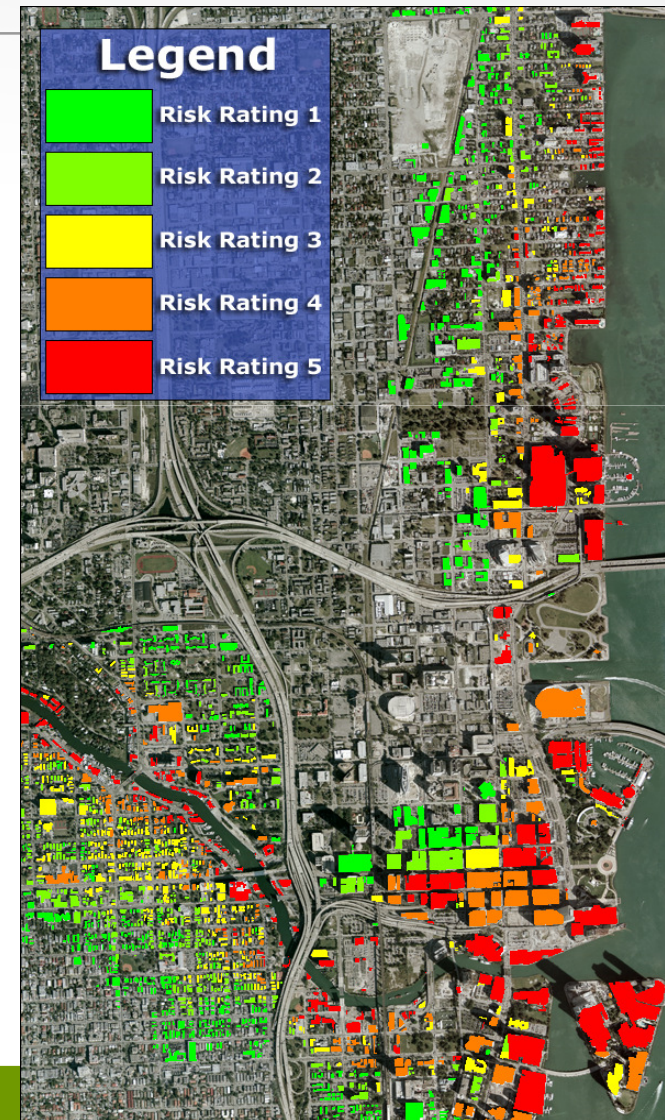
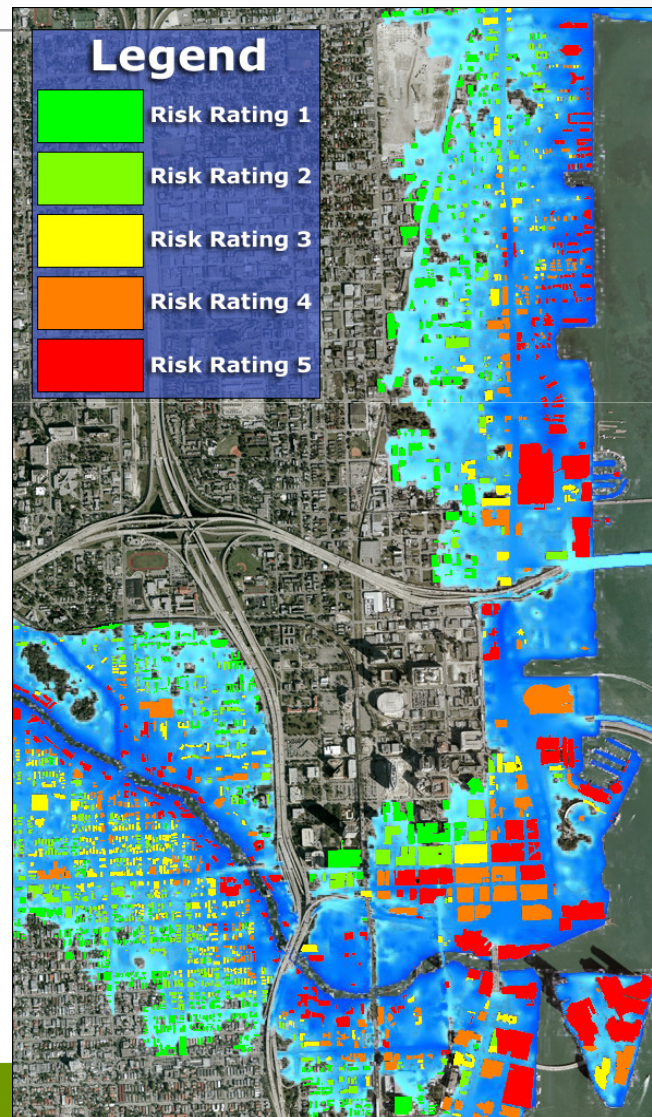
- Service that identifies features in imagery and extracts vectors and polygons
- Automated and manual labor



Build Insurance Information Layers Neighborhood Scale View



Insurance Risk Modelling



Summary

- Archives
 - DigitalGlobe Archive is 6+ Billion Sq Km and Growing at 2.5 Million Sq Km/Day
- Mapping
 - 2D -> 3D -> 4D
- Leveraging the scale of machines and human accuracies

