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# MONITORING PROGRAMS FOR AGRICULTURE

JECAM/GEOGLAM Science Meeting  
Ottawa, Canada  
21 – 23 July 2014

Andrew Pylypchuk | Regional Manager, North America



## Outline:

- RapidEye Constellation
- Commercial Monitoring Program
- Data for JECAM/GEOGLAM



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# RAPIDEYE CONSTELLATION

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Joint Experiment for Crop Assessment and Monitoring



# SUMMARY OF MISSION



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## **Five-Satellite Constellation**

Enables daily revisit capability

## **Broad Area Collection**

77 km wide sensor swath ideal for large area monitoring and mapping

## **Superior Revisit**

Frequent revisit enables large area change detection and monitoring

## **High-Resolution Imaging**

5 meter resolution imagery

## **Multispectral Imaging**

5 spectral bands for improved vegetation analysis

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# RAPIDEYE SATELLITES



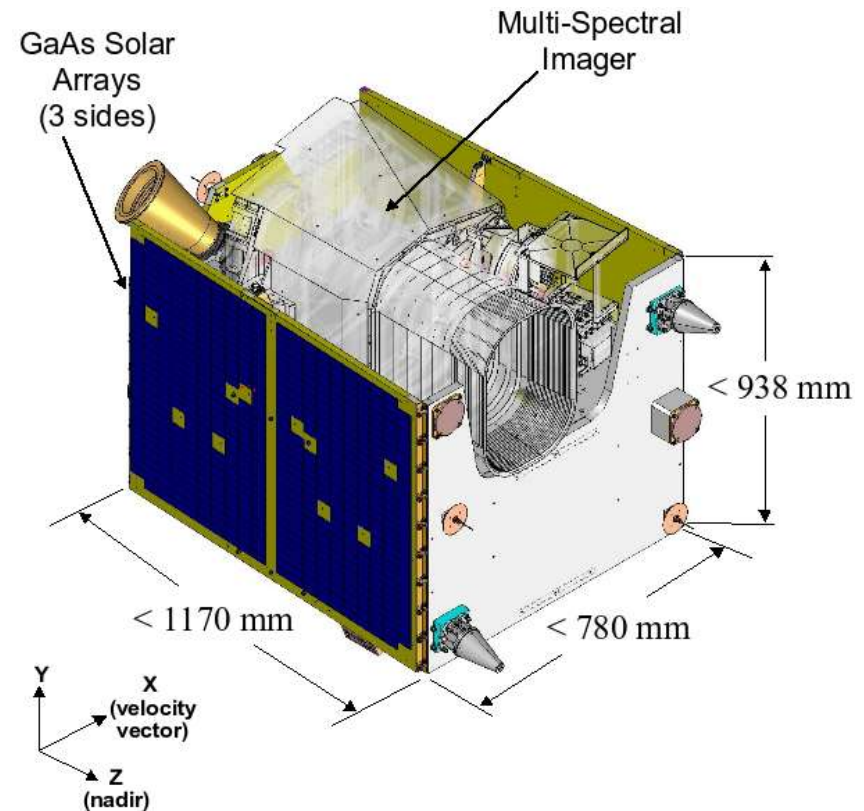
## Spacecraft Mass

Bus: 112.9 kg  
Payload: 43.5 kg  
Total: 156.4 kg

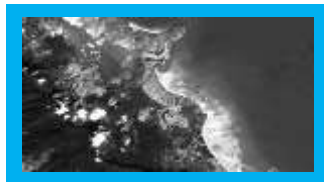
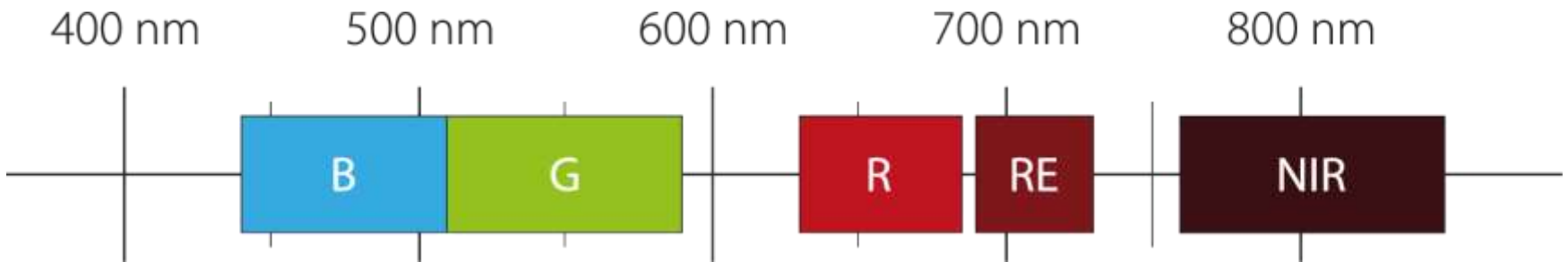
Lifetime: Beyond year 2020

## Manufacturer

Bus:  
Surrey Satellite Technology Limited (SSTL) / England  
Payload:  
Jena-Optronik GmbH / Germany



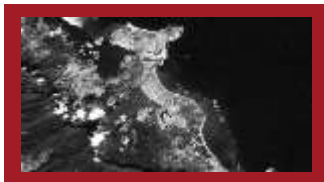
# RAPIDEYE MULTISPECTRAL BANDS



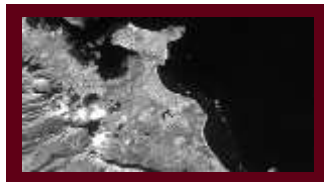
440 – 510 nm



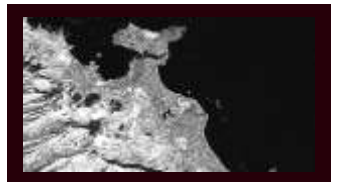
520 – 590 nm



630 – 685 nm



690 – 730 nm



760 – 850 nm

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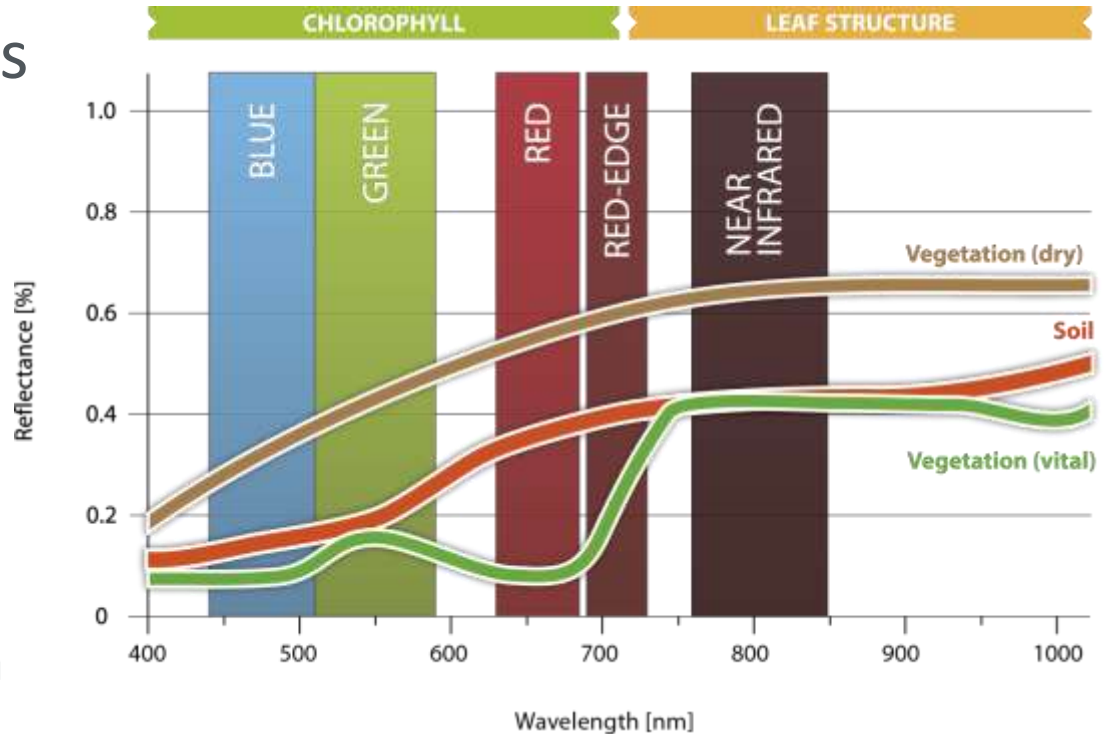
# RED-EDGE BAND



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The Red-Edge band is used to:

- monitor vegetation health
- improve species separation
- measure chlorophyll, protein, and nitrogen content



## JECAM

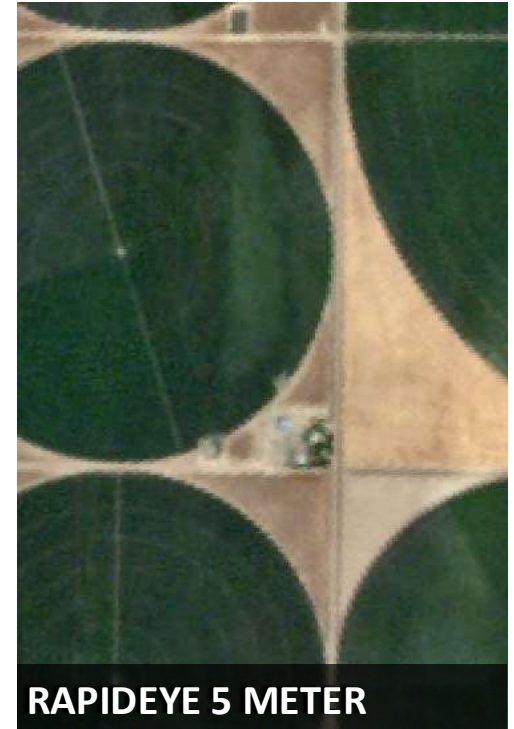
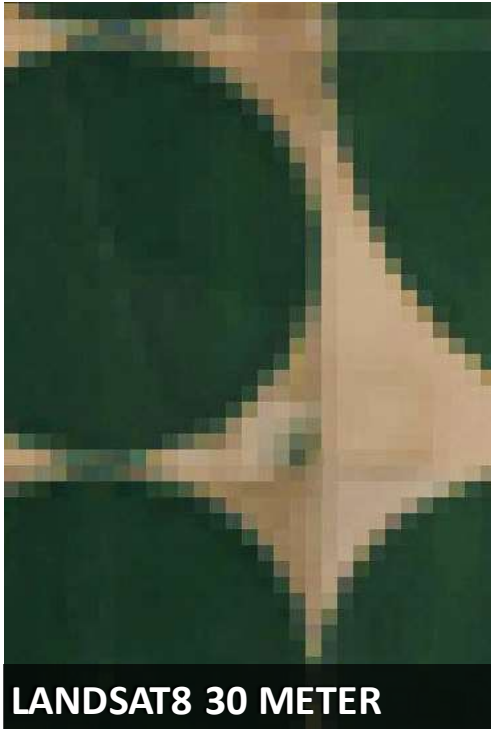
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# RESOLUTION



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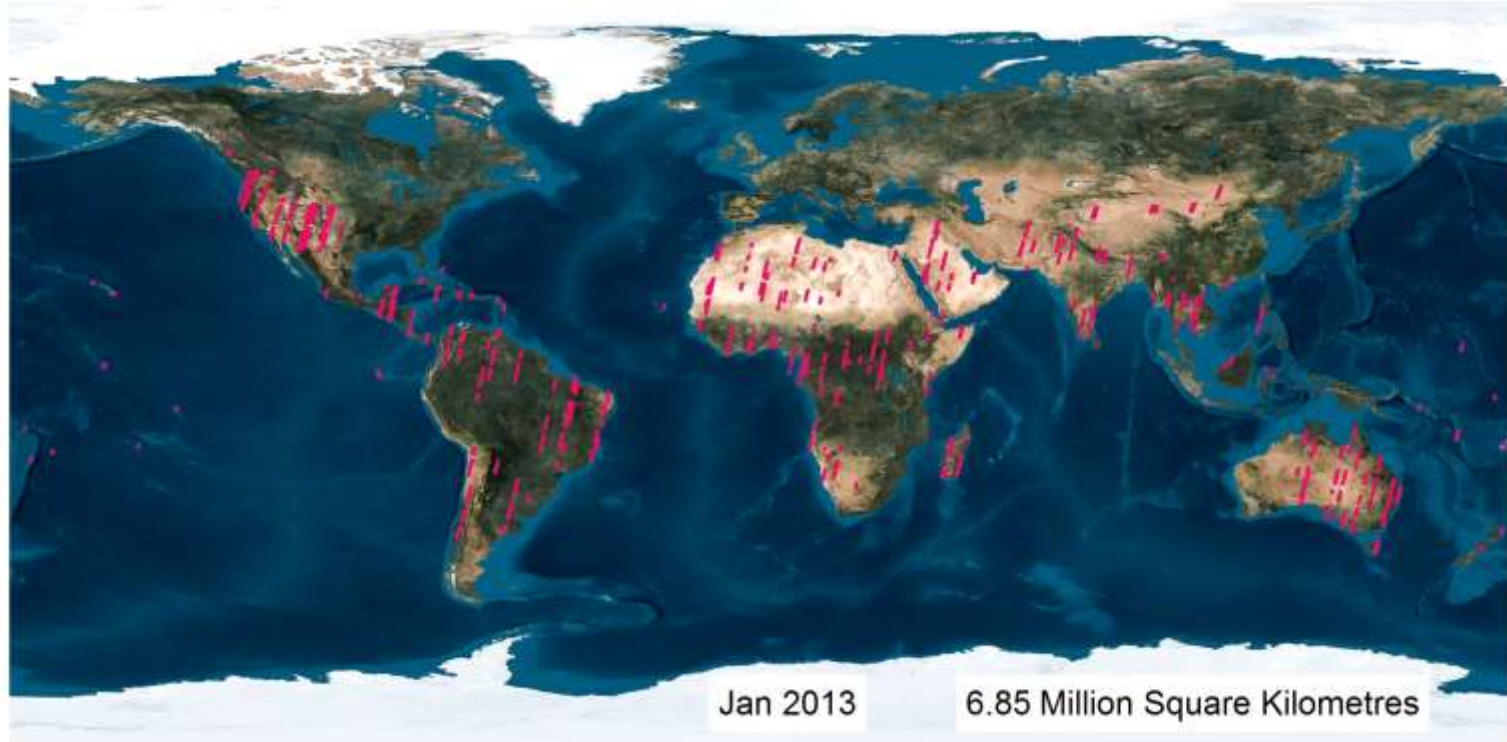
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# 2013 COLLECTION



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# RapidEye+



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# MONITORING PROGRAMS FOR AGRICULTURE

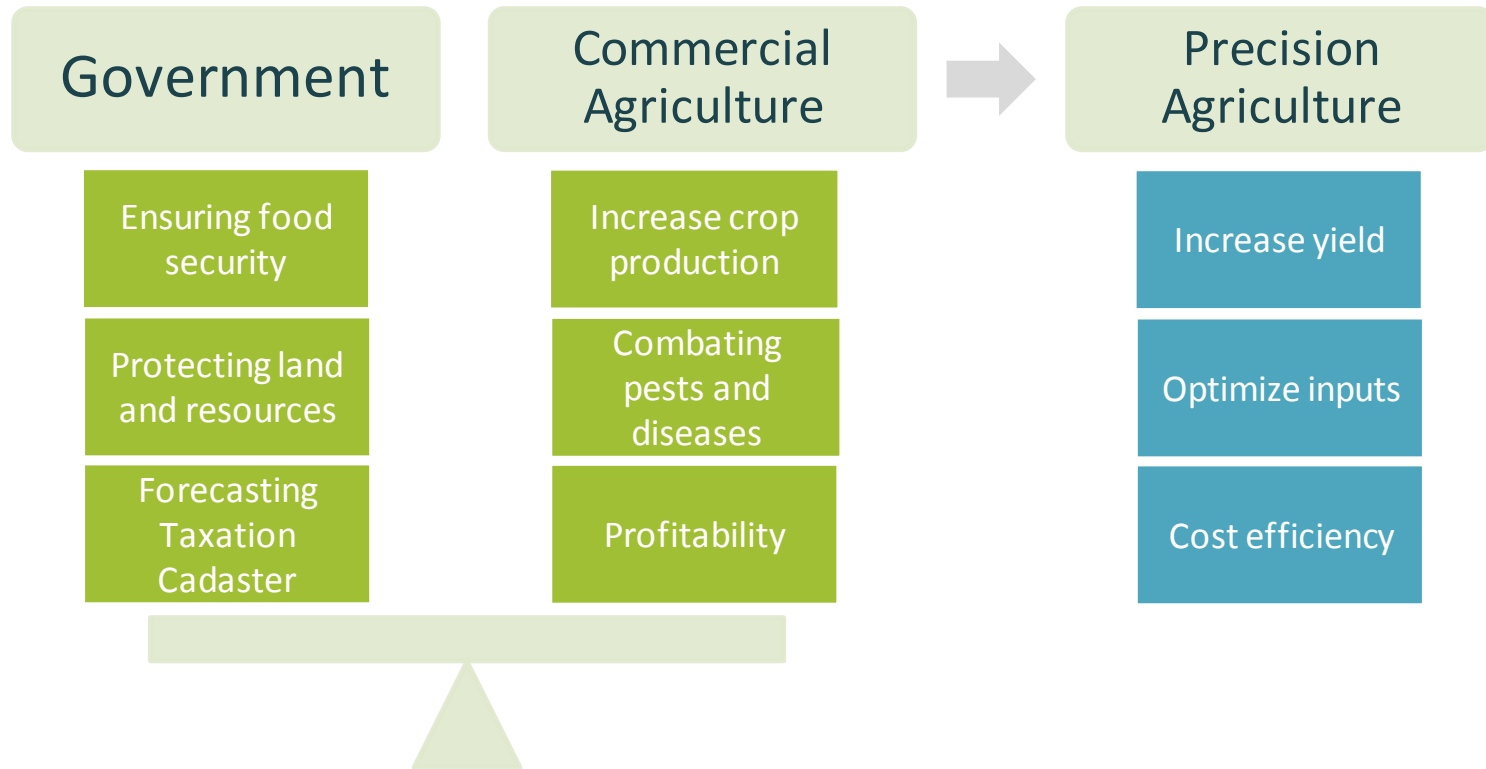
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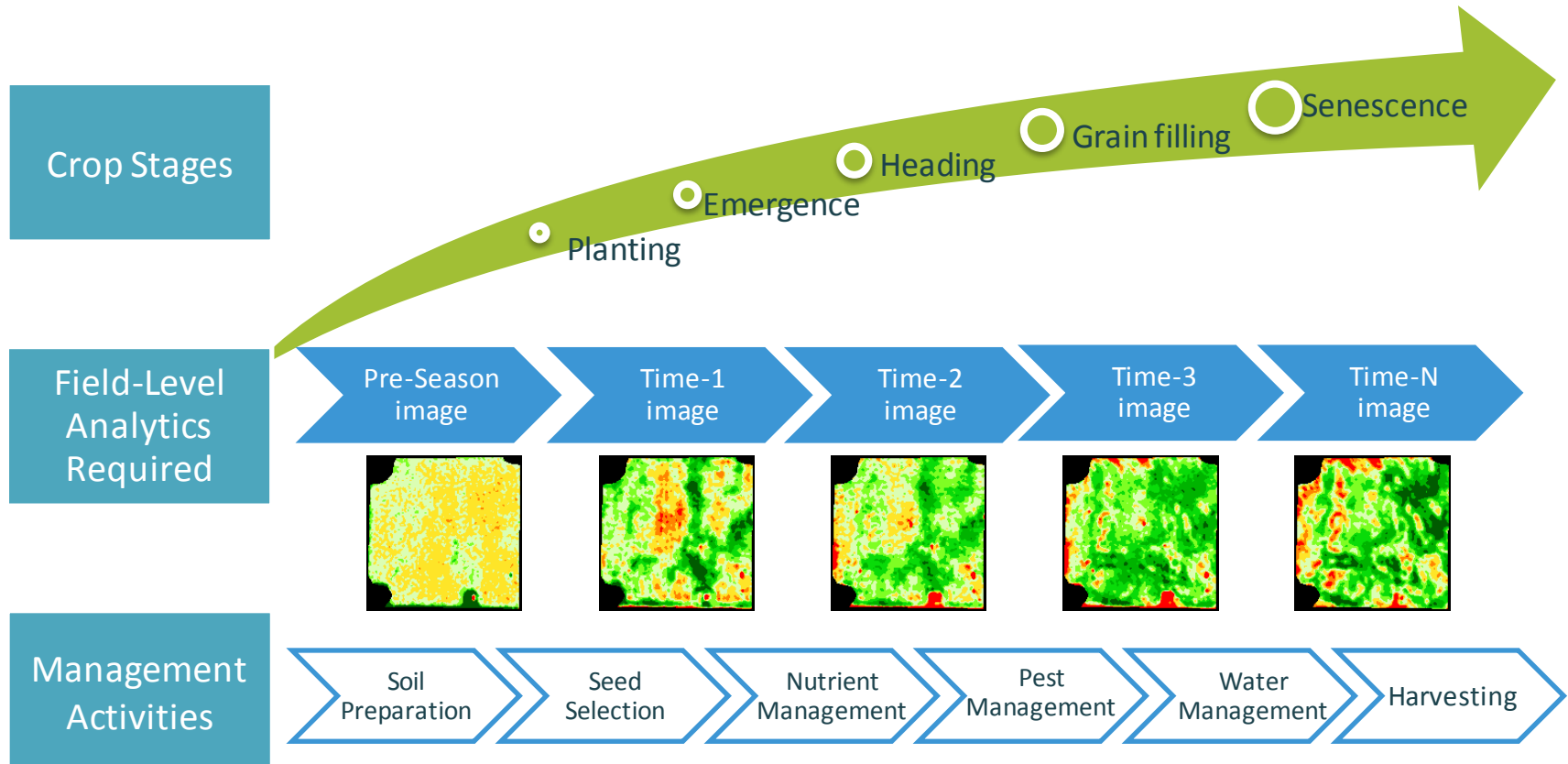


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# NEEDS OF AGRICULTURE



# CROP GROWTH CYCLE



# MONITORING PROGRAMS FOR AGRICULTURE



## IMAGE COLLECTION

- + Target Area (AOI)
- + Critical Times (TOI)
- + Archive Images



## ORTHO PRODUCT

- + 5 Spectral Bands
- + 5 m Pixel Size
- + <10 m RMSE



## CATALOG & DELIVERY

- + Cloud-based
- + Quick Delivery
- + EyeFind / API
- + 3<sup>rd</sup> Party Data



## BUSINESS MODEL

- + Subscription Options
- + Price Options
- + Sales Model

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# 2013 NORTH AMERICA PROGRAM EXAMPLE

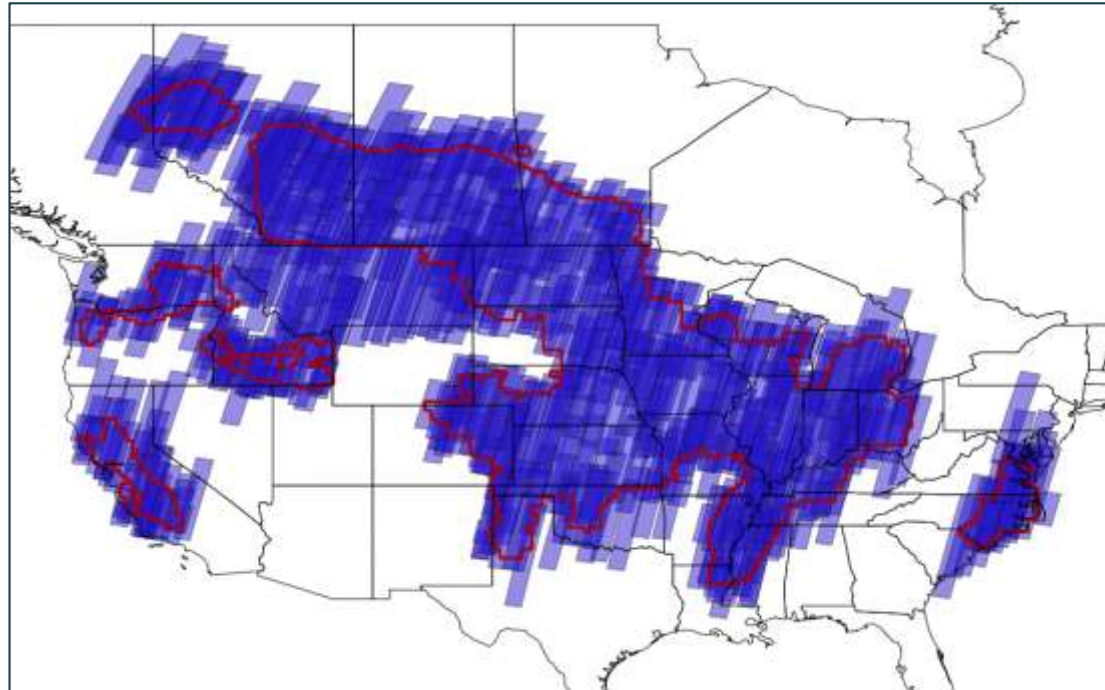


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3 million km<sup>2</sup> AOI

4 TOIs (monthly)

Commitment:  
20% clouds or less



TOI-4: RapidEye collections in 30 days (15-Aug to 14-Sep 2013)

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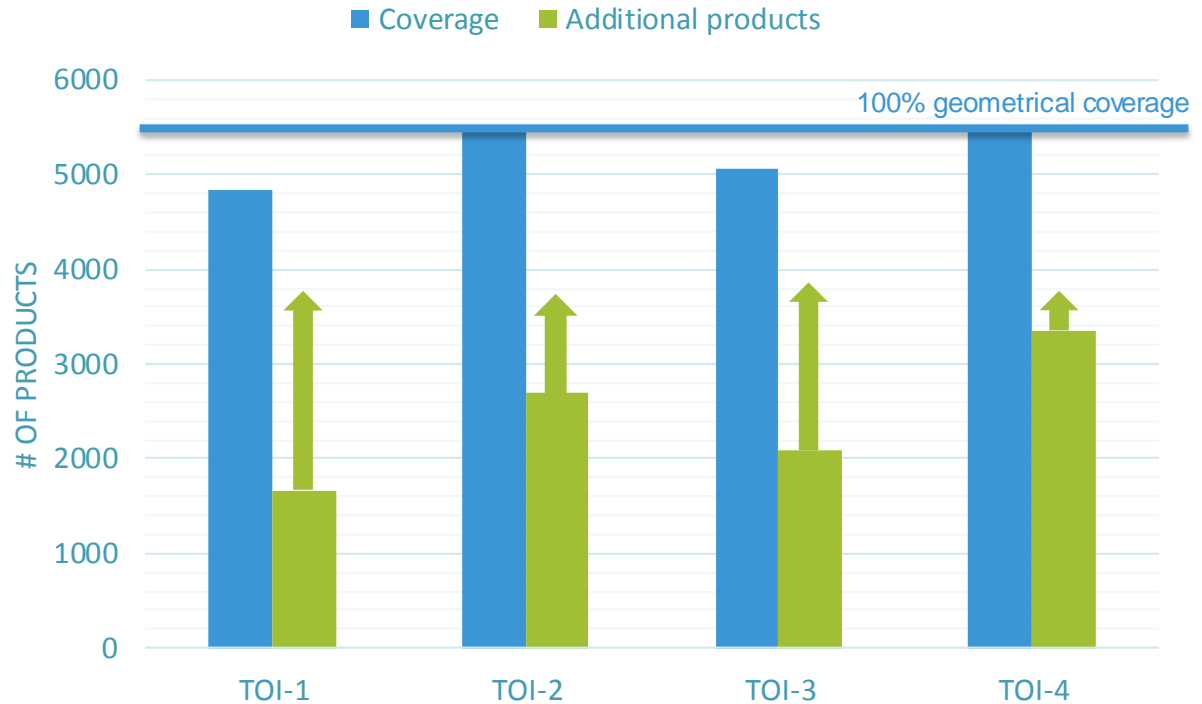
# 2013 NORTH AMERICA PROGRAM EXAMPLE



~90%  
cloud-free

72%  
collected at <math><10^\circ</math>  
viewing angle

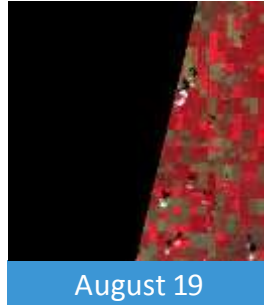
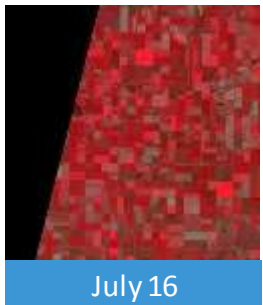
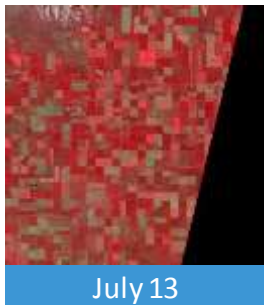
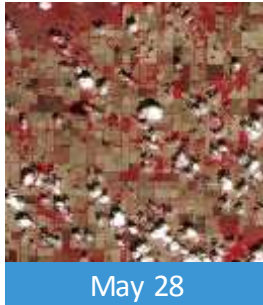
Delivery time  
~24 hours after  
acquisition



# 2013 NORTH AMERICA PROGRAM EXAMPLE



Multi-date  
tile delivery  
within TOI



RapidEye time series 2013, Gettysburg, South Dakota, USA

# DELIVERY BY WEB



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EyeFind-Ag

Intuitive search and  
download

The screenshot displays the EyeFind-Ag web application interface. At the top, there is a navigation bar with the 'EyeFind Agriculture' logo and the BlackBridge logo. Below the navigation bar, there is a search bar and a menu with options like 'Session', 'Query', 'Resultset', 'Layer', 'Help', and 'About/Print'. The main content area is divided into several sections:

- Image List:** A table showing search results with columns for 'Image', 'Acquired At', 'Catalogue ID', 'Clouds', and 'Block'. The table contains several rows of image thumbnails and their corresponding metadata.
- Additional Image Information:** Two panels showing detailed metadata for selected images. The first panel shows information for Catalogue ID: 13295609, Product ID: 1055726\_2013-07-15\_RE4\_34, Tile ID: 1055726, Order ID: 165065, Contract ID: GDNAMAG13US-CAL, Space Craft ID: RE-4, Continent: North America, and Country: United States. The second panel shows information for Catalogue ID: 13035973, Product ID: 1055726\_2013-06-15\_RE3\_34, Tile ID: 1055726, Order ID: 163771, Contract ID: GDNAMAG13US-CAL, Space Craft ID: RE-3, Continent: North America, Country: United States, Administration: California, Unit, UTM Zone: 10, UTM Row: 557, UTM Column: 26, and Acquisition: 2013-06-15T19:41:48.198Z.
- Map:** A satellite map showing the location of the selected images. A red dot on the map indicates the location of the selected image. The map includes labels for various states and countries, such as Texas, Georgia, Florida, and Cuba.

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# DELIVERY BY WEB



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## Search API

Automated query and  
retrieval of new  
imagery

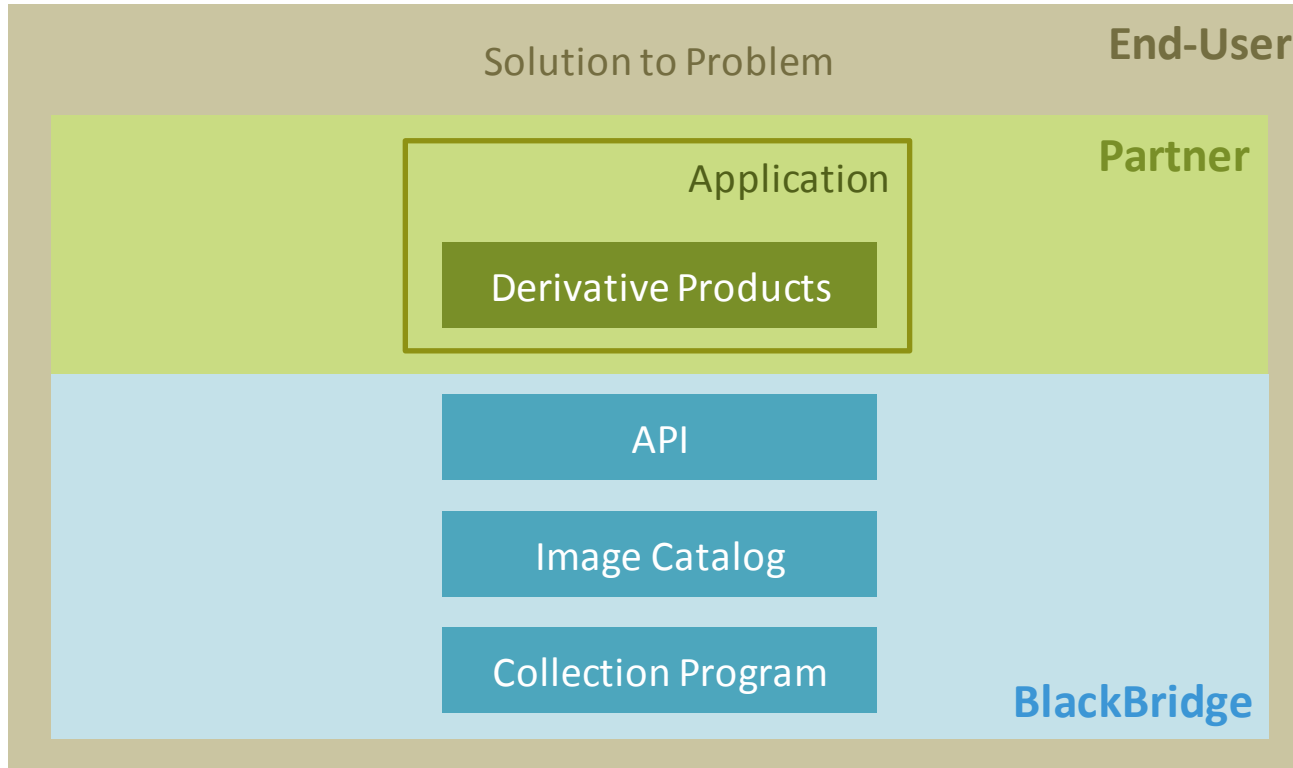
To download a zipped image product directly:

```
>>> import requests
>>> import cgi
>>> s = requests.Session()
>>> s.auth = ('eyefindag.demo', 'BBdemol4')
>>> r =
s.get('https://geocloud.blackbridge.com/gcapi/getProduct?img
streaming=True')
>>> if r.status_code == 200:
...     if r.headers.get('content-type') == 'application/zip
...         _params = cgi.parse_header(r.headers.get('cont
...         filename = params.get('filename')
...         with open(filename, 'wb') as f:
...             f.write(r.content)
...     else:
...         print r.text
... else:
...     print r.text
```

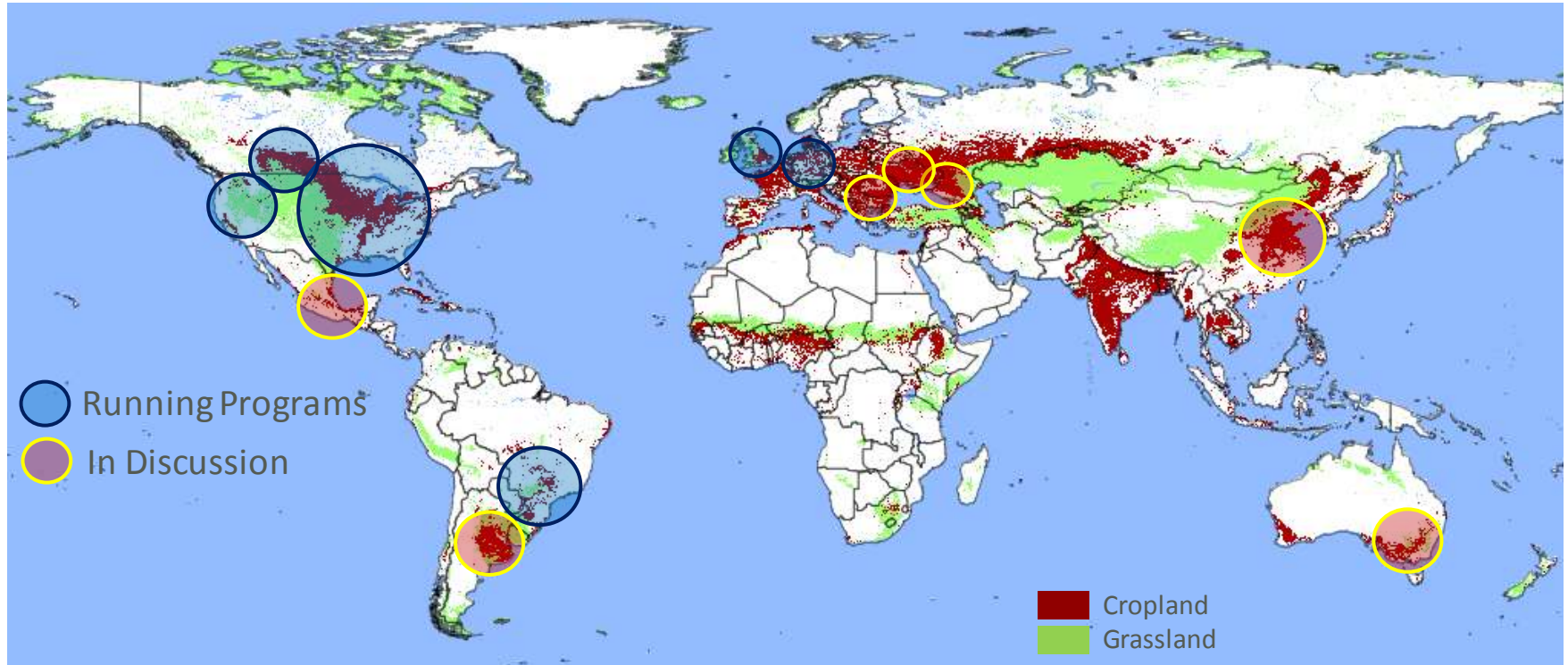
Query:

```
https://eyefind-ag.blackbridge.com/rest/v1?  
toiStart=2012-07-01&  
toiEnd=2012-08-01&  
aoiType=poi&  
country=United States&  
admin=South Dakota&  
cc=5&  
imgType=itt
```

# SUPPLY CHAIN



# PROGRAMS WORLDWIDE



Source: MCD12C1 - MODIS Land Cover Classification Type 2 (UMD)



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# DATA FOR JECAM / GEOGLAM

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# DATA FOR JECAM / GEOGLAM



Currently No Direct Support to JECAM

Supported though/by:

- ESA Third Party Mission: CAT-1 Program
- ESA Sent2-Take5 Program
- Agriculture and Agri-Food Canada

Flexible Data Licensing

- Base Single User can include a user group such as JECAM



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# RAPIDEYE SENT2-TAKE5

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- Within this ESA project we acquired ~12 AOIs (only one tile each) every 5 days.
- Amongst them there are 4-5 JECAM sites.
- For research purposes:
  - Simulate what might be expected from Sentinel 2
  - Prepare different kind of applications (e.g. for wetlands, agriculture, etc.)

# TEST AREA UKRAINE (CEOS JECAM SITE)



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RapidEye Tile ID: 3662206

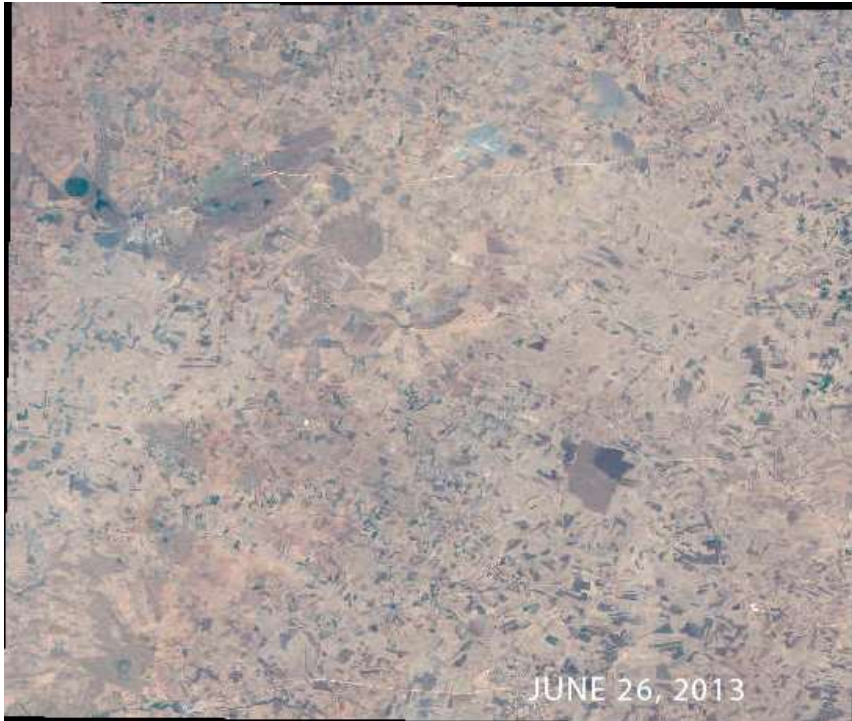
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# TEST AREA MOROCCO



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RapidEye Tile ID: 2954319

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[www.blackbridge.com](http://www.blackbridge.com)

Berlin, Lethbridge, Arlington

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