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agriculture solutions

#### AUREA IMAGING geospatial solutions

# Service portfolio

Presentation by Philippe Serruys



# **Company mission**

Aurea Imaging delivers solutions based on geographical information extracted from remote sensing data.

We deliver solutions mainly for:

- Agricultural applications
- Environmental applications
- Mining applications
- Urban applications

Aurea Imaging is an independent company.



# **Company mission**

Remote sensing data at Aurea Imaging are:

- Imagery generated by Unmanned Aerial Vehicles (UAVs);
- satellite and airborne imagery of any area on Earth; Aurea Imaging solutions use:
- field survey data like GPS and total station;
- specialised image processing software and Geographic Information Systems (GIS).



# The Aurea Imaging Service

#### Processing of all data into usable datasets Extraction of geographical information that is needed in the end



#### e.g. features, indices, change detection, etc.



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# History

## **Aurea Imaging**

Was founded in April 2008

- Out of a fusion of European (Belgium, Spain, Netherlands) and Latin American (Argentina) experts
- Experts in geomatics: remote sensing, land survey and GIS Offices in
- Zaventem, Belgium
- Buenos Aires, Argentina
- Valencia, Spain



# Competences

#### **Remote Sensing**

Using high and very high resolution satellite imagery Using aerial photography taken from UAV

## Land Survey

With UAV

With GNSS technology and totalstation

## GIS

Geographic Data creation, editing, management, Geographic analysis

## UAV

Creation and management of own vehicle





# The UAVs

# Aerial photography acquisition with UAVfixed-wingZeppelinAurea1800





# The UAVs

Specifications of the fixed wing UAV

- 30min, 200m altitude, 60 ha / flight, 12 cm resolution multispectral, 4 cm resolution with normal camera
- 30min, 1000m altitude, 400 ha / flight, 60 cm resolution



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# The UAVs

The own Aurea1800 is better designed for the Tetracam, DSLR camera and Thermal IR cameras. Flying autonomy is larger than the fixed-wing UAV



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# **The Cameras**





- cm resolution at 100m altitude
- no fine spectral resolution, images in visual spectrum



Built-up area (UAV images underneath clouds)



Vineyard management



# The Cameras

#### Multispectral camera

- 6 cm resolution and ~ 80x60m image at 100m altitude
- 6 bands spectral resolution, filters can be chosen





True colour composite (photo taken under clouds)



False colour near-IR composite (710 nm)



#### False colour near-IR composite (810 nm)

filters present at Aurea Imaging today: 470, 490, 510, 550, 570, 660, 670, 690, 700, 710, 790, 810 nm



# The Cameras

## Thermal camera

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# **Areas of applications**

Combining Satellite imagery and UAV for:

- Agriculture
- Forestry
- Environment
- Mining
- Urban and Spatial planning



# **Agricultural applications**

Why precision agriculture ?

to optimize field-level management in order to:

- match farming practices more closely to crop needs (e.g. fertilizer inputs);
- reduce environmental risks and footprint of farming (e.g. limiting leaching of nitrogen);
- boost competitiveness through more efficient practices (e.g. better management of nitrogen fertilizer usage and costs)

Remote Sensing data are a major source of input data



# **Agricultural applications**

#### Applications with multispectral camera

vegetation and crop monitoring, biomass index extraction, chlorophyll content, nitrate deficiency detection, irrigation management, damage assessment

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# **Agricultural applications**

#### Multispectral camera – false colour near-infrared composite



100 ha in 2 flights at 160m AGL > 10 cm pixel resolution



#### Applications with multispectral camera

biomass index map, format is ready to be used in the agri management system







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#### Yield prediction in winter wheat



We used a UAV with a multispectral camera, to obtain an index that was adapted to predict a reference value similar to the SPAD chloropyll meter

Using the UAVs we acquired chlorophyll reference values through the TCARI/OSAVI index, which has very good relationship with Chlorophyll content

It's a hiperspectral index = 3\*((710nm-660nm)-0,2\*(710nm-550nm) \* (710nm/660nm))



Yield prediction in winter wheat





Based on the new 2011 samples, we adjusted previous year's curves relating Spikes per m2, and Grains per spike with NDVI values.



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## DEM of an agricultural field





## DEM of an agricultural field





#### Nitrate fertilisation – 3 strategies



fertilization map based on one measurement in the field, extrapolated to the entire field



fertilization map based on different measurements in the field, interpolated to the entire field



fertilization map based on an multispectral image of the field without field measurements



#### Nitrate fertilisation



Strategy is based on plant sap field measurements

Collected in a database, per plant specie (e.g. per potato variety) and per region

> extrapolation to region per plant specie



#### Nitrate fertilisation



Strategy is based on plant sap field measurements + nitrate stairs

Collected in a database, per plant specie (e.g. per potato variety) and per region

> extrapolation to region per plant specie



#### Damage assessment







#### Salinisation monitoring

plagues

Automated classification of the damage



# Fruityard monitoring

citrus Valencia



Health monitoring based on dedicated indices

# apples and peers Brobant





#### Vineyard monitoring





map of vine carotenes content

maps using thermal IR for irrigation purposes



#### Olive orchards



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# **UAV & Satellite images**

Advantages of the different (complementary) platforms

#### UAV

Full control over acquisition time Spectral bands can be chosen Flights underneath clouds possible Highest spatial resolution possible Satellite platform

Large areas in 1 image Few geometric correction







# High scale Topography Exploration and prospection







# High scale Cartography Monitoring of waste







## Topography

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IKONOS satellite data draped over the DEM, Bronces mine Chile



# Topography based on UAV images





# **Urban applications**

# 3D modeling

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Model based on 360° oblique aerial photos







# Website and contact details

AUREA IMAGING

geospatial solutions

More information can be found on our website www.aureaimaging.com

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