e-geos

AN ASI / TELESPAZIO COMPANY

Geospatial Information Services, Optical and COSMO-SkyMed satellite data supporting food quality and security

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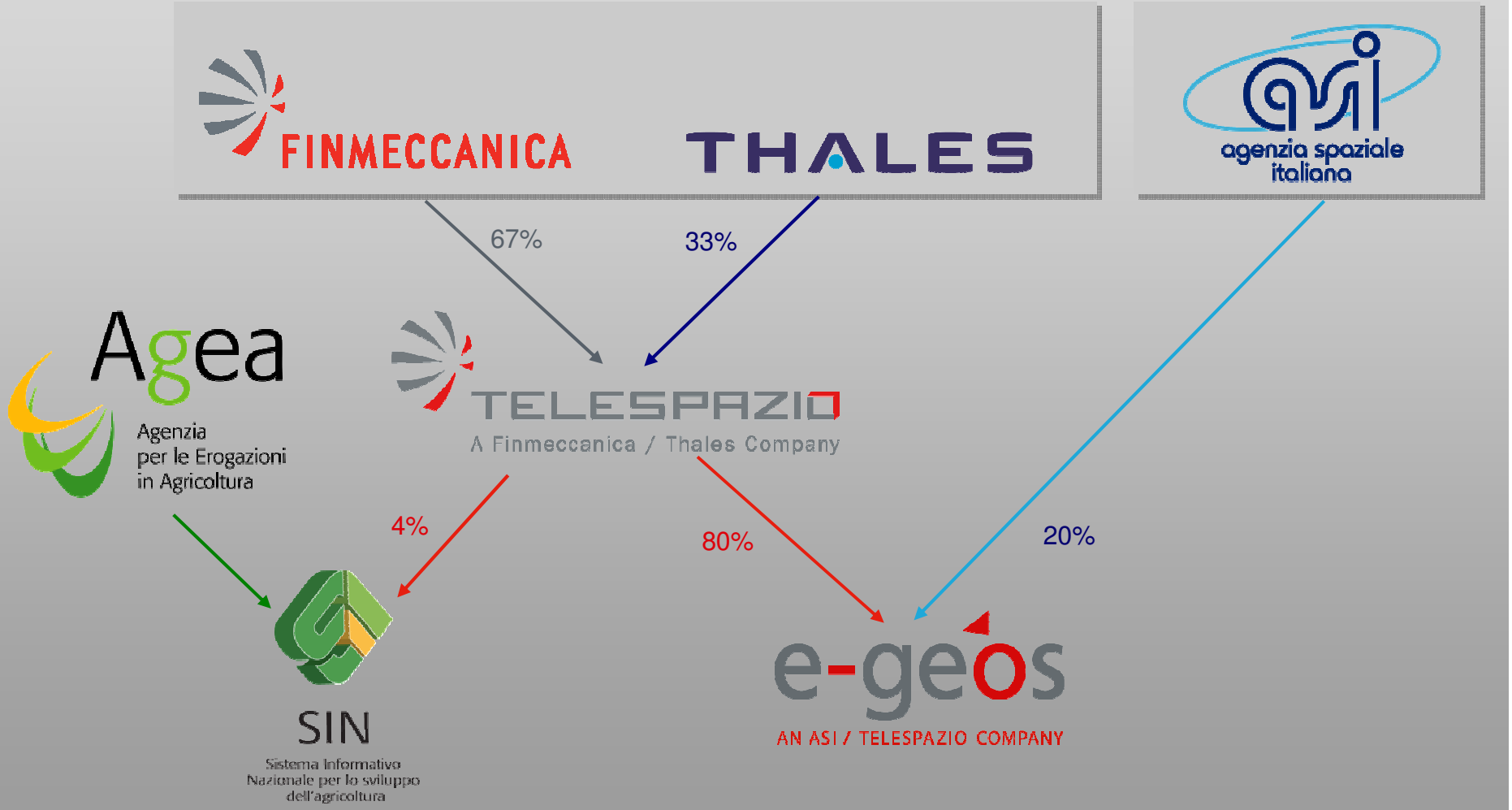
Group Structure



Food security

Food security exists when all people, at all times, have physical, social and economic access to sufficient safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life.

(http://www.fao.org/cfs/en/)

Food security analysts look at the combination of the following three main elements:

- Food availability
- Food access
- Food utilization

(http://www.wfp.org/food-security)

Leveraging on our facilities and on the capabilities of COSMO-SkyMed (radar data) and GeoEye (optical data)

we are able to reactively map any area in the world

COSMO-SkyMed
Supporting food quality and security

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Key features

- **X-Band SAR**
- **High Revisit Time (4 satellites)**
- **Day/Night and all weather acquisitions**

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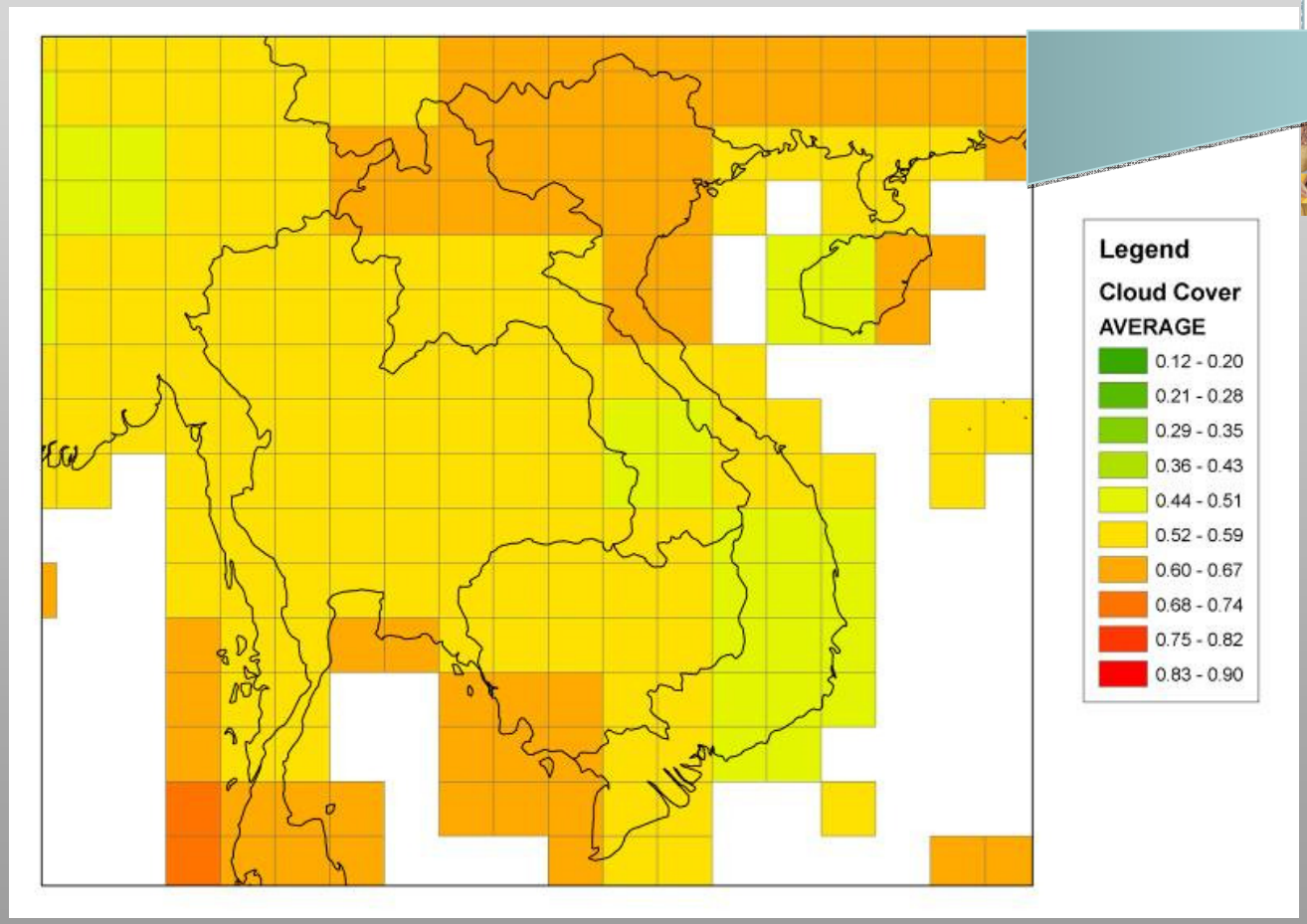
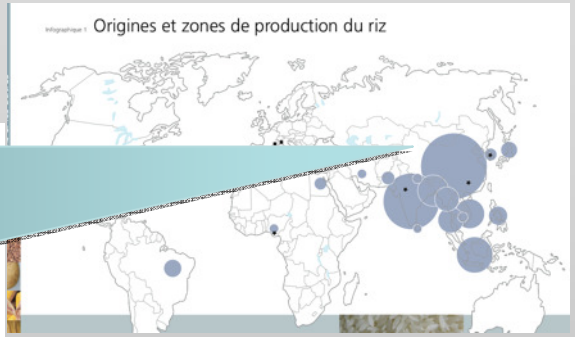
- **WorldWide exclusive distributor**
- **Downlink infrastructures**
- **Sentinel future downlink**
- **Multitemporal capability (analysis over time)**
- **Land Use extraction**

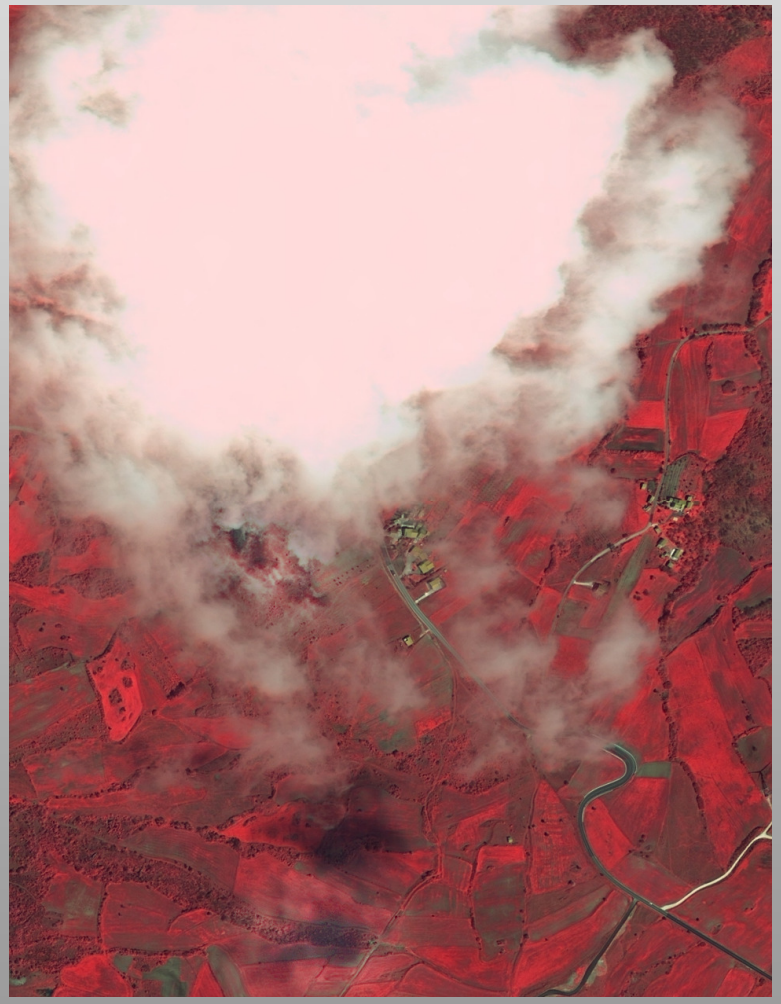
Day/Night and all weather acquisitions





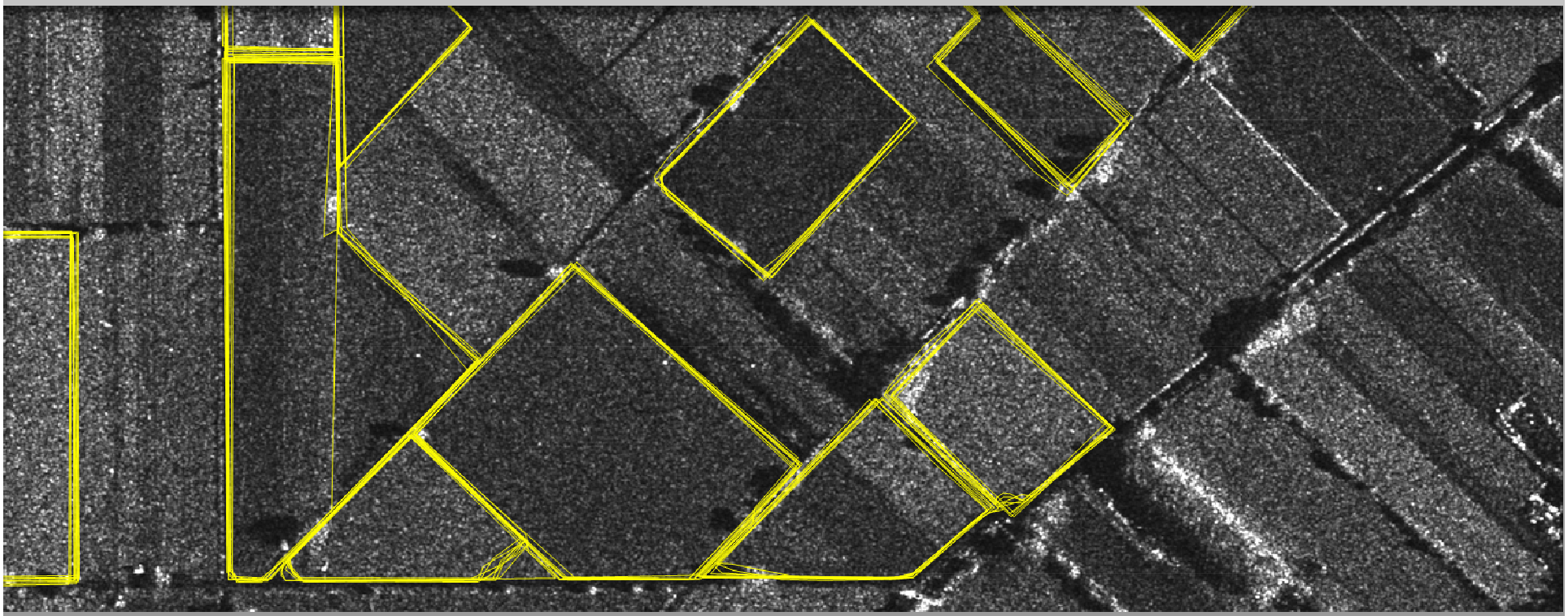
> 90%
of rice is produced in areas where the cloud cover is > 50%

SAR remedy to cloud cover



Satellite Data

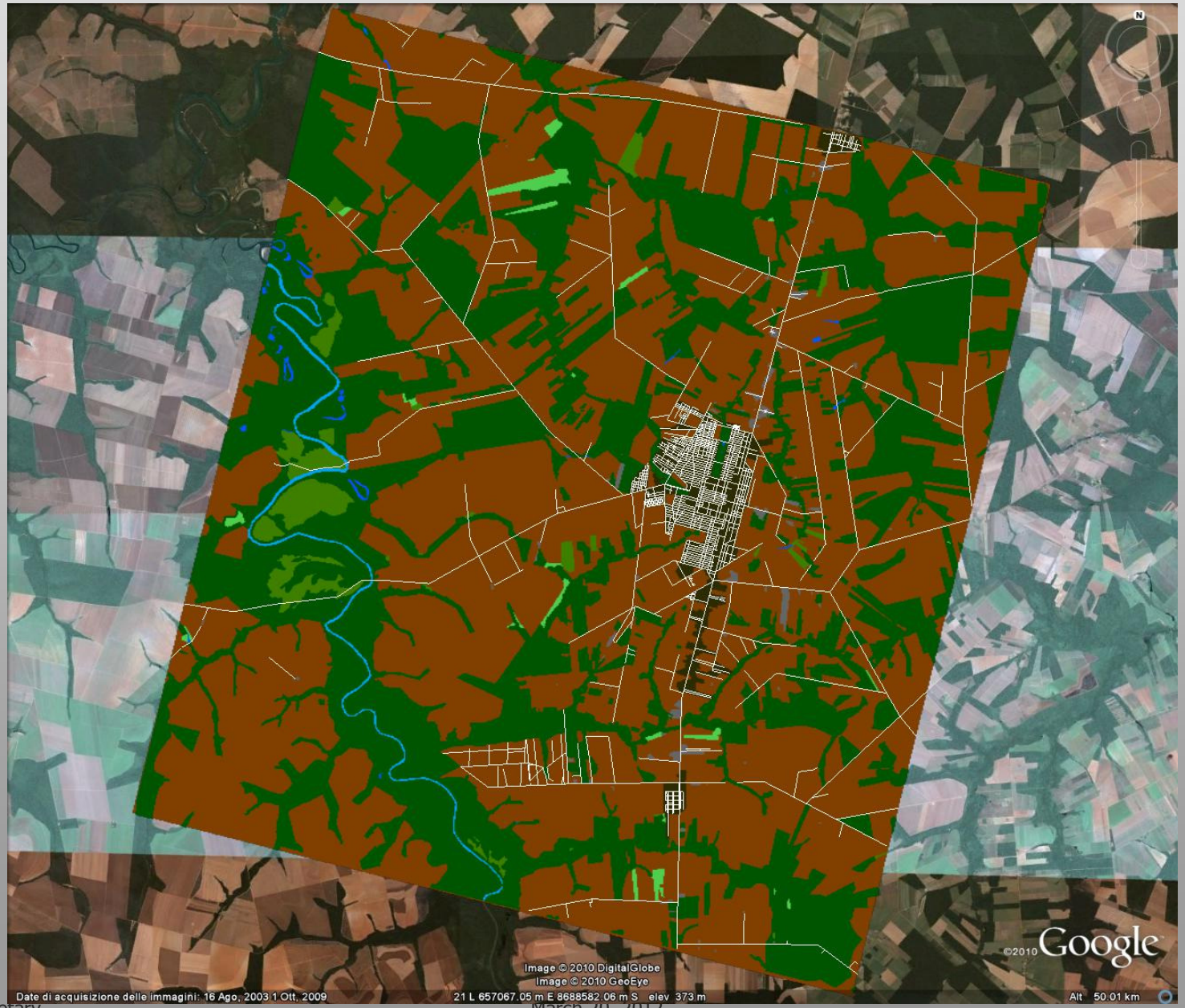
- Land-Use Extraction
- Crop biomass - Yield Estimation
- Coherence Map – Paddy Fields Monitoring



Land-Use Thematic Extraction

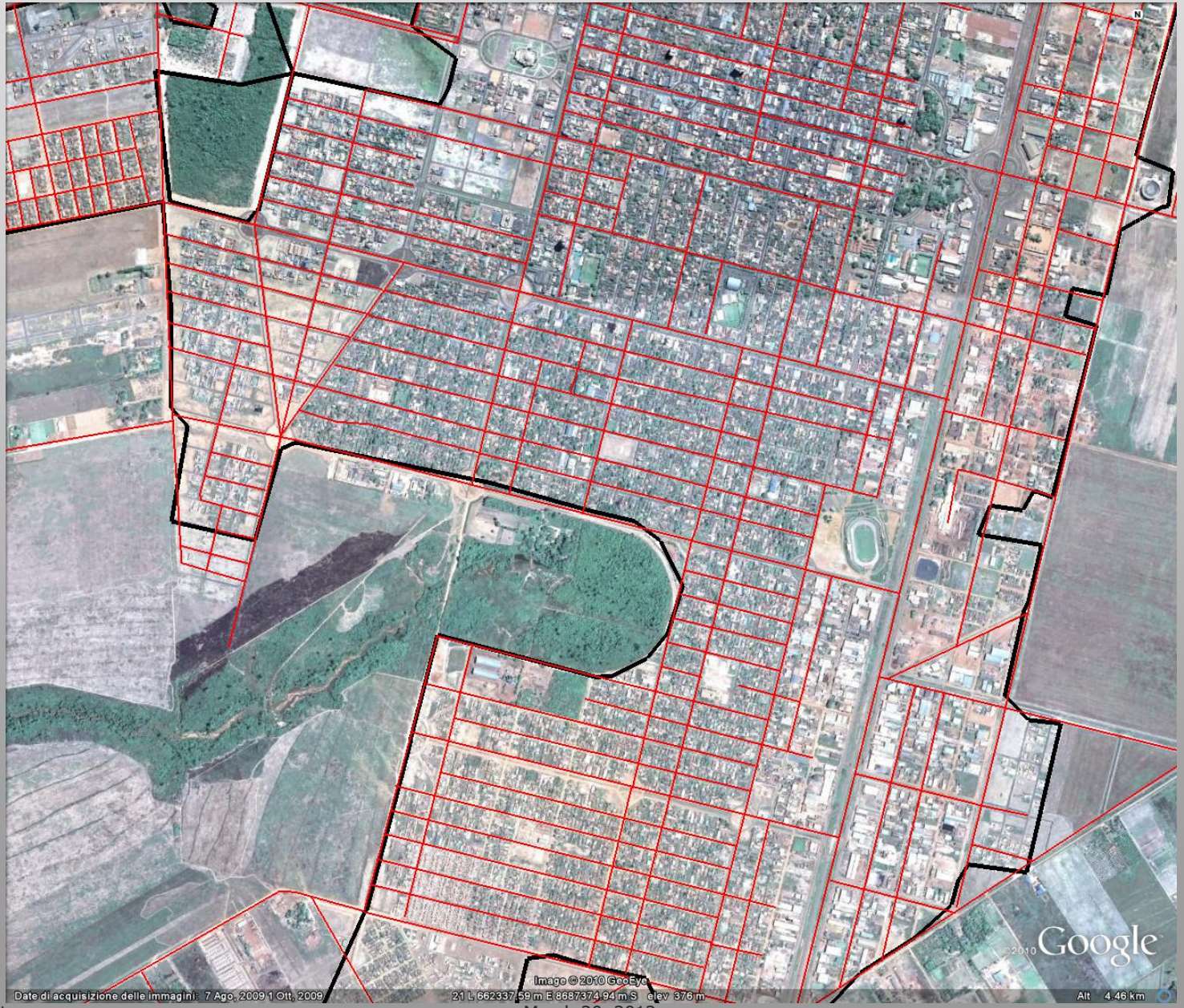
- **Spotlight-2**
  - Area : Asmara
  - Acquisitions date: 19/09/2009 - 04/10/2009
  - Identified Classes
    - Water Bodies (lakes and rivers)
    - Urban (Dense and Open)
    - Forest (Dense and Open)
    - Industrial and Commercial
    - Agricultural (Cultivated and Not Cultivated)
    - Bare soil
  - Identified Features
    - Buildings
    - Roads and highways
    - Rivers

Land-Use Extraction from MTC



Agricultural Land-Use

Urban Area Characterization



Forest Area


N
Image © 2010 GeoEye
©2010 Google
Data di acquisizione delle immagini: 7 Ago, 2009
21 L 641918.98 m E 8689885.52 m S elev 316 m
Alt 12.93 km

Sparse Forest Land-Use

Grassland Land-Use

Water Bodies

Mekong
COSMO-SkyMed Extracted Information

REQUIREMENT	SPECIFICATION	COMPLIANCE ACTION
Feature acquisition	Collection mode: multiple optical	
	Shape of roads	Roads extraction (with size)
	Shape of rivers	Rivers extraction (with size)
	Shape of buildings	Buildings extraction (polygon)
	Required resolution urban: 0.5 m	With Spotlight-2
	Required resolution agricolture: 2.5 m	With Spotlight-2/Himage
	Required resolution mountain: 5 m	With Himage
Feature change detection	Collection mode: multiple optical	
	Change of shape of roads	Change detection sample
	Change of shape of rivers	Change detection sample
	Change of shape of buildings	Change detection sample
	Required resolution urban: 0.5 m	With Spotlight-2
	Required resolution agricolture: 2.5 m	With Spotlight-2/Himage
	Required resolution mountain: 5 m	With Himage

Road
River
Fields

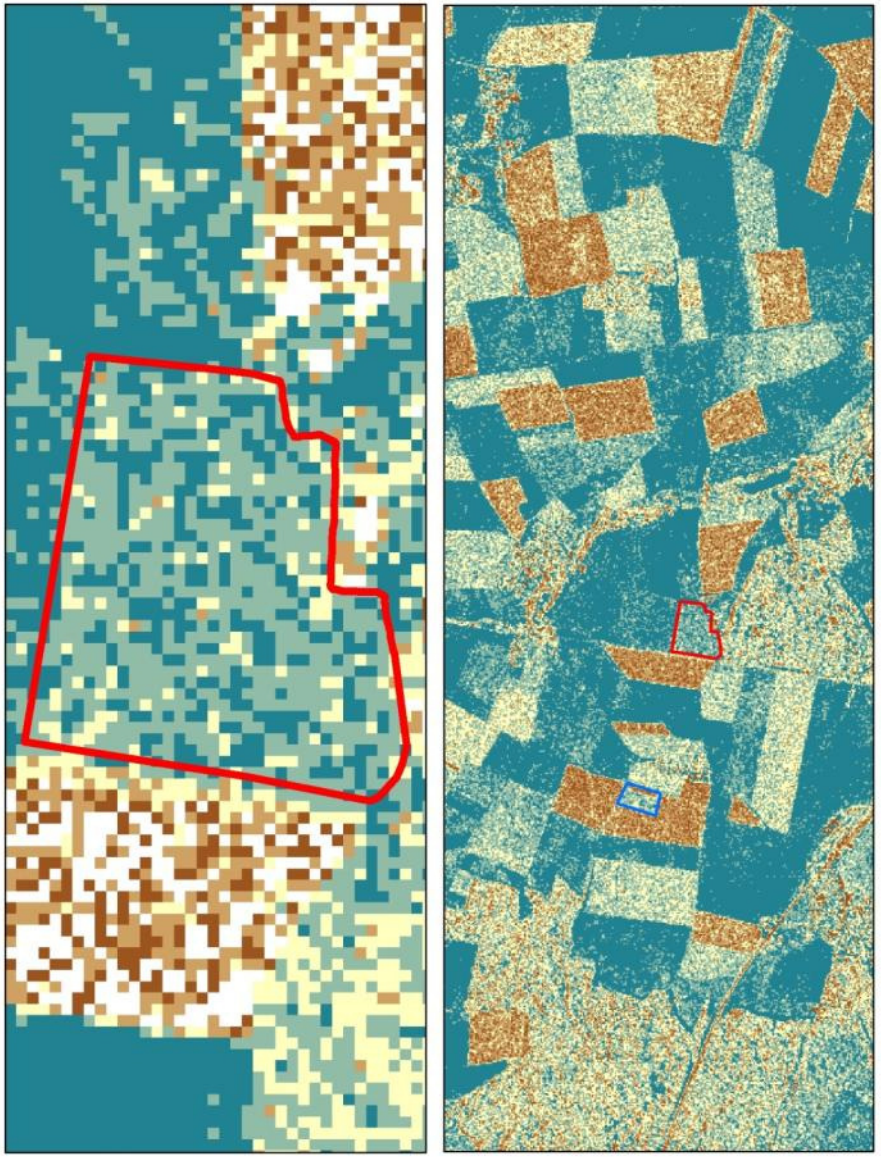
REQUIREMENT	SPECIFICATION	COMPLIANCE ACTION
Land use classification	Collection mode: multiple optical	
	Class: Forest dense	Polygon
	Class: Forest open	Polygon
	Class: Grassland	Polygon
	Class: Rice	Polygon
	Class: Bare area/dry field	Polygon
	Class: Urban area	Polygon
	Class: Water area	Polygon
	Class: Agricultrure cultivated	Polygon
	Class: Agricultrure not-cultivated	Polygon
	Required resolution urban: 0.5 m	With Spotlight-2
	Required resolution agricolture: 2.5 m	With Spotlight-2/Himage
	Required resolution mountain: 5 m	With Himage
Land use classification change detection	Collection mode: multiple optical	
	Change to class: Forest dense	Change detection sample
	Change to class: Forest open	Change detection sample
	Change to class: Grassland	Change detection sample
	Change to class: Rice	Change detection sample
	Change to class: Bare area/dry field	Change detection sample
	Change to class: Urban area	Change detection sample
	Change to class: Water area	Change detection sample
	Change to class: Agricultrure cultivated	Change detection sample
	Change to class: Agricultrure not-cultivated	Change detection sample
	Required resolution urban: 0.5 m	With Spotlight-2
	Required resolution agricolture: 2.5 m	With Spotlight-2/Himage
	Required resolution mountain: 5 m	With Himage

Rice
Other Agriculture
Forests

REQUIREMENT	SPECIFICATION	COMPLIANCE ACTION
Detection of devasted area	Extraction of area devastated by flood	Sample
	Extraction of area devastated by tide	Sample
	Rapid extraction	Compliance in few days
	Performance equaling or surpassing optical	
Detection of flooded mangrove forest	Expecially in dense mangrove area	To be verified over a sample area
	Required resolution 0.5-2.5 m	With Himage
Detection of mangrove forest changes	With each species (?)	HImage (ancillary data required)
Detection of land sinking	sinking area (due to underground water pumping)	Interferometry highly compliant.
	Analysis with centimeter resolution of vertical rise	
Detection of sea level rise	Due to global warming	
	Analysis with centimeter resolution of vertical rise	

Devastated area by
Flood, Tide …

Crop biomass - yield estimation



Legend

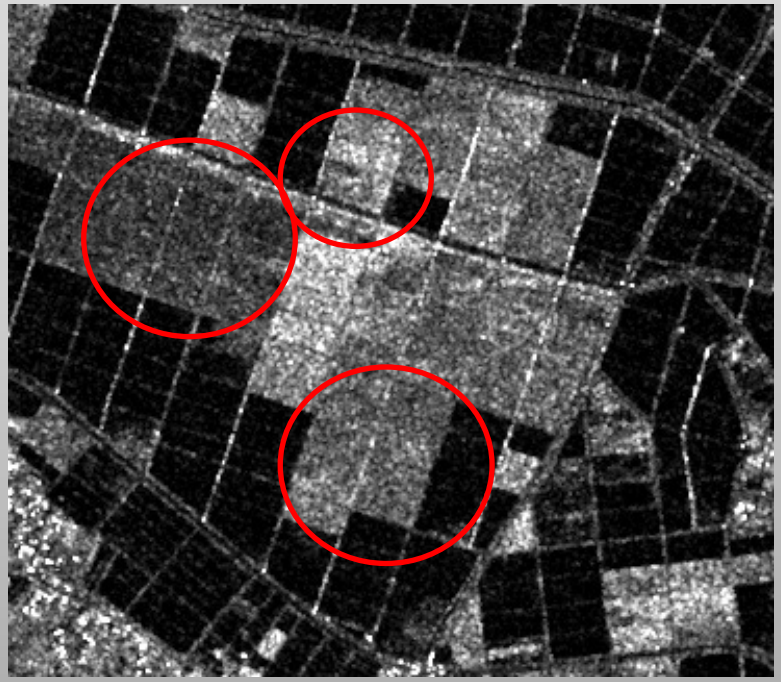
yield Kg/100mq

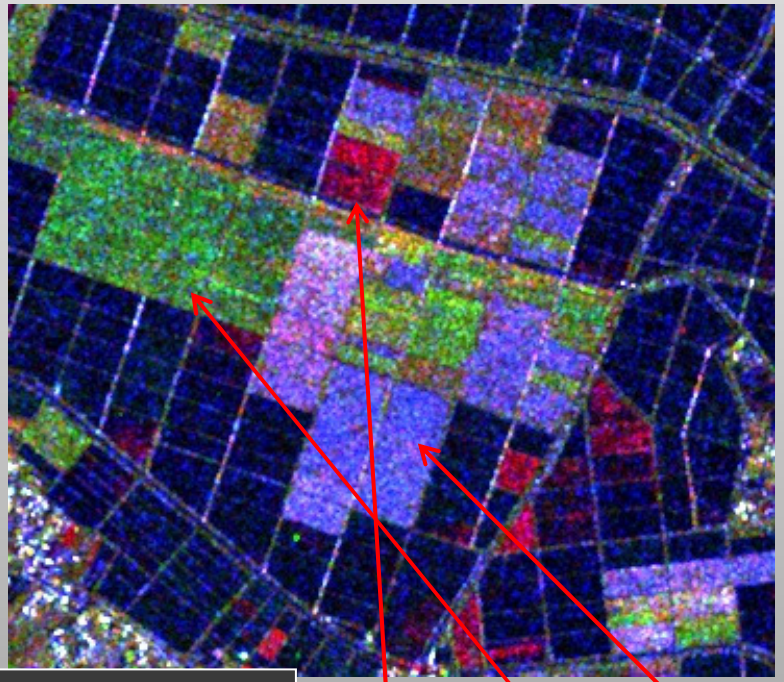
- 0,0 - 10
- 10,1 - 25
- 25,1 - 40
- 40,1 - 50
- 50,1 - 65

- Yield estimated from CSK data
  4,20 T/Ha
- Yield measured on ground
  4,5 T/Ha

Note: SAR biomass was calculated by relating measured backscattering and biomass ground samples

Paddy fields Monitoring





COSMO-SkyMed HIMAGE ifsar pair
May 16 – Jun 01, 2010

- May 17
- Jun 02
- Coherence

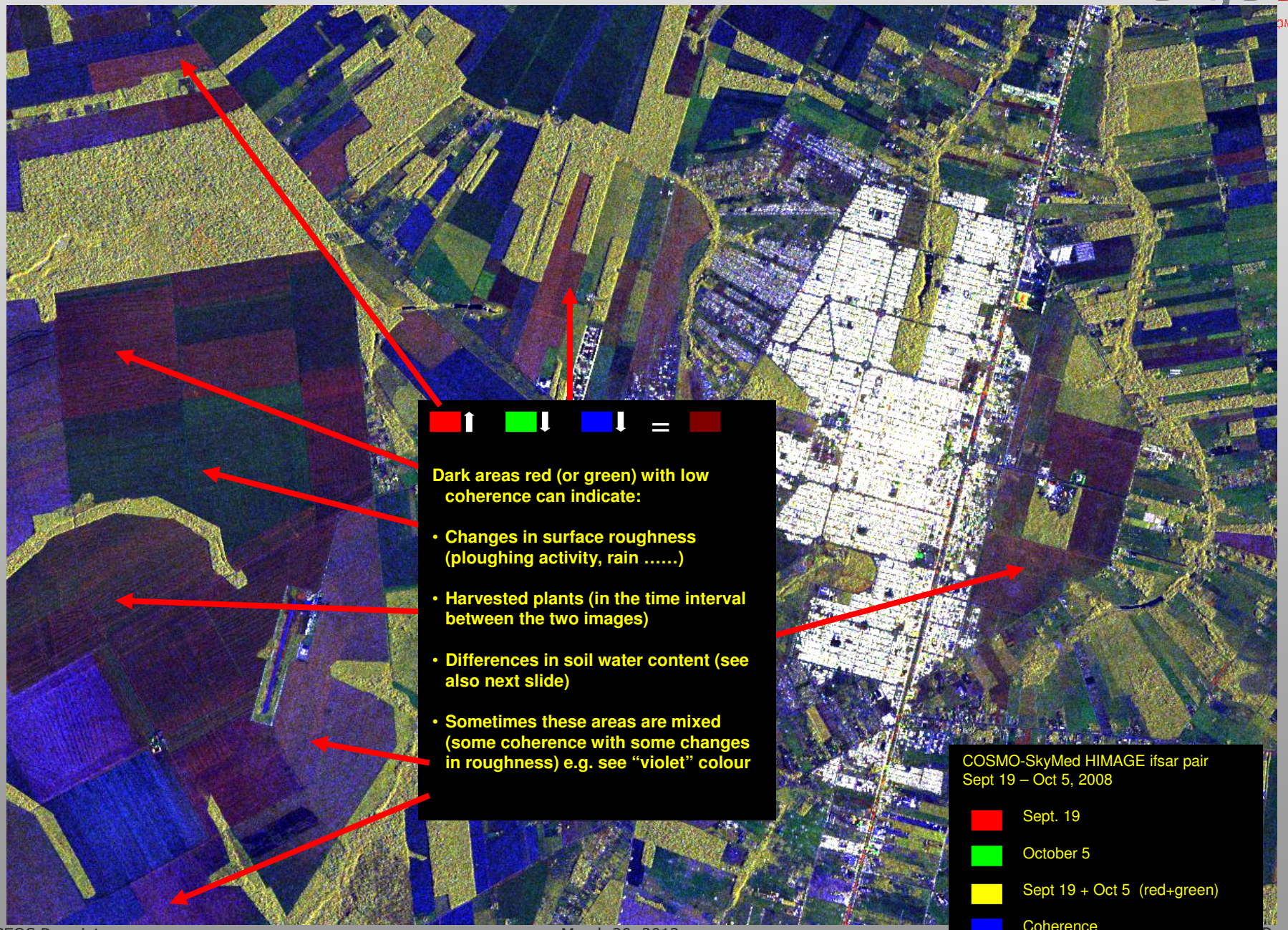
Green: Fastly growing vegetation or ploughing activities (depending on season)

Red: Changes in surface roughness (flattening) or ponding activity

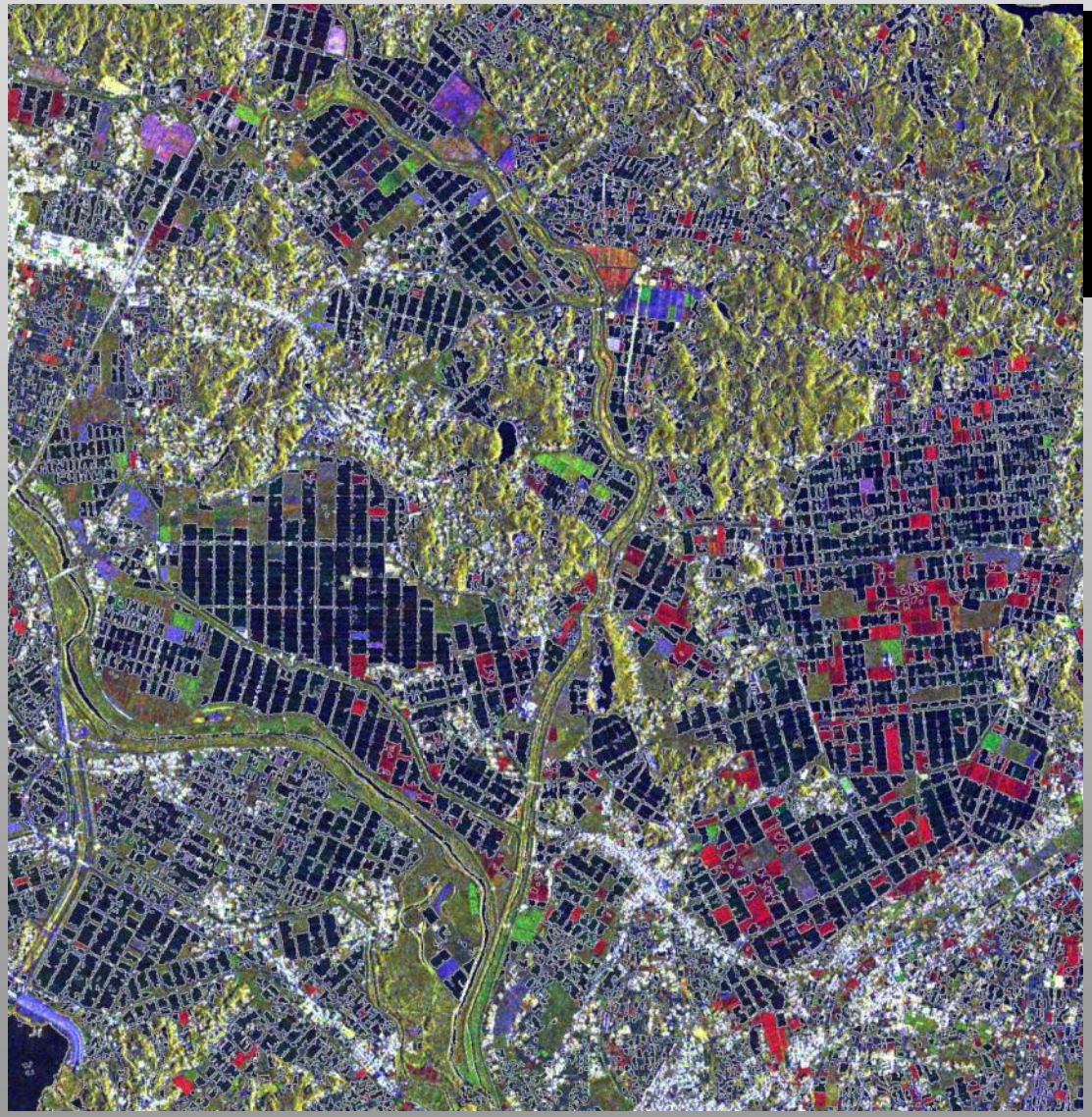
Blu: Unchanged bare soil

Note:
Green color (low coherence and increase of brightness between the first and the second image) indicates plant growing (to be monitored up to harvesting)

Key for interpreting colour composite image



Extracted paddy fields overlayed to MTC image



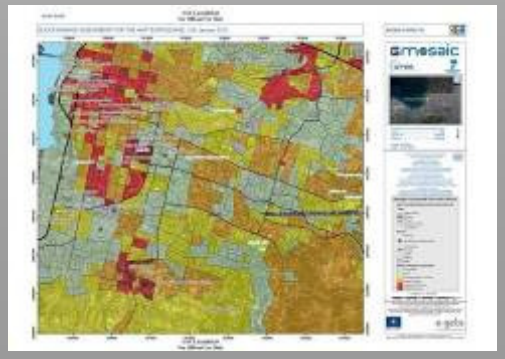
COSMO-SkyMed HIMAGE ifsar pair
Sept 19 – Oct 5, 2008

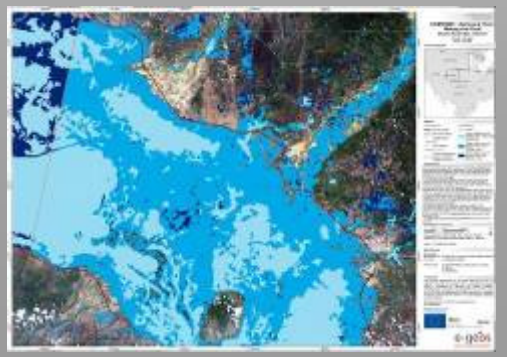
- Sept. 19
- October 5
- Sept 19 + Oct 5 (red+green)
- Coherence

Emergency

- **e-GEOS is now the sole provider of Emergency Response Service rush productions at EU level (27 countries)**
- **e-GEOS has played an active role with more than 50 activations over the last 2 years**

- **having an H24 team, available on call in Rome, to task satellites, receive data and produce situation maps**





Emergency Team – H24

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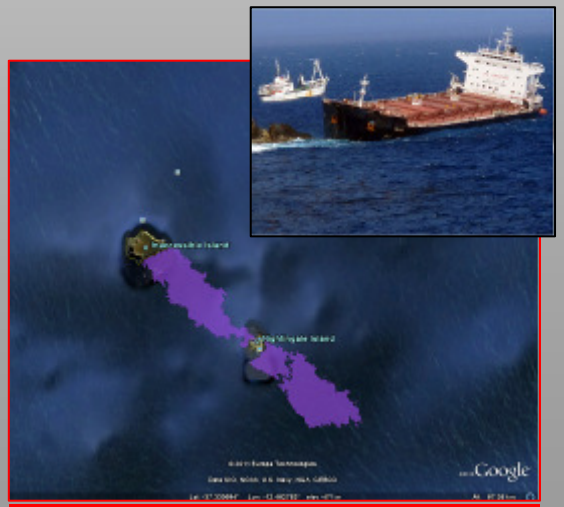
Floods

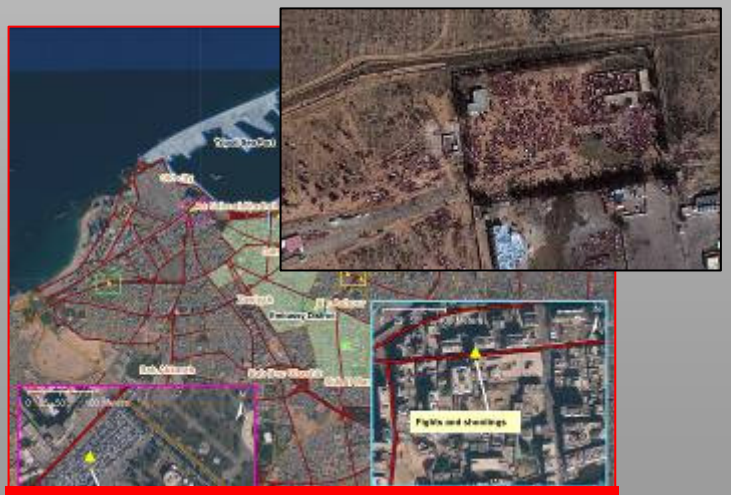
Earthquakes

Fire



Oil spill detection

Ship detection

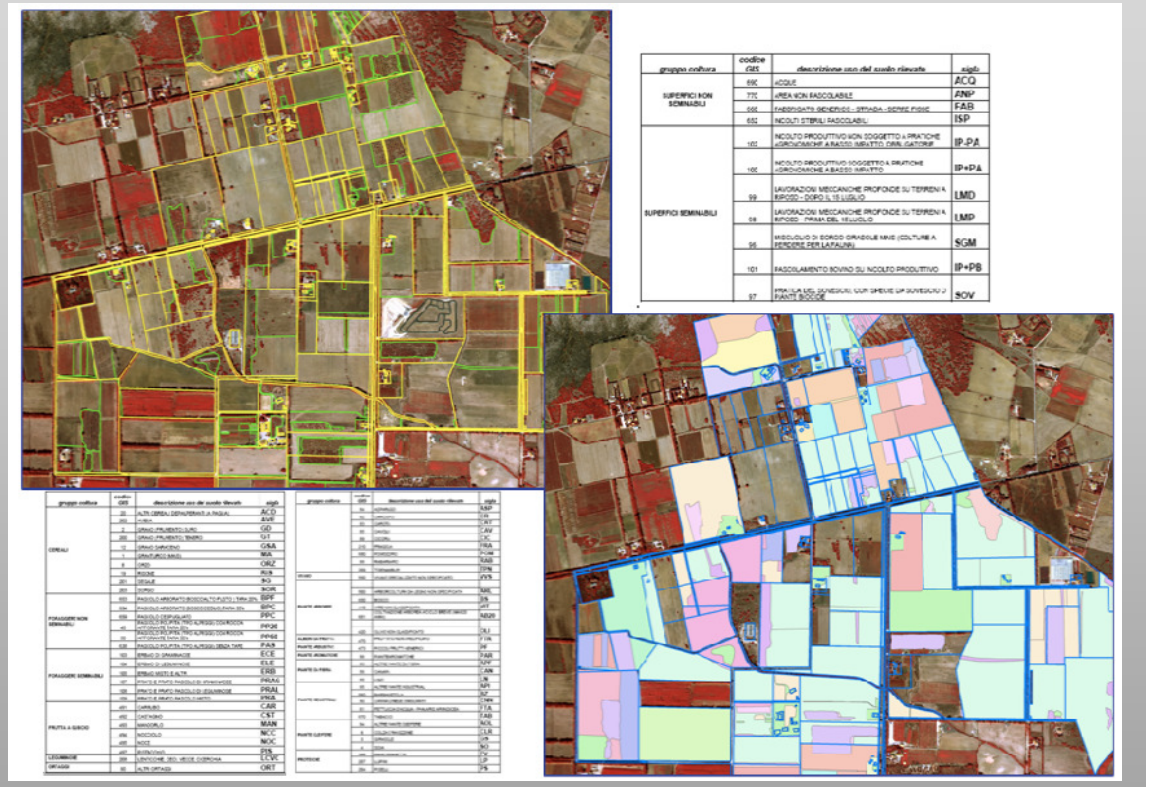


Complex crisis

Remote Sensing optical data

- In Italy e-Geos is involved in Agriculture subsidies declaration controls, through the AGEA Integrated Agricultural System

- E-Geos offers services with both aerial acquisitions and optical satellite covering 1/3 of Italy every Year, in order to extract information at large scale agriculture land change and measurements



Conclusion and perspectives

Leveraging on our facilities and on the capabilities of COSMO-SkyMed (radar data) and GeoEye (optical imageries)

we are able to reactively map any area in the world

Remote sensing has many additional use in Food Security

Micro insurance
Emergency evaluation of "spot" situations
World Wide Globe SDI (Remote Sensing + other info) for overall food information
etc

GMES and SENTINEL

Europe has always been advanced in use of satellite in agriculture applications and is bringing free and open data from the SENTINEL satellites (from 2013) that will secure the essential satellite data sources for food security