



Twitter: @UsenseUAV

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Agro-ecosystems mapping by low cost photogrammetry, based on UAVs

What we do

USENSE captures **aerial data** from innovative **drone** platforms to support **decision makers** on optimizing their resources and improving performances. **Open-source hardware and software** with a unique fleet of **drones, sensors** and **processing algorithms** ensure cost-efficient and flexible **solutions** for broad range of applications.

Drones



Sensors



Processing



Markets

Agriculture



Geospatial



Environment



Construction



Remote Sensing: looking through the clouds or fly below?

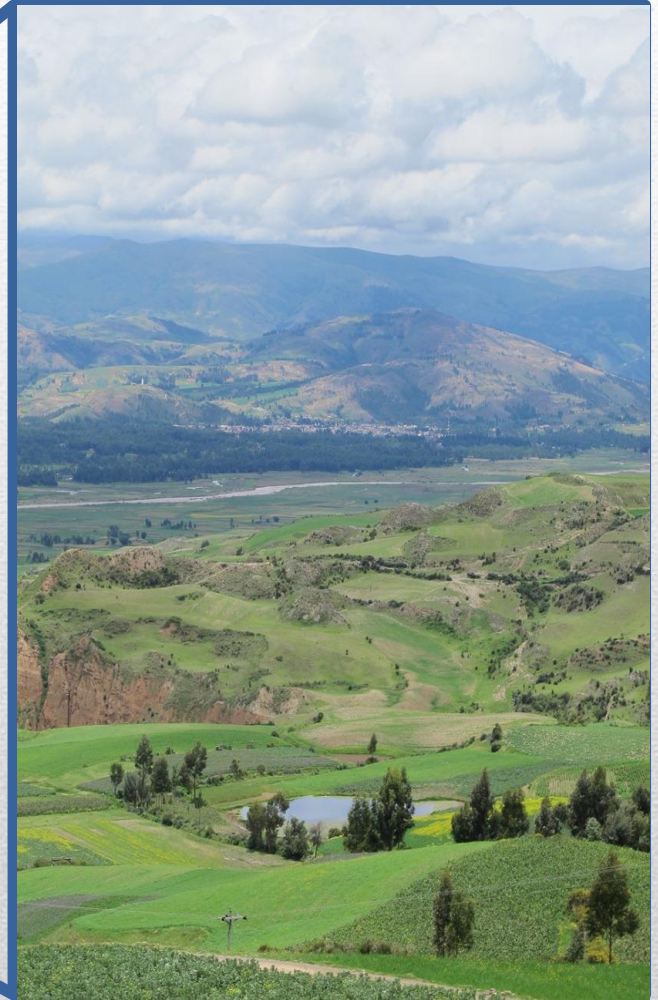
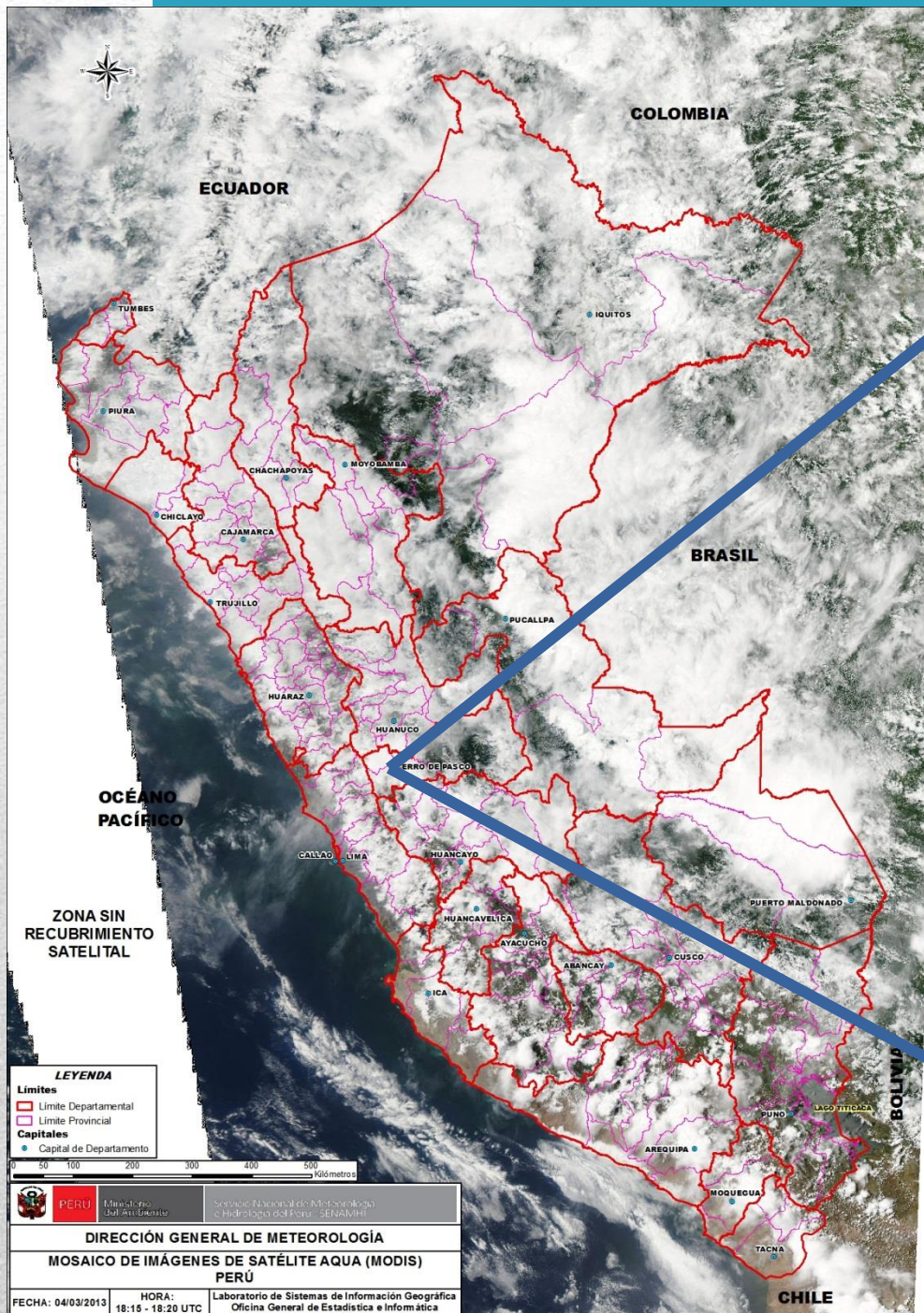


Belgium in October: Animated GIF of MODIS satellite imagery

Source: <https://earthdata.nasa.gov/labs/worldview/>

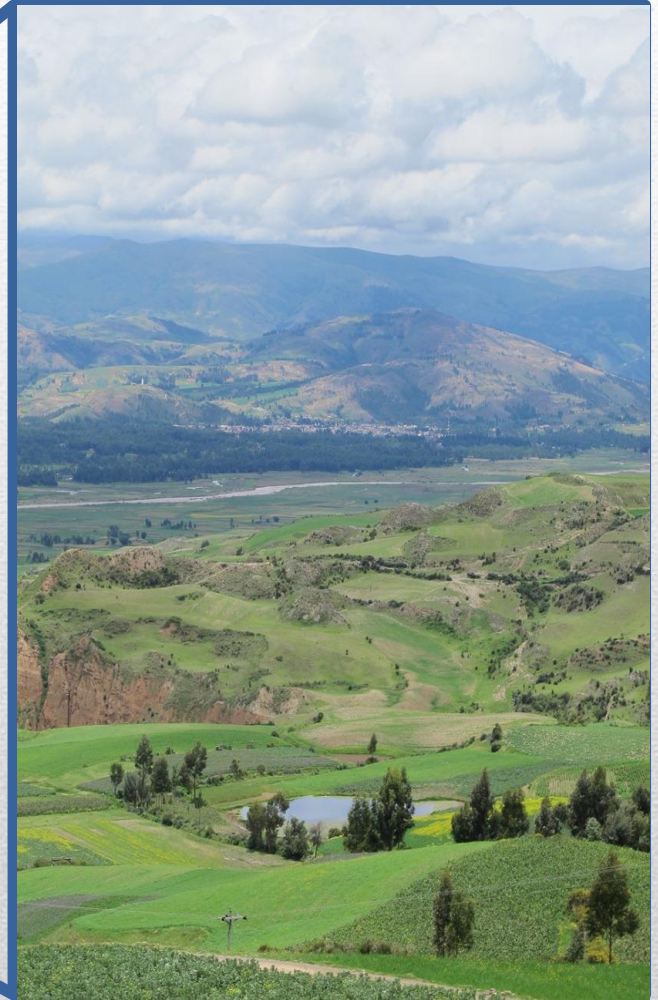
MODIS image of Peru

4/03/2013



Orthomosaic of UAV images

4/03/2013



USENSE-X8 UAV



- All you need to start mapping in one box
- 2.1m wingspan designed for stable flights
- 3kg take-off weight
- 30-40min operational time
- 2km² - 200m AGL - 75% overlap
- 3cm resolution imagery
- Telemetry- range up to 10km
- Room and technology to upgrade..





Technology - Drones

USENSE-MD8



USENSE-Jet



USENSE-X8



Use	Inspection	Mapping	Mapping XXL
Operational time	15min	30min	30-60min
Area in one flight	10 ha	100ha	+200ha
Weight	2.7kg	2kg	3-4kg
Camera	RGB, NIR, Multispectral Thermal	RGB, NIR	RGB, NIR, Multispectral Hyperspectral, Thermal
Autopilot	Auto take-off/landing Waypoint navigation	Auto take-off/landing Waypoint navigation	Auto take-off Assisted Landing Waypoint navigation
Software	Planning & Monitoring	Planning & Monitoring	Planning & Monitoring



Technology - Sensors

USENSE selects the **right sensor** for each specific application. Farmers can identify **plant health stress** far beyond human vision with **multi- or hyperspectral** sensors , Inspection teams of **solar cells** can be detected hotspots with a **thermal** imaging sensor and geospatial **surveyors** can rely on **+24MP** camera systems





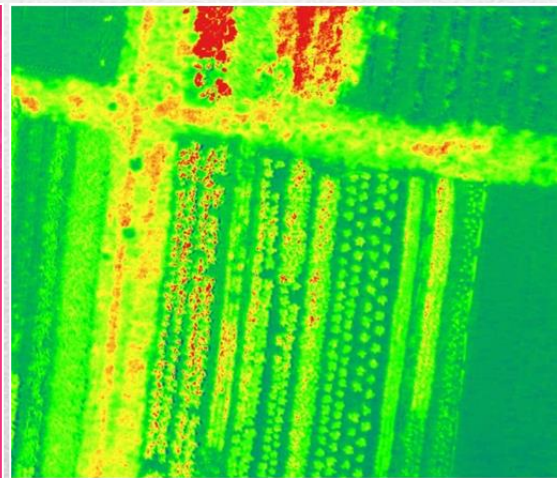
Technology - Sensors

Improved vegetation/crop monitoring with Near Infrared

RGB

Near Infrared

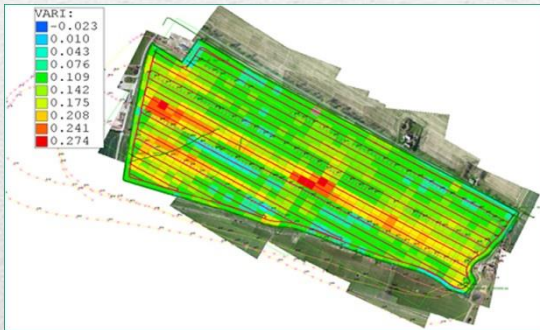
NDVI



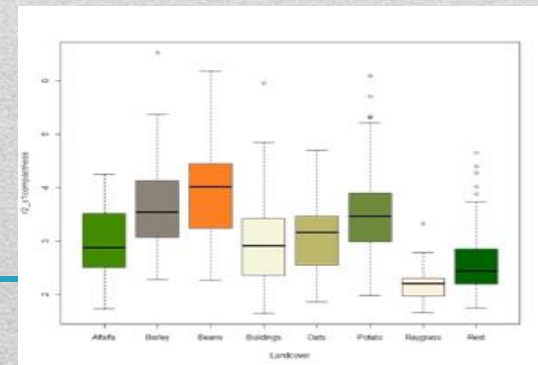
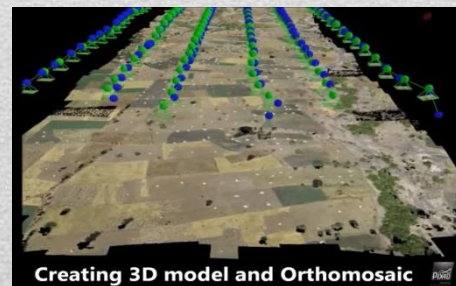
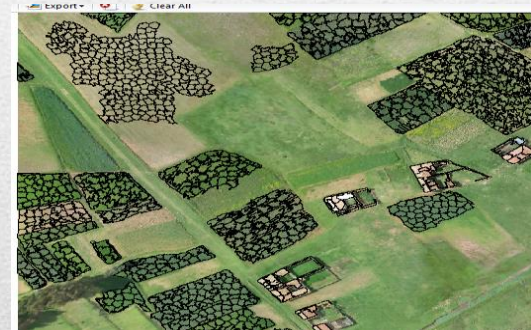


Technology – Image processing

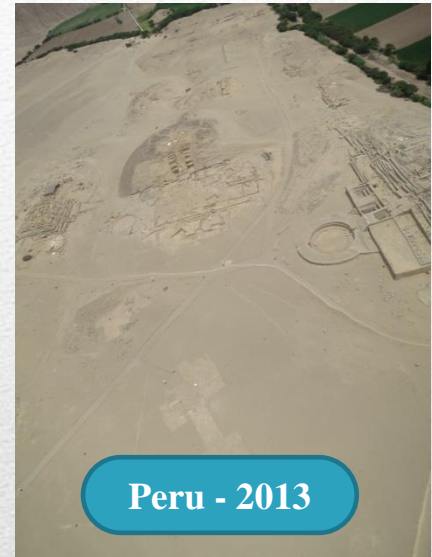
USENSE doesn't just fly drones, nor only supplies a set of images. We use **image processing and analysis tools**, which are adopted from the GIS and Remote Sensing community to deliver a **wide range of geospatial products** aimed to drive our **customer productivity**.



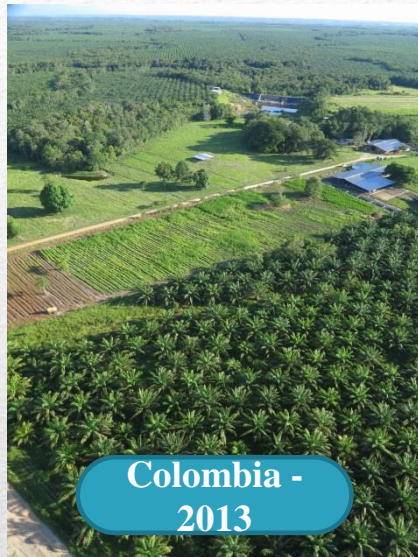
```
File Edit Search Source Run Tools View
C:\Documents and Settings\johndoe\My Documents\workspace\proj
Interpretation [?] workspace_proj
Source Console Output numpy.mean
numpy.mean
Compute the arithmetic mean along the specified axis.
Return the average of the array elements. The average is taken over the
indicated axis or axes. In the case of multiple axes, values over the
axis/axes are first collapsed, and then the mean is calculated.
Parameters
-----
a: array_like
Array containing numbers whose mean is desired. If a is not an
array, it is converted to an array.
axis: int, optional
Axis along which the means are computed. The default is to compute
the mean of the flattened array.
keepdims: bool, optional
If this is set to True, the axes which are collapsed in the
result are set to 1 in the resulting array.
Console
Python 2.7.6
In [1]: numpy.mean([1,2])
Out[1]: array([ 0.5])
In [2]: numpy.mean([0.3456789, 0.9000743, 0.3411206])
Out[2]: array([ 0.54228456])
```



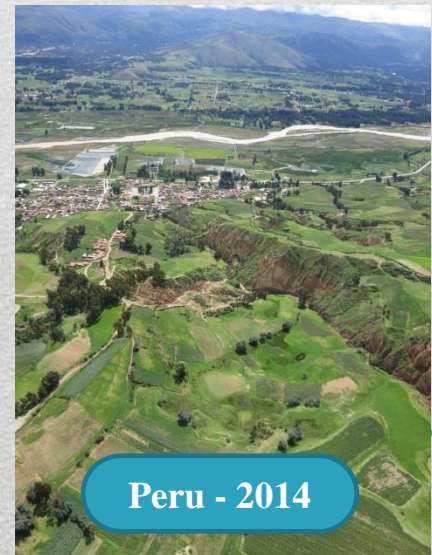
RECENT PROJECTS - Mapping



Peru - 2013



Colombia - 2013



Peru - 2014



Ecuador - 2014



Ethiopia - 2014

RECENT PROJECTS – Training

Peru - 2014



Colombia - 2013



Ecuador - 2014



Peru - 2014



Cuba - 2014

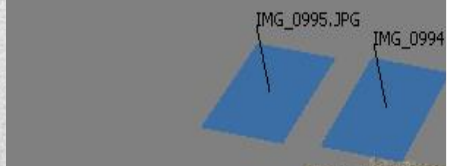
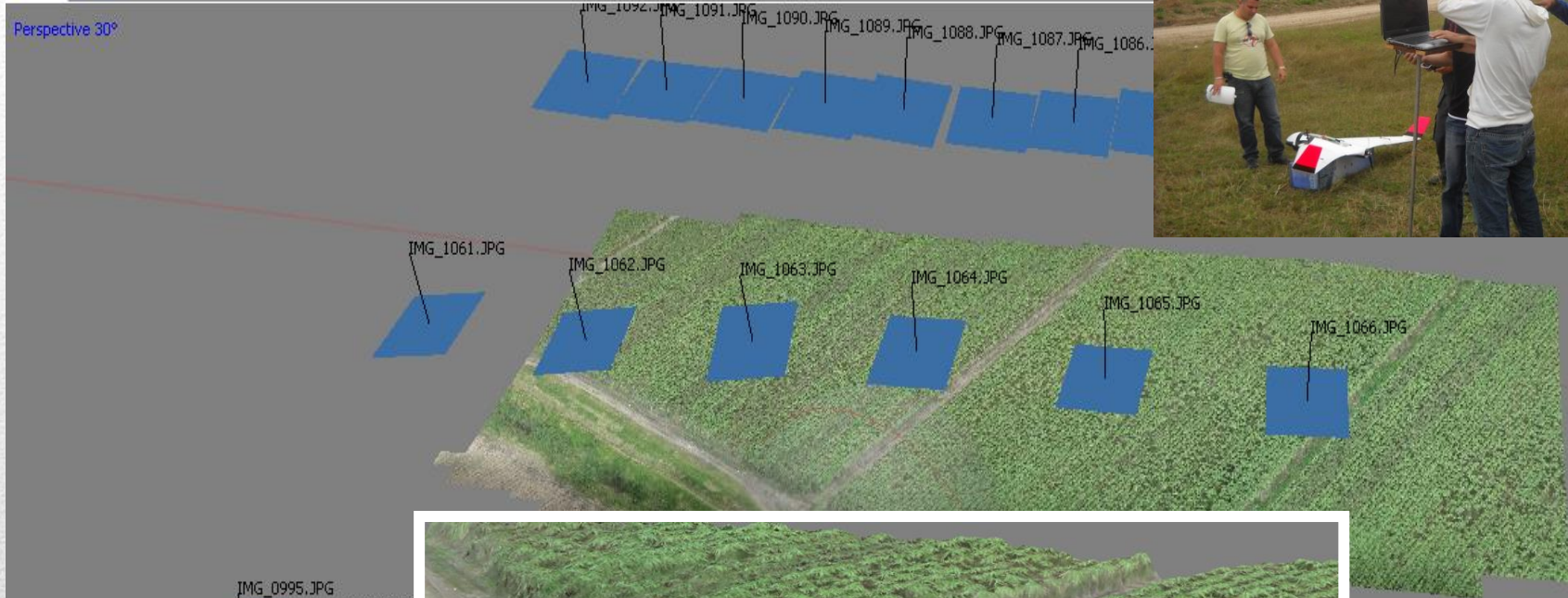


Ethiopia- 2014

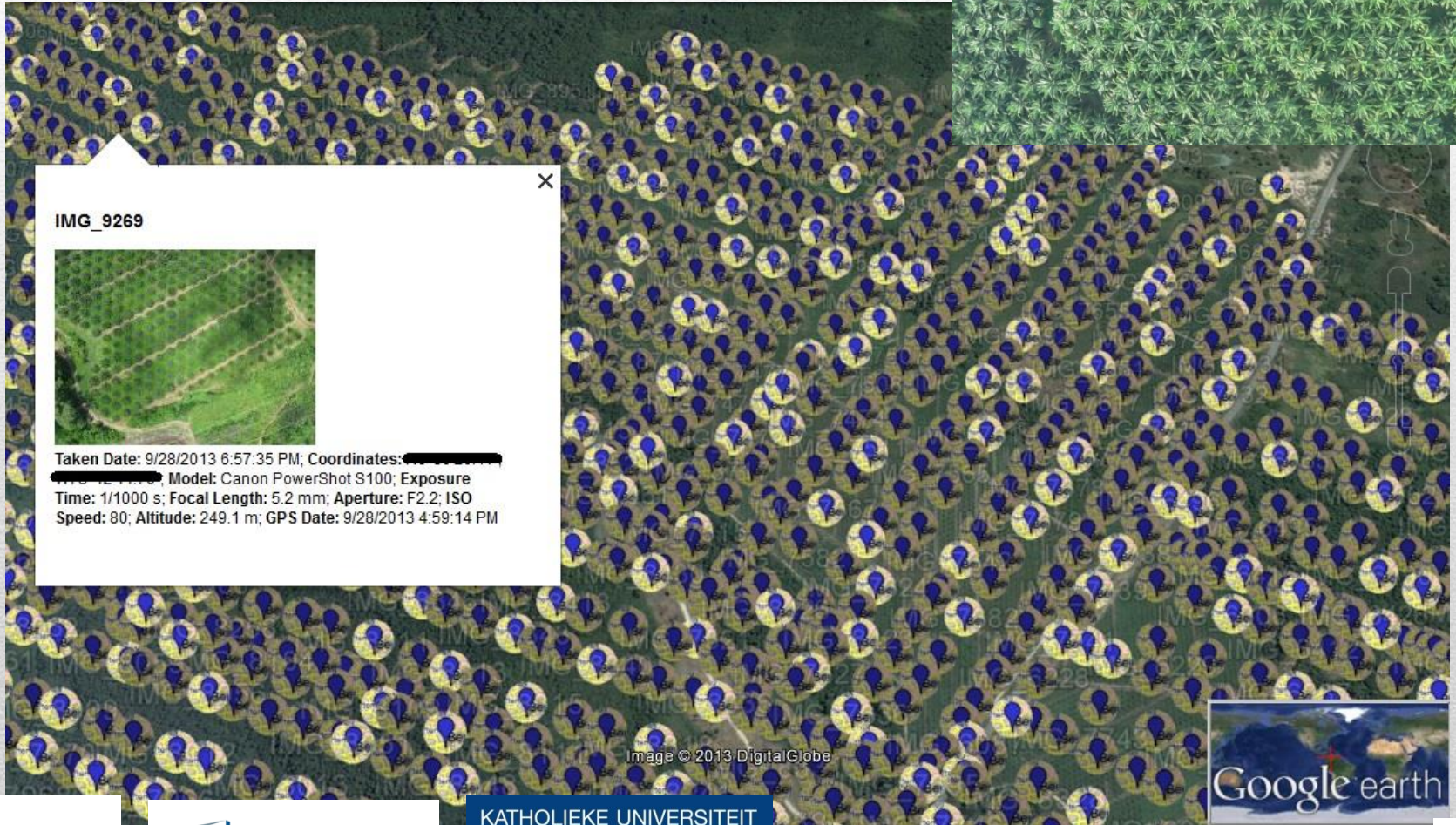


Peru - 2013

Sugercane - Cuba



Oil Palm - Colombia



IMG_9269

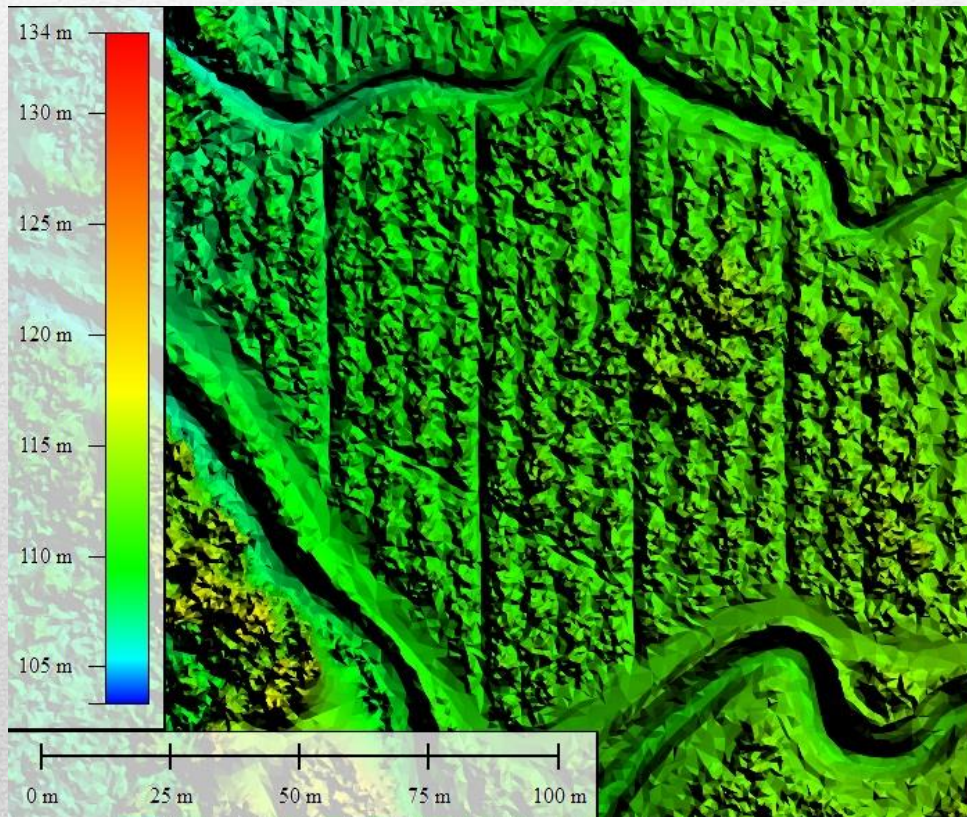


Taken Date: 9/28/2013 6:57:35 PM; Coordinates: [REDACTED]
Model: Canon PowerShot S100; Exposure Time: 1/1000 s; Focal Length: 5.2 mm; Aperture: F2.2; ISO Speed: 80; Altitude: 249.1 m; GPS Date: 9/28/2013 4:59:14 PM

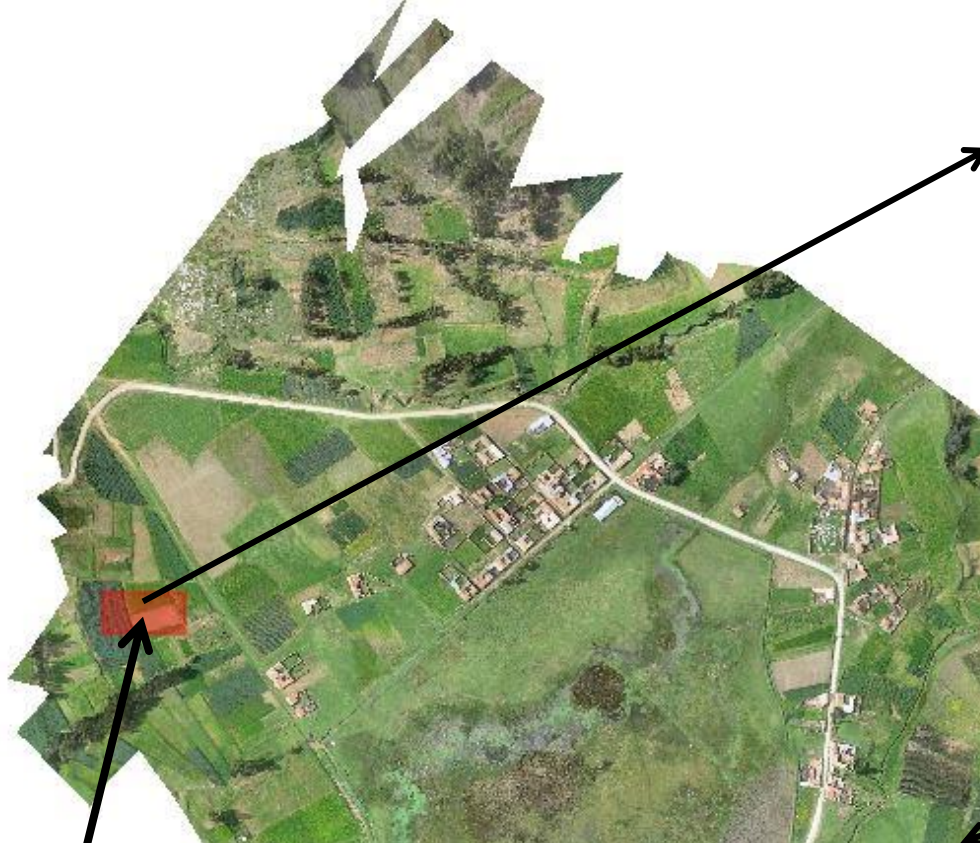
Image © 2013 DigitalGlobe



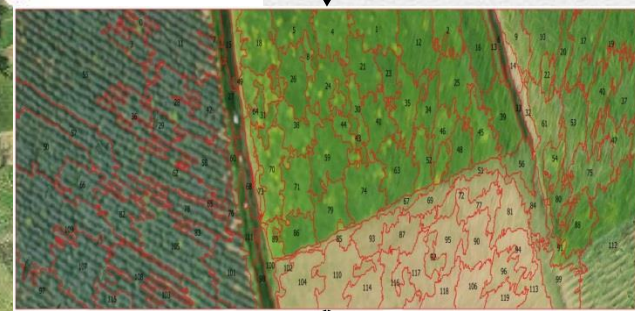
Oil palm - Colombia



Landuse evaluation - Peru

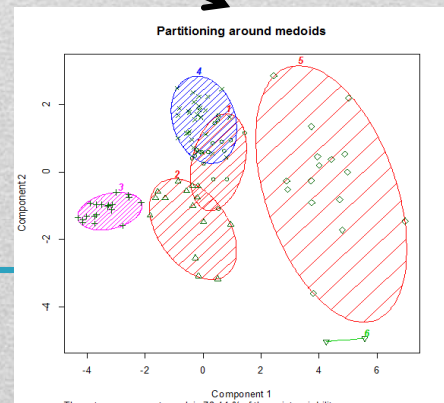
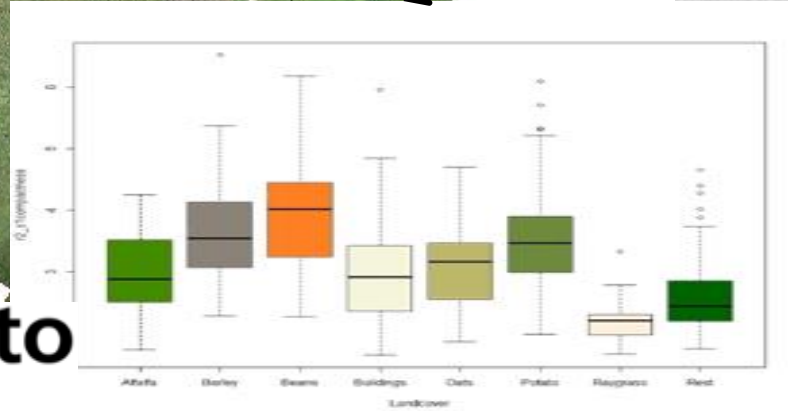


Supapixel algorithm



Supervised

Unsupervised



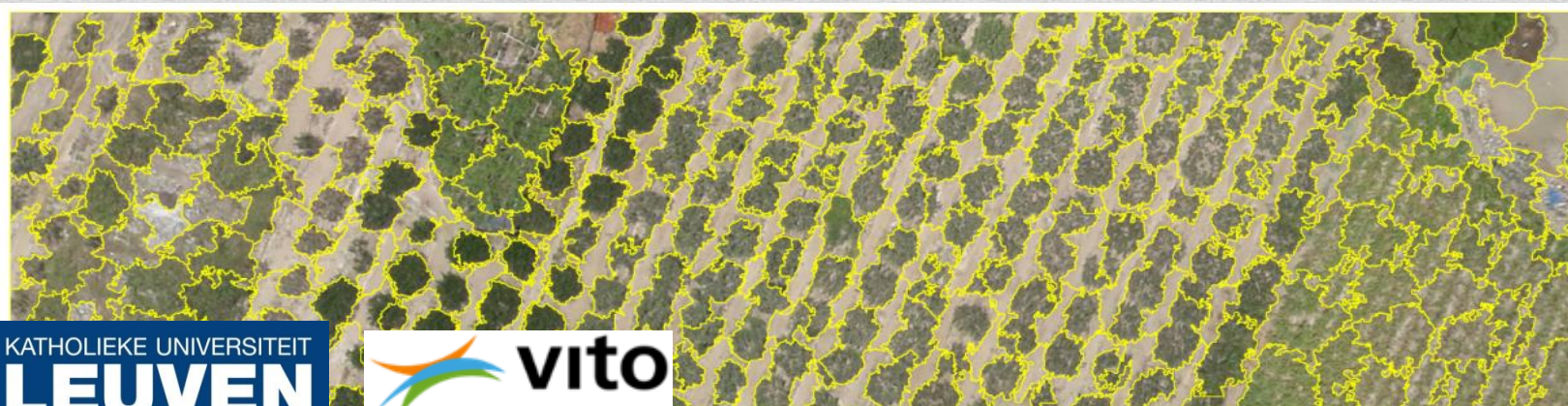
Landuse evaluation

Results Superpixel algorithm

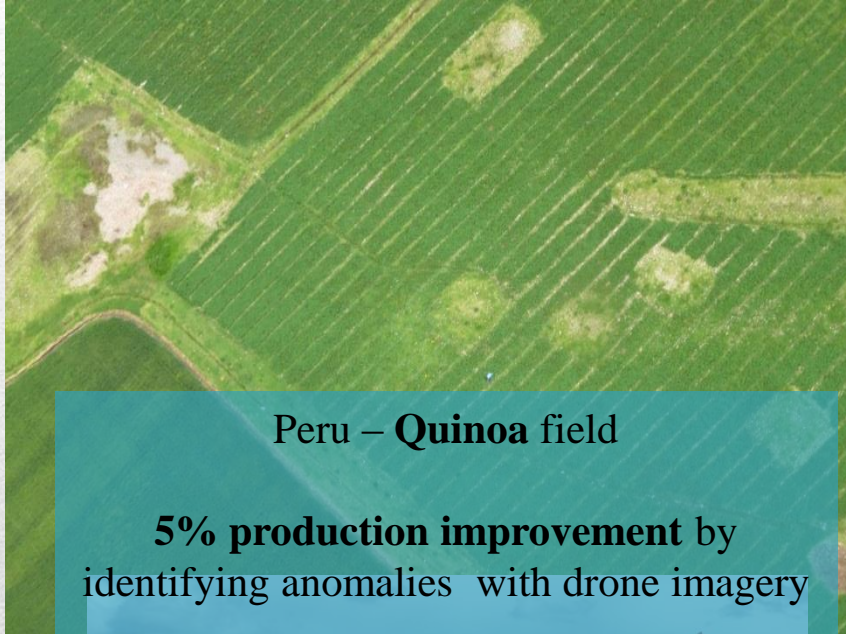
Oil palm



Apple trees



Production optimization



Let's map your world!

Are drones the game changers we all have been waiting for?

*YES.. But it will only be **together** with recurring satellite information, fast processing capacity, smart algorithms and enthusiastic people that it can have a real impact on food production!!*

