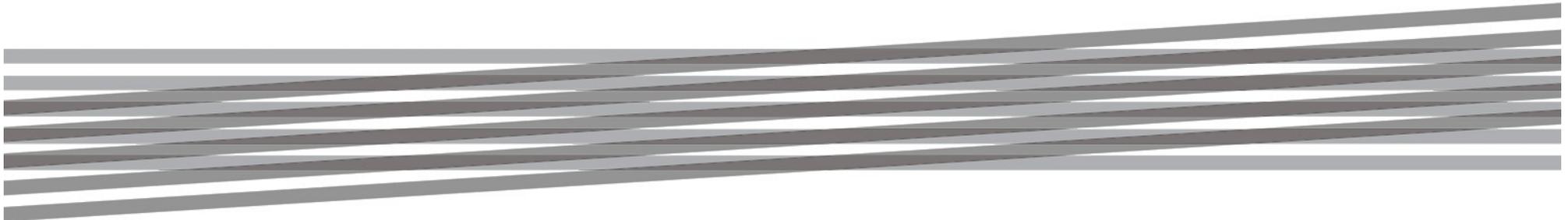




RapidEye – Small Satellites Gone Operational

Civil Commercial Imagery Evaluation Workshop
March 31 – April 2, 2009

F. Jung-Rothenhäusler, RapidEye AG, Germany



Overview

- > Customer Needs
- > System Overview
- > Status to Date
- > Capabilities and Applications

Customer Needs

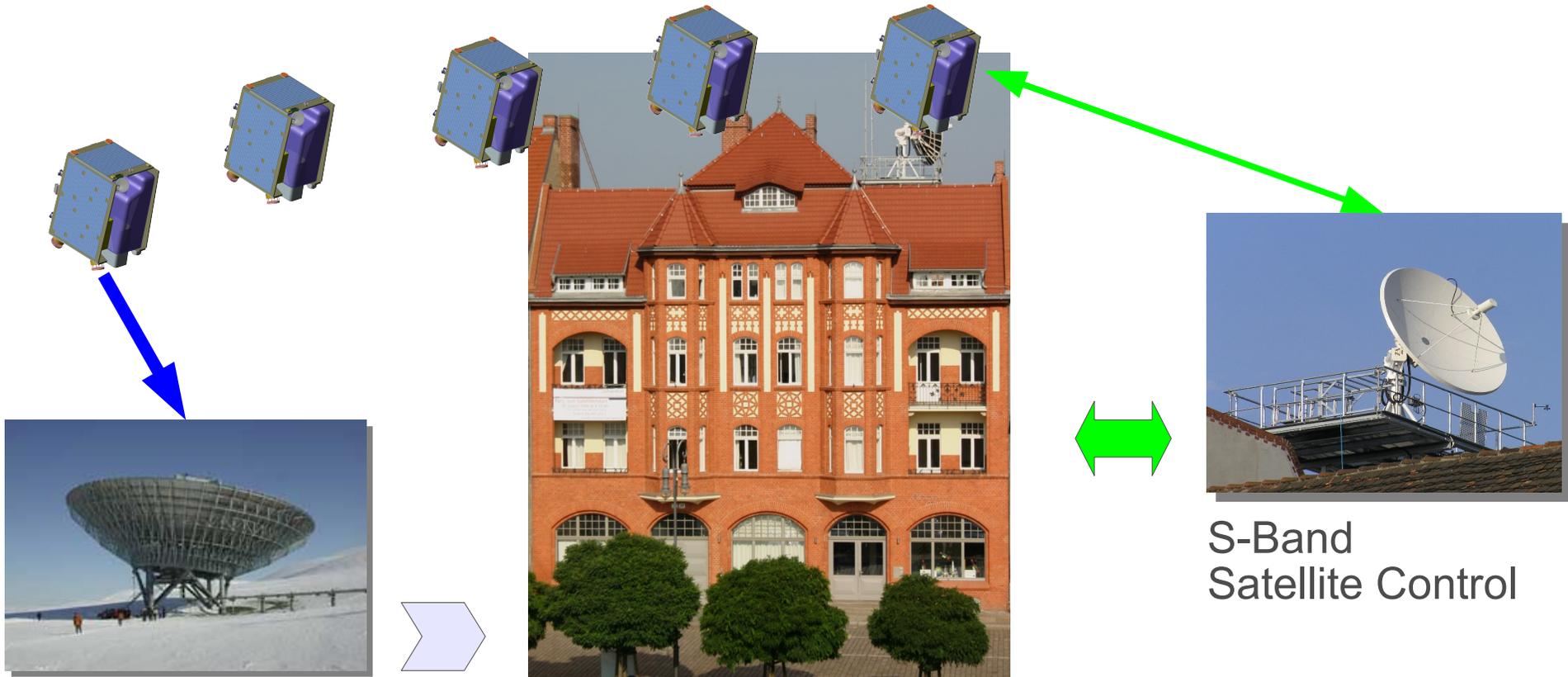
- > Large area coverage +
- > Daily accessibility of any point on the globe +
- > Low risk of failure, redundancy +
- > High ground resolution +
- > Immediate processing of data into customer information +
- > Rapidly growing archive, allows unique multi-temporal analyses +
- > High value for money

drive the RapidEye design and operational concepts

Corporate Development

- > Vision: Deliver to customers reliable, current, cost-effective and high quality geo-spatial data and information.
- > 1998 Incorporated in Munich, private individuals +  
- > 2004 Financed          
- > Kickoff construction, MDA serving as general contractor.
- > Launch successful on August 29, 2008; Dnepr Launch, Kazakhstan
- > 5 months system commissioning, calibration
- > February 01, 2009 Start of Operations

RapidEye End to End System



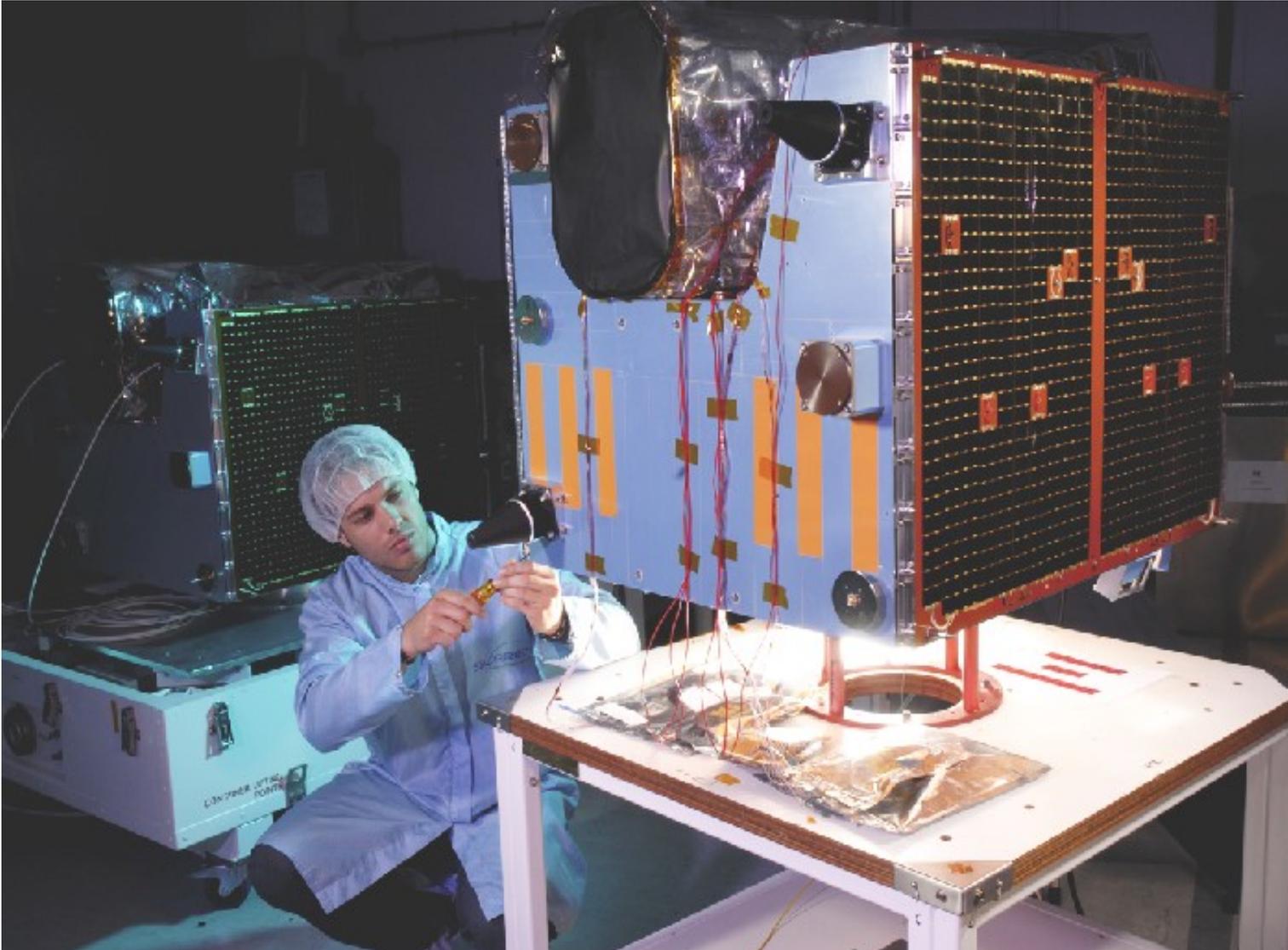
X-Band Antenna
Data Reception
Svalbard (Norway)

RapidEye Headquarters in Germany

- Command & Control
- Production
- Archive

S-Band
Satellite Control

Final Touches



- > 5 satellites
- > 300 pounds each
- > Cube 1x1x1m
- > 15 orbits / satellite
- > 75 orbits a day
- > Descending
- > Sun-synchronous
- > 98° Inclination

RapidEye System Details

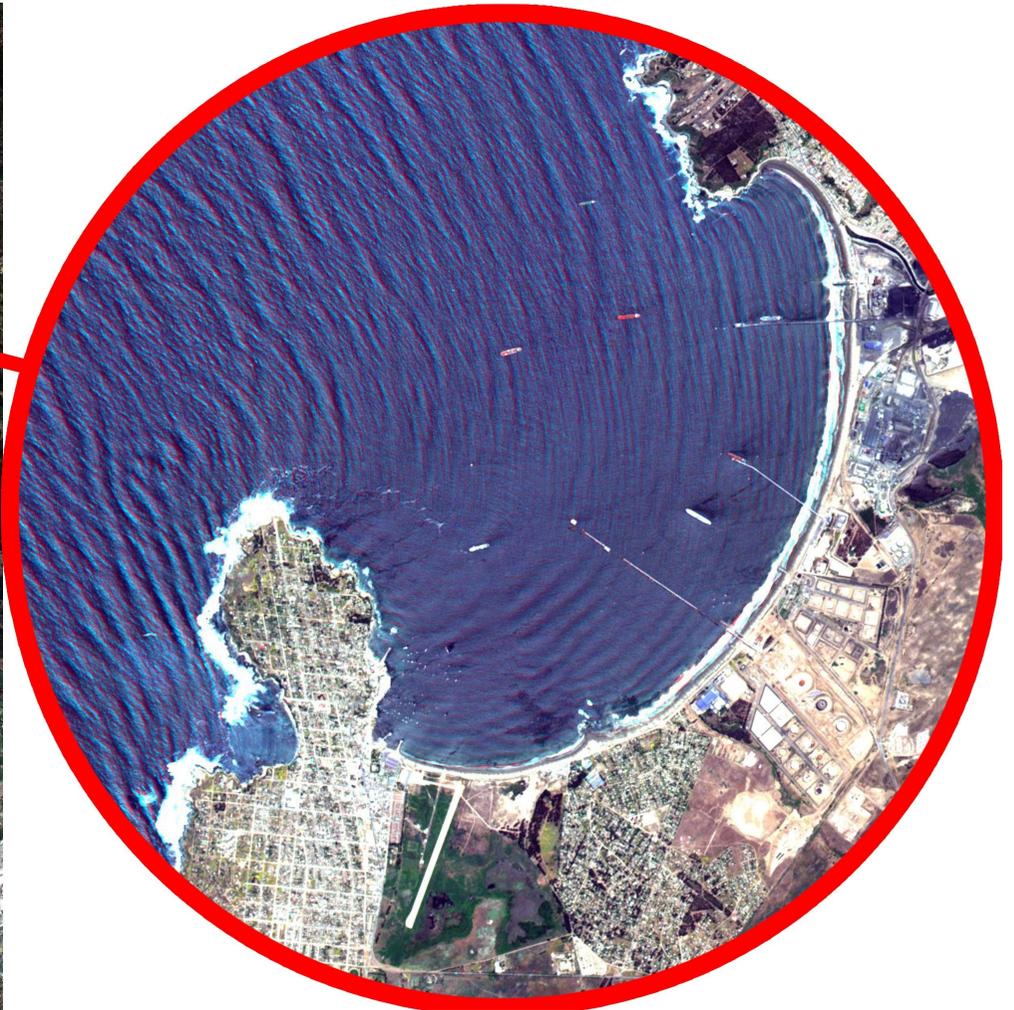
Spectral Bands	Blue	440-510 nm
	Green	520-590 nm
	Red	630-685 nm
	Red Edge	690-730 nm
	NIR	760-850 nm
Satellite Altitude	630 km	
Ground Sampling Distance	6.5 m	
Pixel Spacing (orthorectified)	5 m	
Ortho Image Tile Size	25 x 25 km ²	
Swath Width	77 km	
Maximum Strip Length	1500 km	
Revisit Time	DAILY	
Equator crossing time	11:00 a.m. (approximately)	
Image Capture Capacity	4 Million square km/day	

Status to Date

- > All five satellites working nominally
- > Satellite command and control from headquarters
- > Data reception in Svalbard and transmission working nominally
- > Data processing working nominally with
 - > Large amount of manual ground control point marking
 - > Significant effort into image quality control
 - > Calibration efforts ongoing

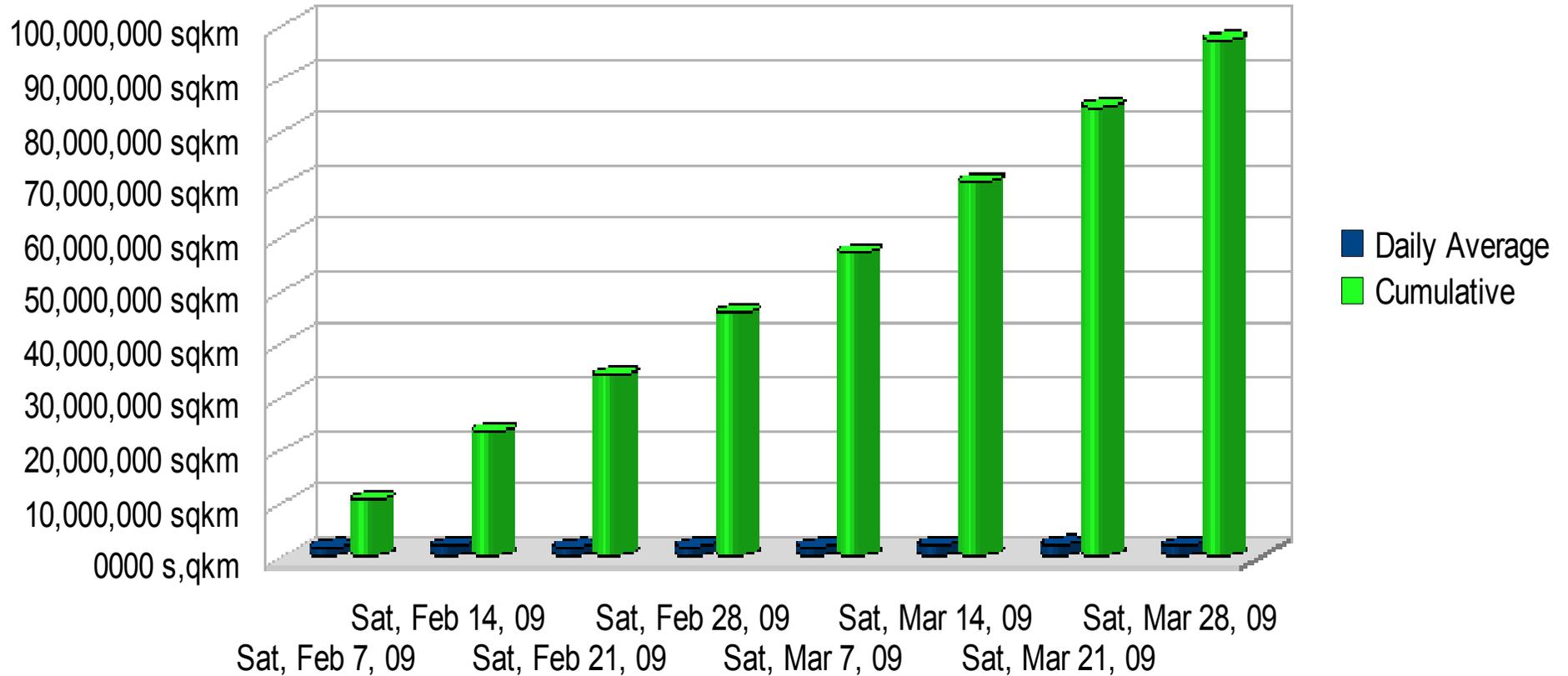
RapidEye – Image Example

November 2009

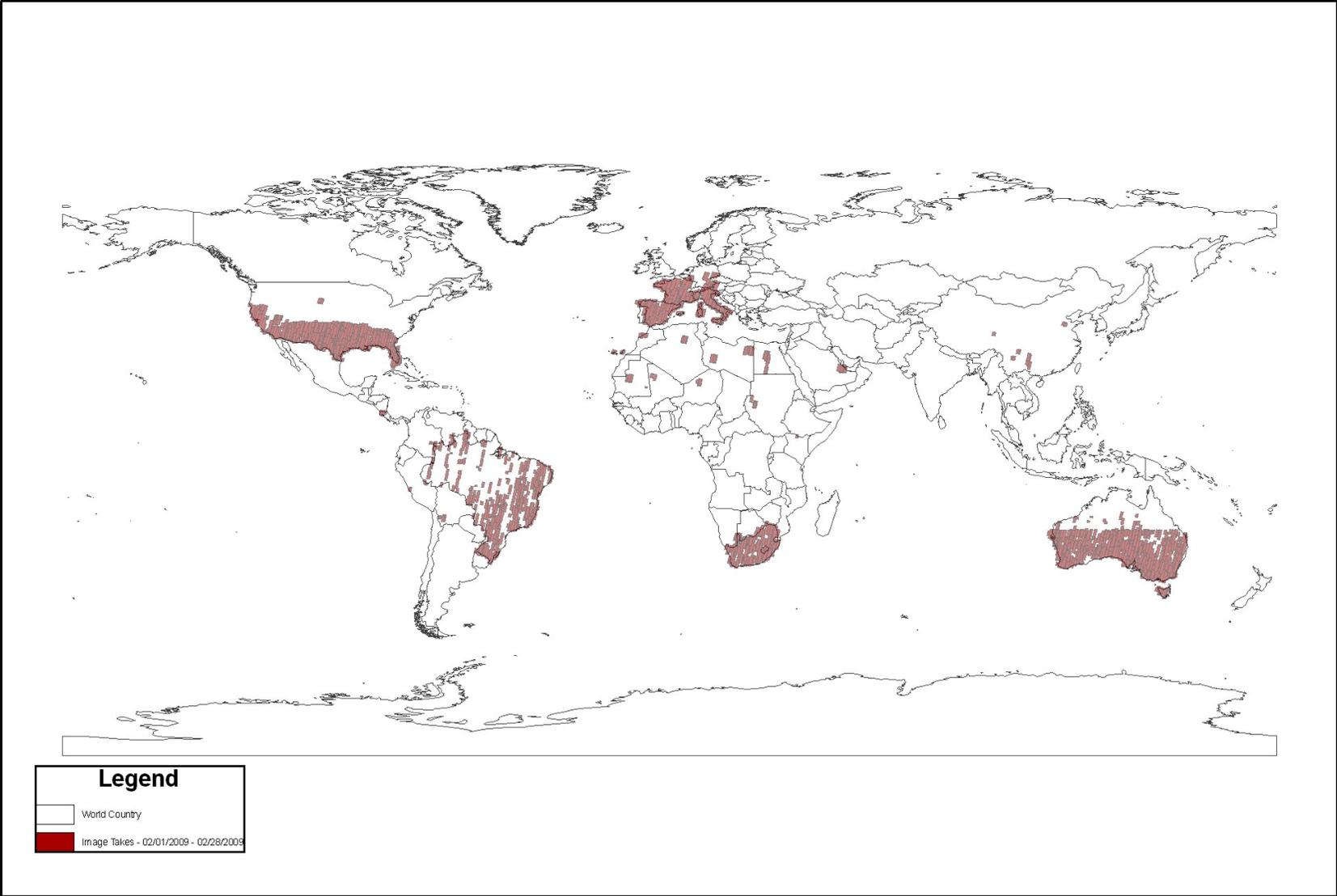


56 Days of Operation

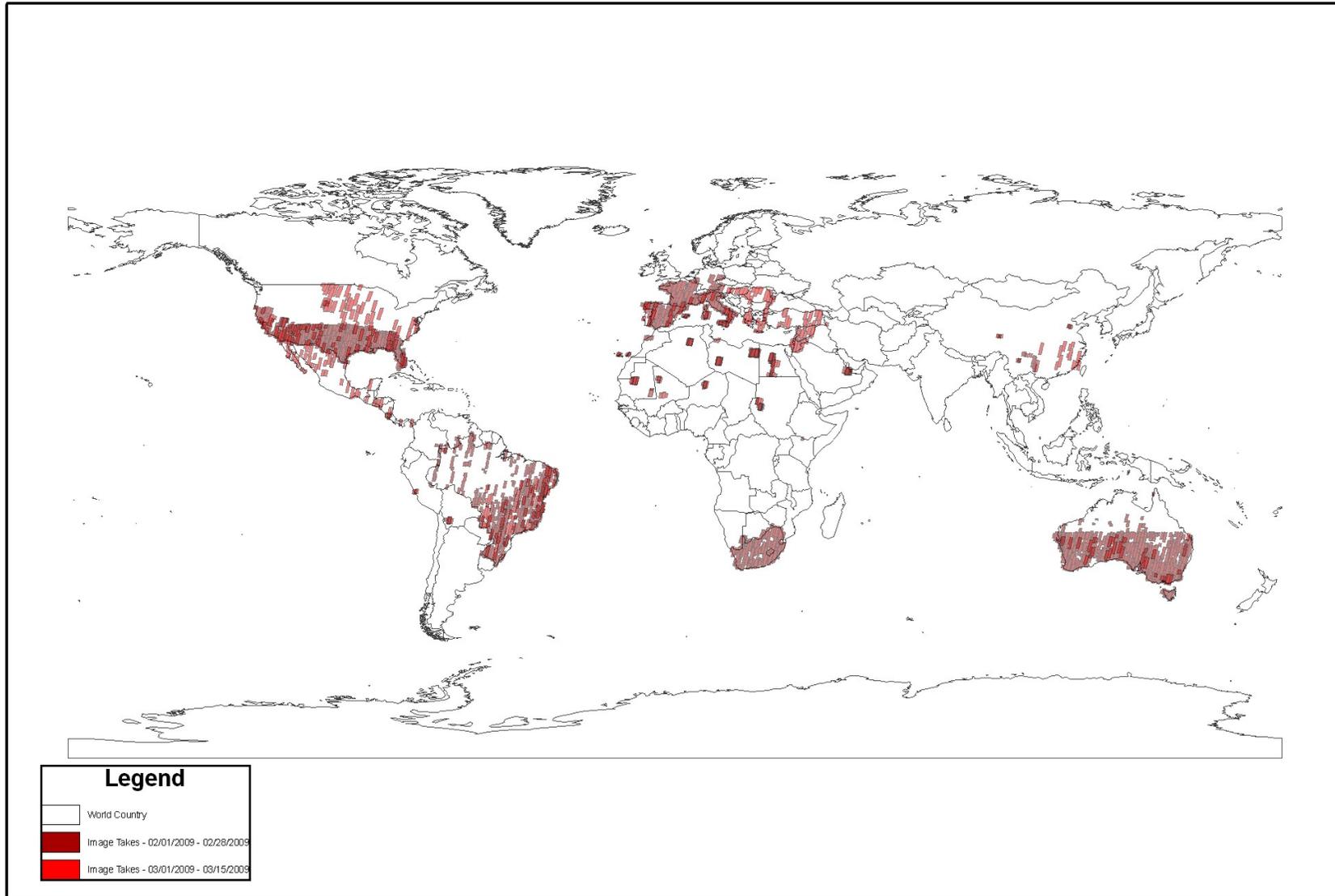
Image Acquisition since February 01, 2009
Cloud Cover < 20%



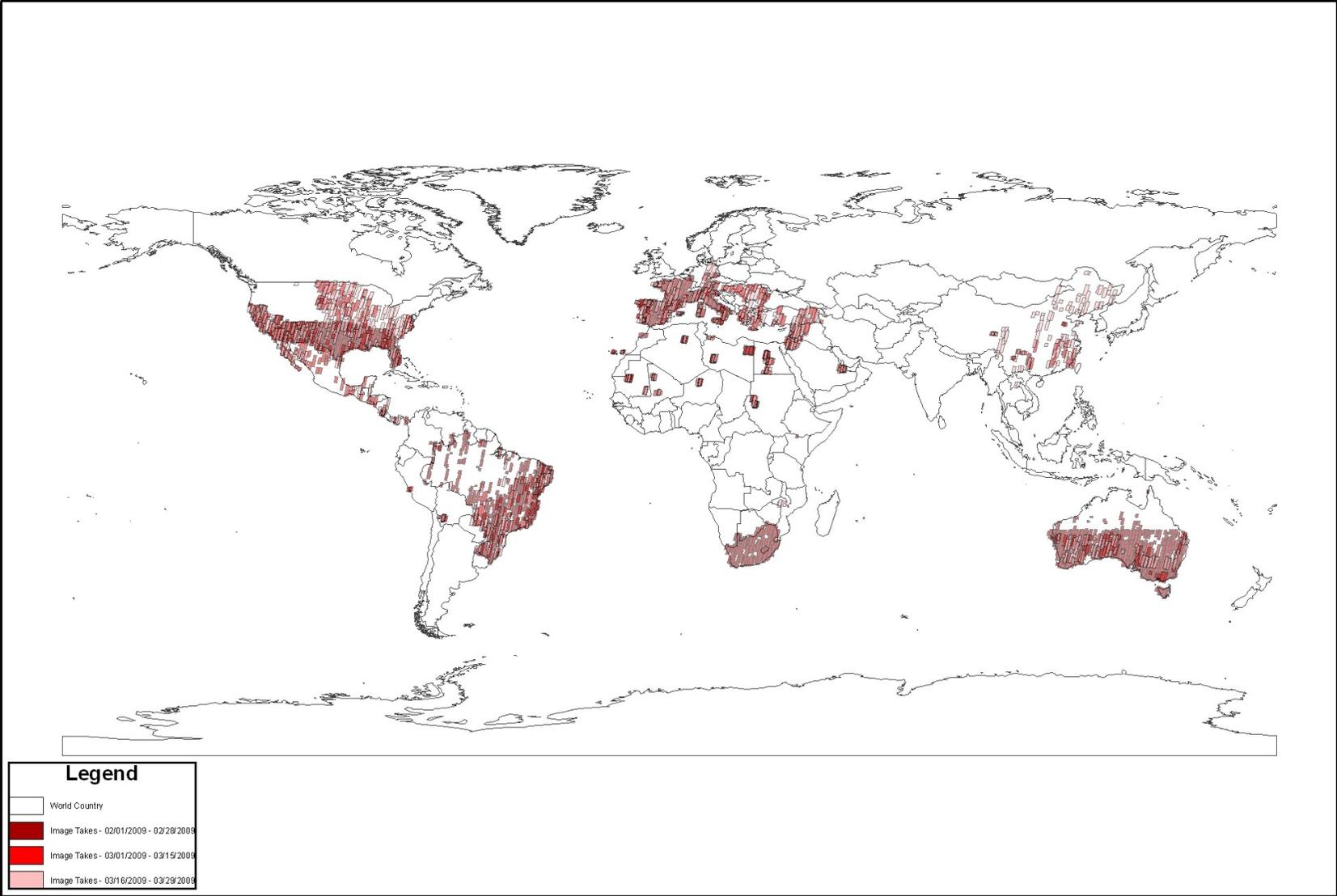
Acquired Data from 02/01/2009 to 02/28/2009



Acquired Data from 02/01/2009 to 03/15/2009



Acquired Data from 02/01/2009 to 03/29/2009



RapidEye Core Capabilities

> **Data Generation**

- > Satellite constellation command and control
- > Image acquisition planning
- > Image pre-processing and ortho-rectification
==> all images are GIS-ready

> **Service Capabilities**

- > Multi-temporal Image Analysis aka Change Detection
- > Crop Typing, Monitoring, Crop Condition
- > Forestry Tree Species Separation and Monitoring
- > Land Cover, Land Use

RapidEye Applications

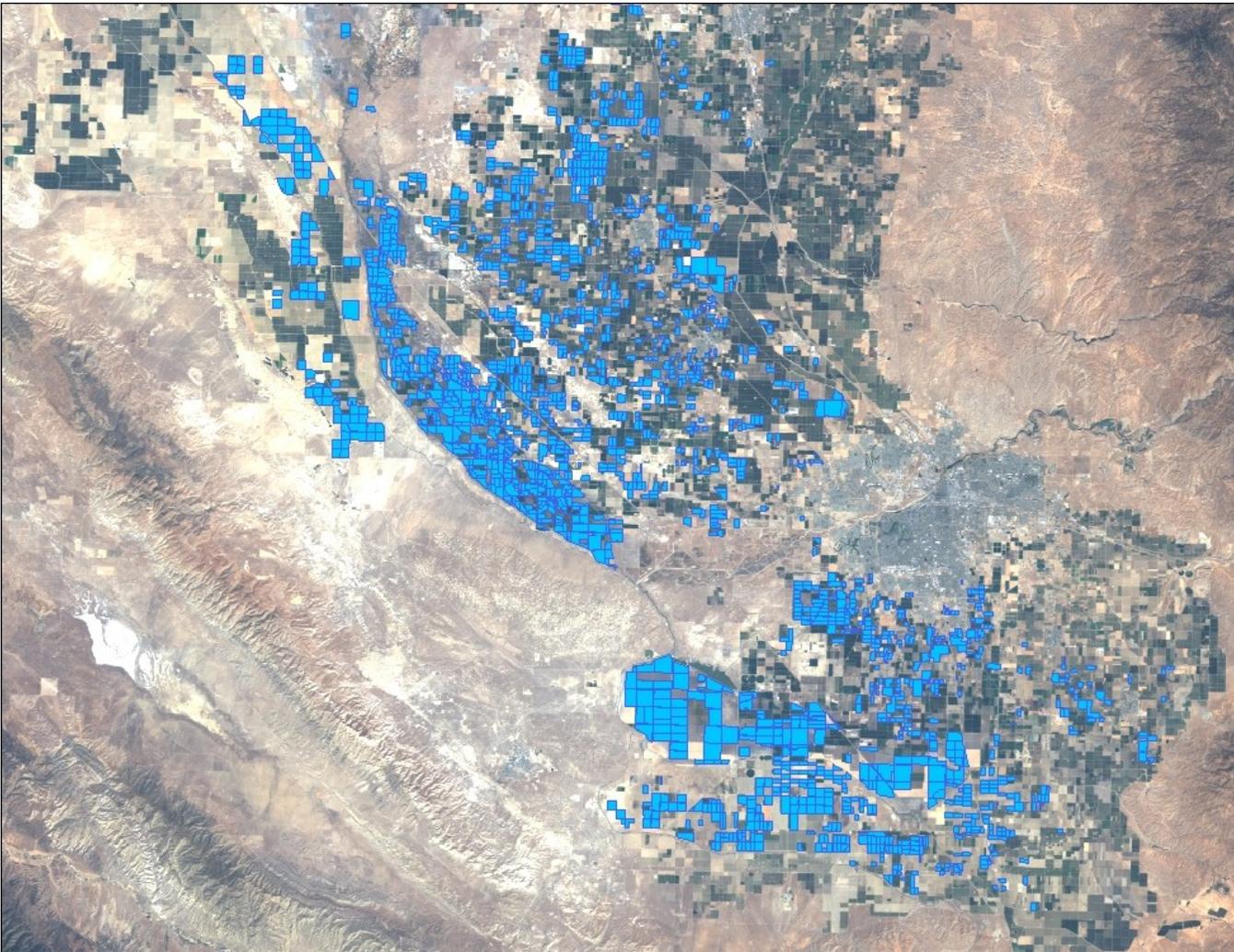
- > Tip-Off Service Large Area Change Detection
- > Biomass Intelligence Solutions
 - > Agriculture Crop Identification, Area under Crop
 - > Forestry Illegal Logging
 - > Environmental Desertification
- > Biomass Management Solutions
 - > Insurance Services
 - > Precision Farming Services
 - > Invasive Species Monitoring
 - > Forest Management Services

Geo-facts turned into knowledge



Overview of
Kern County,
San Joaquin Valley, CA

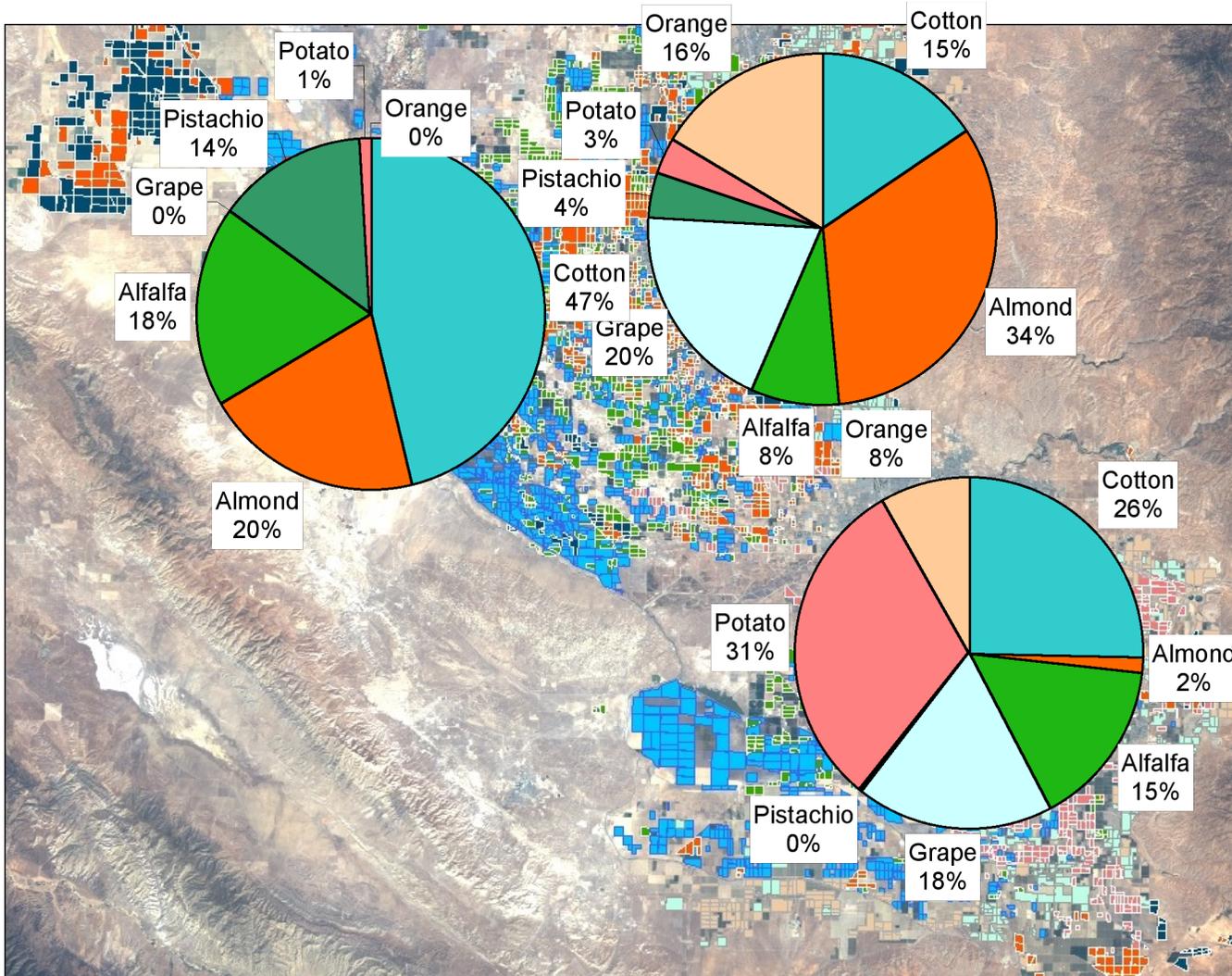
Geo-facts turned into knowledge



Cotton fields

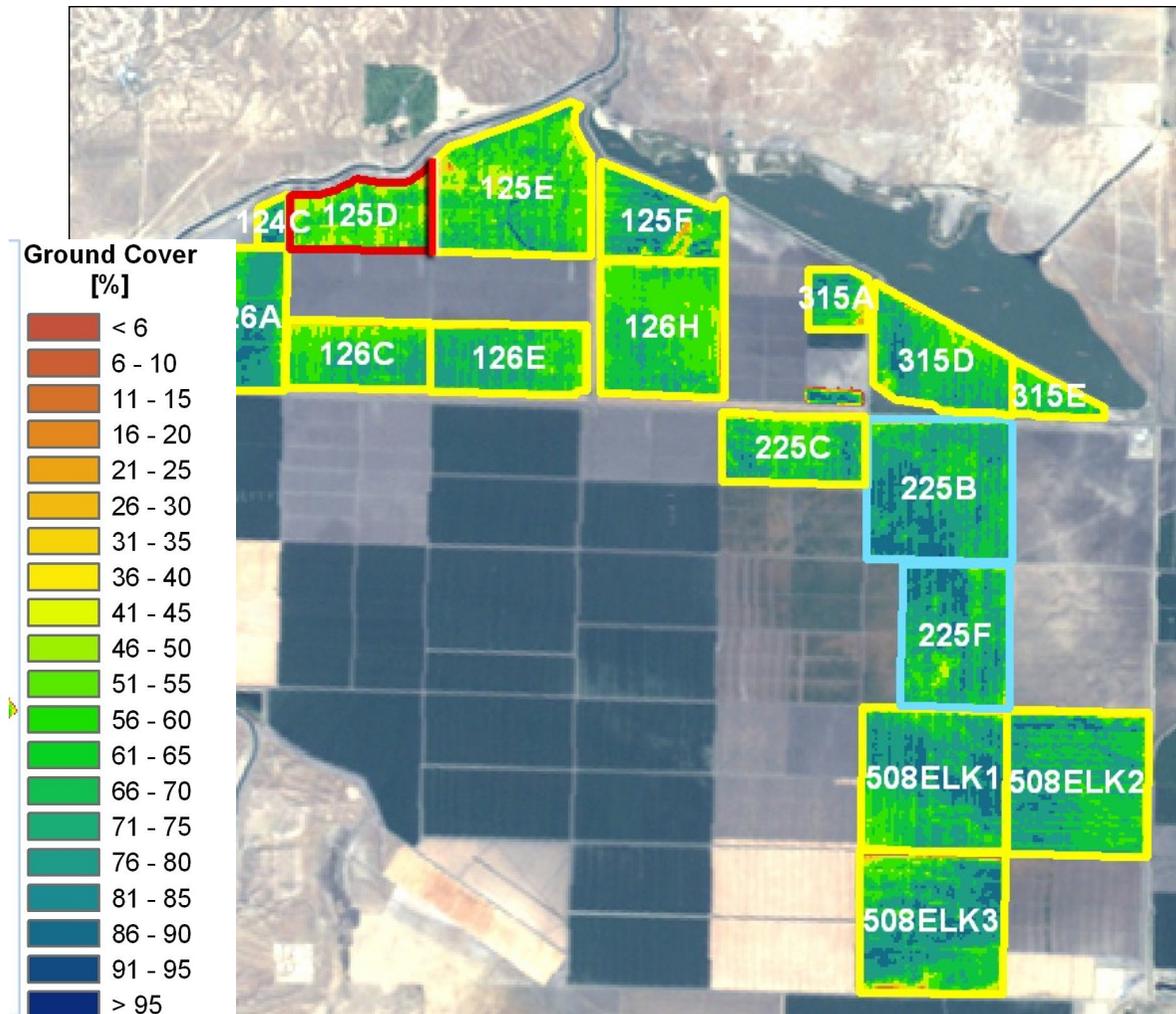
●	●	Crop	Acres
✓	■	Cotton	101,450
■	■	Almond	64,420
■	■	Alfalfa	54,848
■	■	Grape	41,175
■	■	Pistachio	26,727
■	■	Potato	26,641
■	■	Orange	24,461

Geo-facts turned into knowledge



Distribution of crops by region

Status of Cotton Fields



Farm	Field	Ground Cover [%]
McDaniel Farms	23CT	~95
Smith's Corner	225F	~58
Smith's Corner	225B	~58
McDaniel Farms	508ELK1	~55
McDaniel Farms	508ELK2	~52
McDaniel Farms	508ELK3	~52
Willow Farms	124C	~50
Willow Farms	126A	~50
Willow Farms	125F	~48
Smith's Corner	225C	~48
Smith's Corner	315A	~48
Smith's Corner	315D	~48
Willow Farms	126E	~48
Smith's Corner	315E	~48
Willow Farms	125E	~48
Willow Farms	126H	~48
Willow Farms	126C	~45
Willow Farms	125D	~10

Summary

- > RapidEye has been operational for 2 months
- > We have collected 100 Million square kilometers
- > We offer data collection services
- > We offer data analysis services like:
 - > Tip-off and change detection
 - > Rapid response in case of disaster
 - > Agriculture, forestry and environmental monitoring