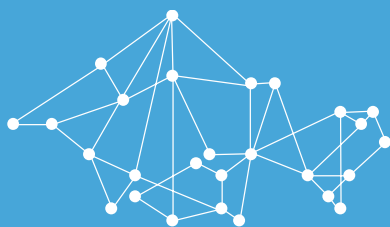




BELAIR WORKSHOP
2016,
8 NOVEMBER,
BRUGES



THE BELAIR 2015 PROJECT

Ils Reusen, Koen Meuleman, Kristin Vreys, Bart Ooms, Bart Bomans, Johan Mijndonckx, Pieter-Jan Baeck, Marian-Daniel Iordache, Tom Verstappen,
VITO Remote Sensing

BELAIR 2015

BELAIR 2015 - Objectives



- » Organize spaceborne, APEX and UAV acquisitions

- » Simultaneously perform in-situ measurements at
 - “Litora”
 - “Sonia”
 - “Hesbania”

in collaboration with all key users interesting in joining

Local coordinators at each of the three sites: Liesbeth De Keukelaere (VITO) @ “Litora”, Boud Verbeiren (VUB) @ “Sonia” and Stephanie Delalieux (VITO) @ “Hesbania”

- » **Process, archive and distribute** spaceborne, APEX and UAV imagery and in-situ data to be exploited in MSc and PhD theses and/or running/future (inter)national research projects

BELAIR 2015 - Kick Off meeting, 20 March 2015 @ BELSPO



- » Preliminary APEX, UAV acquisition plans presented and discussed
- » APEX and UAV processing presented
- » Preliminary field campaign plans discussed
- » BELAIR sites discussed and “Sonia” and “Hesbania” sites extended
- » Collaboration at BELAIR sites discussed and extended

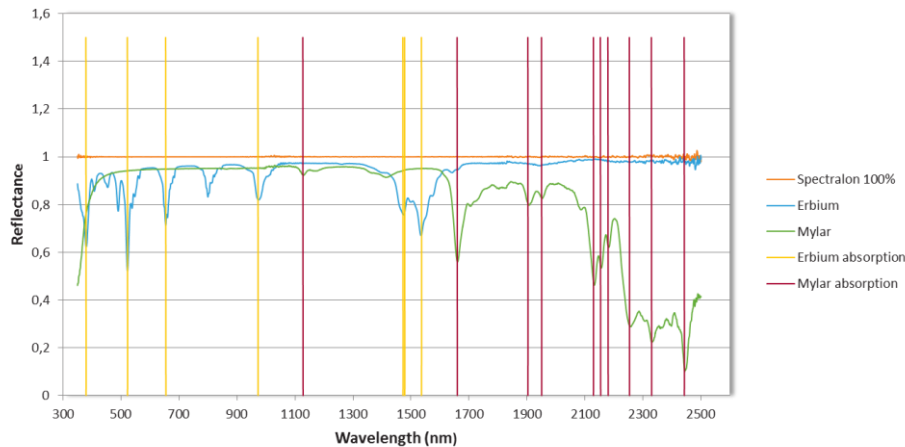


BELAIR 2015 - Performance verification

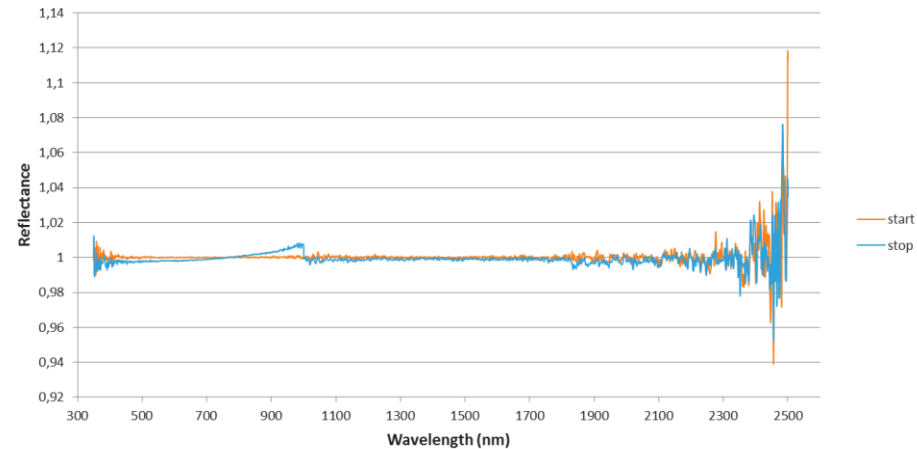


- » Uniform measurement protocol and verification of spectral and radiometric performance of ASD spectroradiometers UCL, VUB and VITO: spectral (Erbium, Mylar), radiometric (synthetic panels, stability)
- » A spectral and radiometric verification report including recommendation to clean the spectralon panel before the start of the campaign was provided to UCL and VUB.

Spectral verif ASD KULeuven



Stability ASD VUB (30min)



BELAIR 2015 - Auxiliary data training



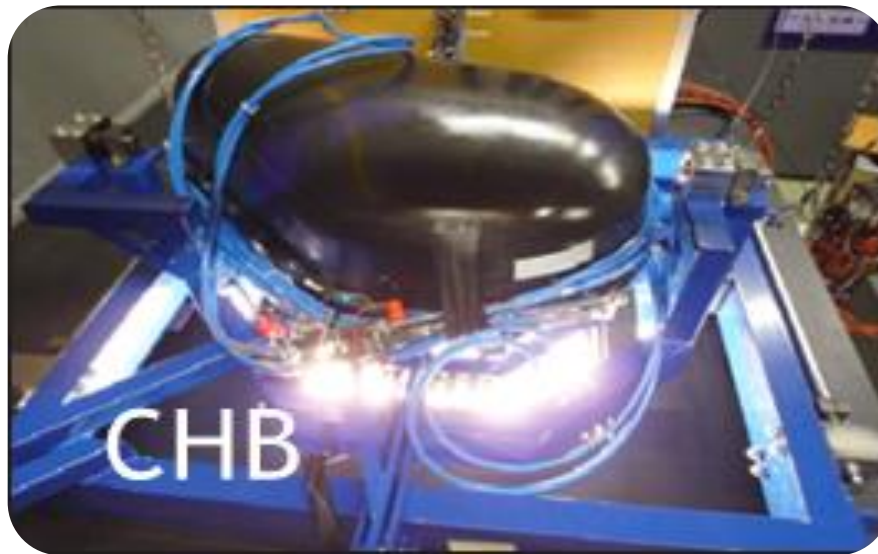
- » BELAIR auxiliary data training at VITO on 6 May 2015
- » Recommendations/manuals/forms/sample data for pre-processing provided to teams



BELAIR 2015 - APEX calibration



- » The hyperspectral APEX sensor was calibrated (spectral, radiometric and geometric) at the Calibration Home Base (CHB) hosted by DLR in April 2015.





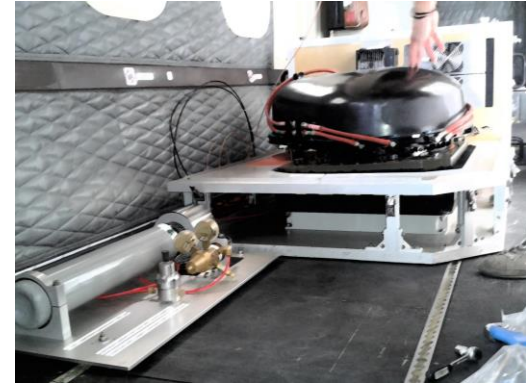
BELAIR 2015 - APEX Campaign

APEX



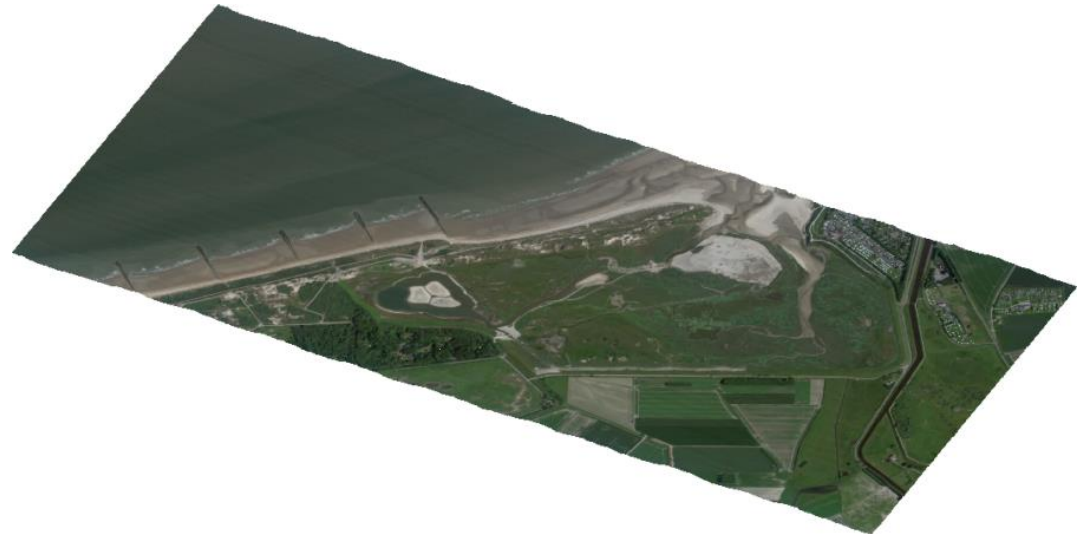
APEX data acquisition:

- » Hesbania
- » Sonia
- » Litora



APEX data processing:

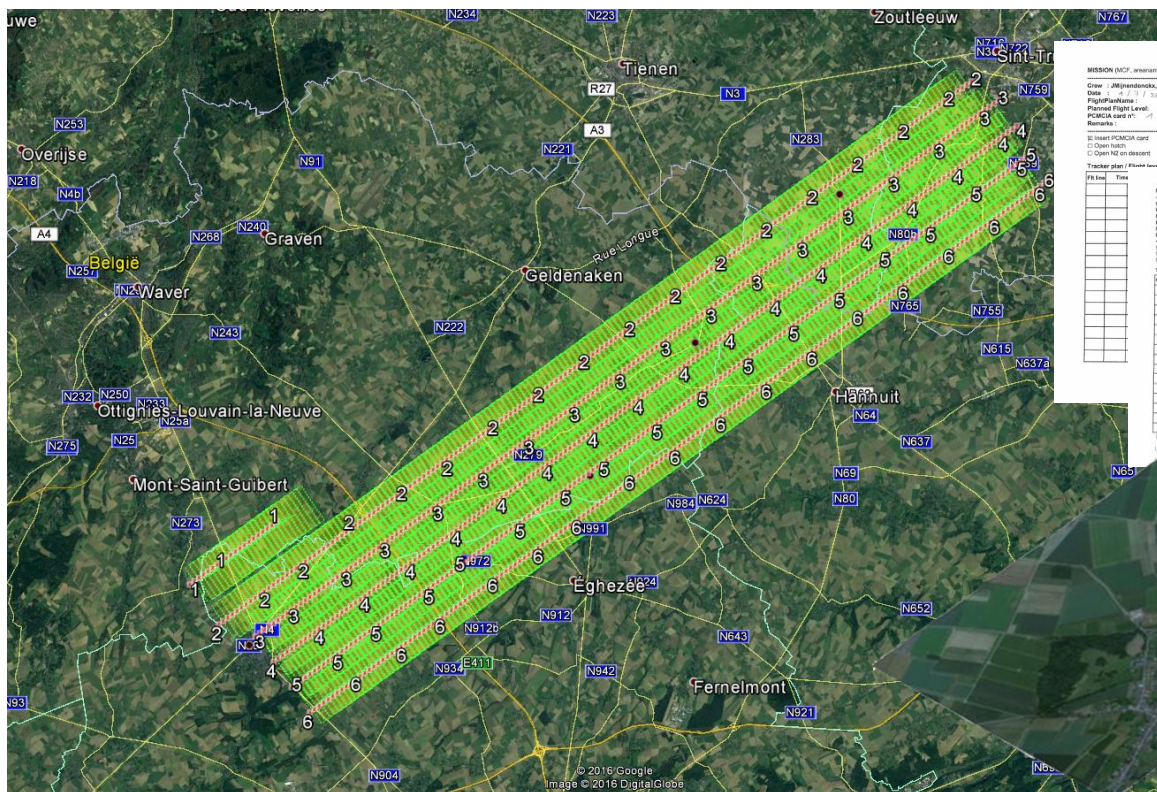
- » POS data processing
- » Image data processing



Hesbania flight



Location, area : St. Truiden - Gembloux, 300 km²
 # FLs planned : 5 + 1
 # FLs imaged, alt. : 4 + 1, 4200m AGL (FL140)
 Date Time : 01/07/2015 1500-1600 LT
 Remark : MIL restrictions, last FL aborted
 Conditions : ++



MISSION (MCP, anemom): HESBANIA, BELAIR

Crew : J.M.Pons, B.Bornans, B.Bornans, ...

Date : 01/07/2015

Planned Flight Level : 4200

PC/MCA card # :

Remarks :

Insert PC/MCA card
 Open NZ on ascent
 Remove PC/MCA card
 Close hatch
 Open NZ on descent
 Close NZ after landing

Connect Tracker to Applique POS + Connect Tracker to CSU
 Select the Flight Lines to be flown + check heading accuracy (+ 9°)
 Pressure NZ before take off : 0
 Time engine ON : 15:00
 Start/End time static POS logging : Start 15:00 End 16:00 (min:5)
 Time engine OFF : 16:00
 Pressure NZ after landing : 0

Time to/return : 15:00
 Start/End time static POS logging : Start 15:00 End 16:00 (min:5)
 Time engine OFF : 16:00
 Pressure NZ after landing : 0

Tracker plan / Flight level :

FL track	Time
1	
2	
3	
4	
5	
6	

MISSION (MCP, anemom): HESBANIA, BELAIR

Crew : J.M.Pons, B.Bornans, B.Bornans, ...

Date : 01/07/2015

Planned Flight Level : 4200

PC/MCA card # :

Remarks :

Insert PC/MCA card
 Open NZ on ascent
 Remove PC/MCA card
 Close hatch
 Open NZ on descent
 Close NZ after landing

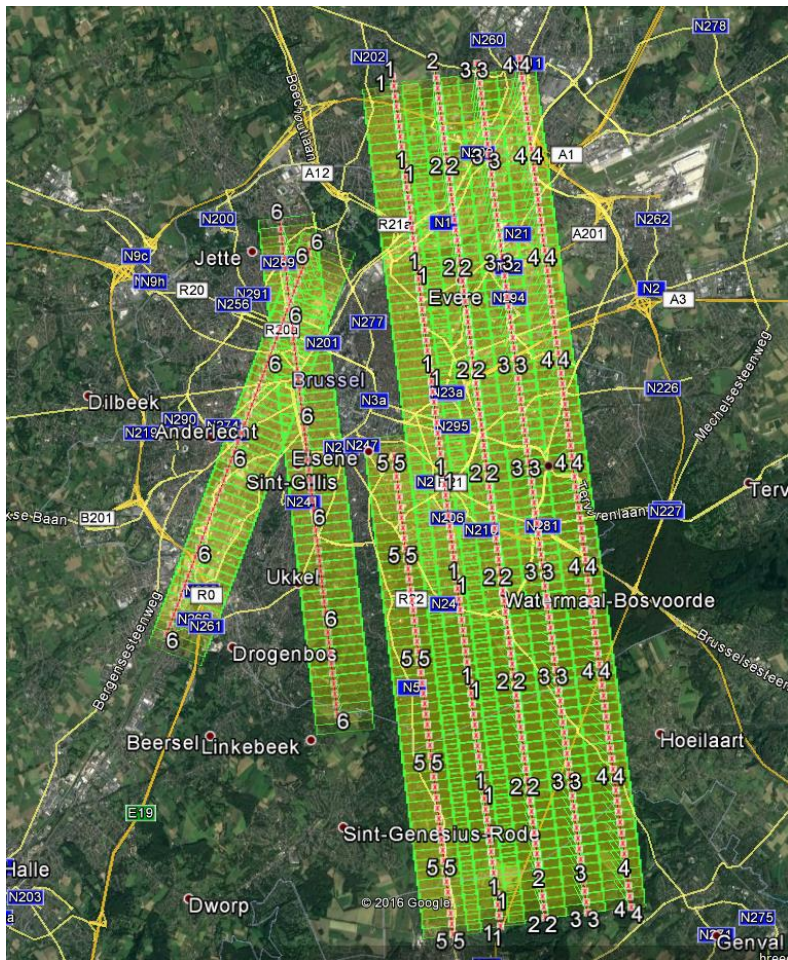
Connect Tracker to Applique POS + Connect Tracker to CSU
 Select the Flight Lines to be flown + check heading accuracy (+ 9°)
 Pressure NZ before take off : 0
 Time engine ON : 15:00
 Start/End time static POS logging : Start 15:00 End 16:00 (min:5)
 Time engine OFF : 16:00
 Pressure NZ after landing : 0

Time to/return : 15:00
 Start/End time static POS logging : Start 15:00 End 16:00 (min:5)
 Time engine OFF : 16:00
 Pressure NZ after landing : 0

Tracker plan / Flight level :

FL track	Time
1	
2	
3	
4	
5	
6	

Sonia flight



Location, area : Zoniën and Brussels City, 150 km²
 # FLs planned : 6
 # FLs imaged, alt. : 7, 3350m AGL (FL110)
 Date Time : 30/06/2015 1130-1230 LT
 Remark :
 Conditions : ++

MISSION(B): SONIA FL110 M012

Crew : J.Mijnders, B.Doms, B.Bomans, ...
 Date : 30/06/2015
 PCMCIA card n°: 4
 Remarks :

Insert PCMCIA card Remove PCMCIA card
 Open hatch Close hatch
 Open NZ on descent Close NZ after landing

Pressure N2 before take off: Left _____ Right _____
 Time engines ON: Start _____ End _____ (min S)
 Time airborne: Start _____ End _____ (min S)
 Time touchdown: Start _____ End _____ (min S)
 Start/End time static POS logging: Start _____ End _____ (min S)
 Time engines OFF: Start _____ End _____ (min S)
 Pressure N2 after landing: _____

MCP: Sonora 83 (in Sonora V2)

Flight plan level:				Flight plan level:			
FL line	Time(LT)	Setting	Notes (weather, flight direction, flight level...)	FL line	Time(LT)	Setting	Notes (weather, flight direction, flight level...)
1	11:30		1st paper standard imaging	6	12:35	D=0	BACKSCATTER, 11:30
2	11:31	B-G-B	N+S				
3	11:32	B-G-B	S+N				
4	11:33	N+S					
5	11:34	N+S					
6	11:35	N+S					



Litora flight - 2 separate days



Location, area : IJzermonding, 10 km²
 # FL'ns planned : 1
 # Fl'ns imaged, alt. : 4x 1, 3650m AGL (FL120)
 Date Time : 06/07/2015 1130-1145 LT
 Remark : extra heli's Tour de France - ATC
 Conditions : bad

Location, area : Lage Moere, 40 km²
 # FL'ns planned : 5
 # Fl'ns imaged, alt. : 5, 3650m AGL (FL120)
 Date Time : 30/06/2015 1050-1115 LT
 Remark : flown just before Sonia
 Conditions : ++ blue sky

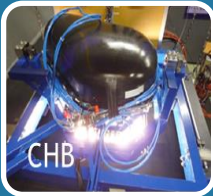
Location, area : 't Zwin, 12 km²
 # FL'ns planned : 2
 # Fl'ns imaged, alt. : 4x 2, 3650m AGL (FL120)
 Date Time : 06/07/2015 1155-1245 LT
 Remark, conditions : as IJzermonding

BELAIR 2015 - APEX processing and delivery

APEX data processing

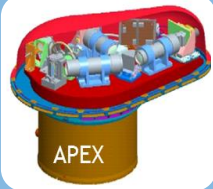


Determine:




• APEX sensor geometry
• APEX spectral characteristics

Process:

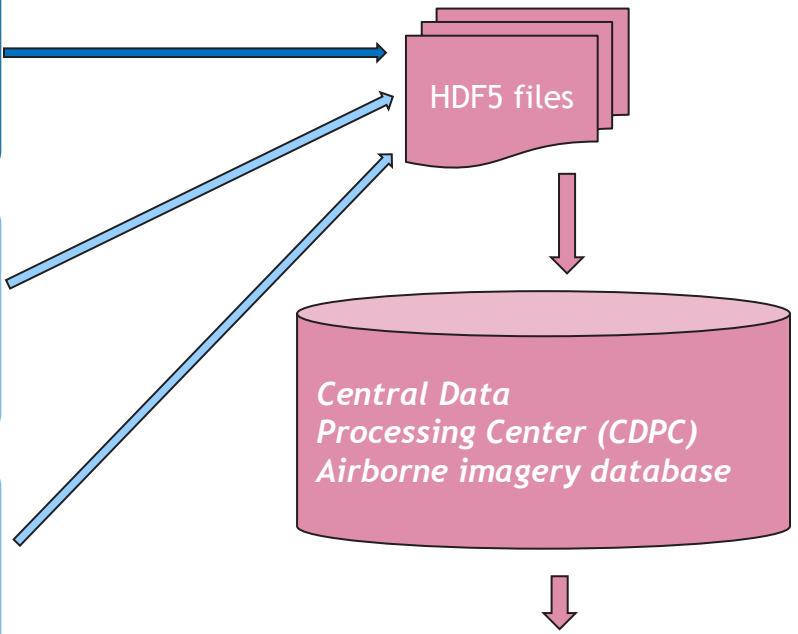


• Raw digital numbers to at-sensor radiances
• Image & system metadata

Perform:



• Differential correction of GPS (position) data
• Blending of GPS (position) and IMU (orientation) data
• Boresight calibration



CDPC L2 processing chain:

- Geomodelling
- Atmospheric correction
- Spectral resampling
- Projection

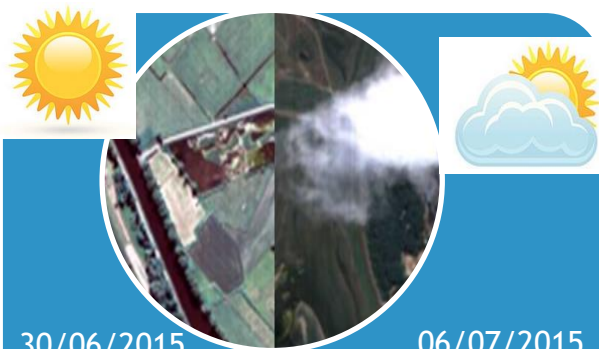
Four circular icons, each containing a gear with a circular arrow, representing the steps of the CDPC L2 processing chain.

Colibri:

spectral smoothing

An icon for Colibri, showing a magnifying glass over a line graph with a yellow peak, representing spectral smoothing.

APEX data delivery



30/06/2015
Lage Moere

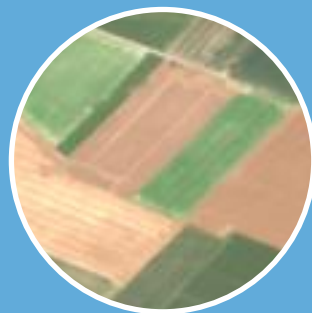
06/07/2015
Zwin / IJzer

Hyperspectral data cubes
of 5 flight lines
(Lage Moere only)

Available on BelAir FTP-server
<ftp://cvbftp.vgt.vito.be>
folder 'litora'

Litora

Data delivery: 07/12/2015



01/07/2015

Hyperspectral data cubes
of 5 flight lines

Available on BelAir FTP-server
<ftp://cvbftp.vgt.vito.be>
folder 'hesbania'

Hesbania

Data delivery: 06/11/2015



30/06/2015

Hyperspectral data cubes
of 7 flight lines
Geometrically corrected using
AGIV DHMVII DTM/DSM @ 1m

Available on BelAir FTP-server
<ftp://cvbftp.vgt.vito.be>
folder 'sonia'

Sonia

Data delivery: 02/11/2015

APEX quicklooks 2015 - Litora - Lage Moere



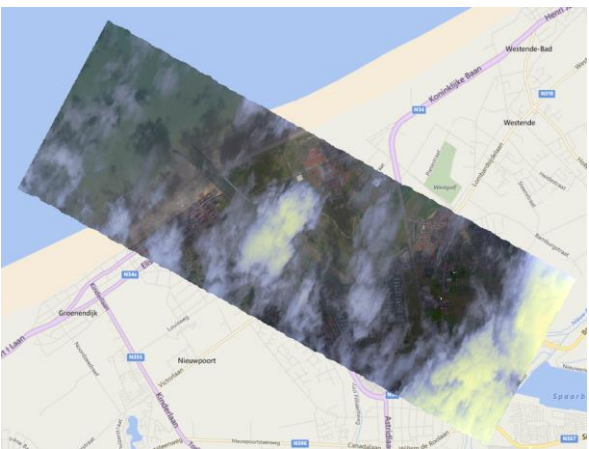
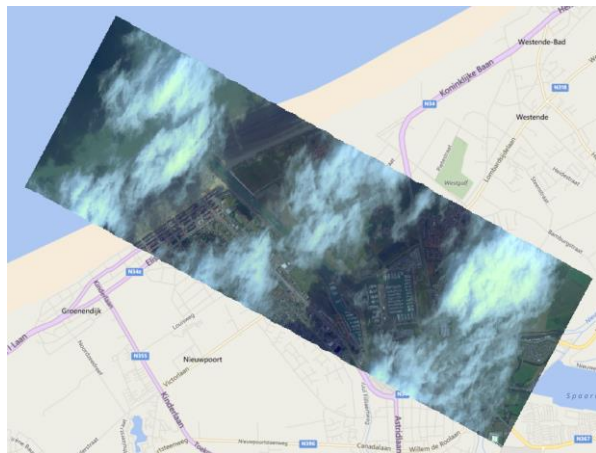
APEX quicklooks 2015 - Sonia



APEX quicklooks 2015 - Hesbania



APEX quicklooks 2015 - Litora - IJzer



APEX quicklooks 2015 - Litora - Zwin



LITORA-Lage Moere



The screenshot displays the BELAIR web application interface. At the top, there is a navigation bar with the BELAIR logo on the left, the user name "Hello IIs Reusen" in the center, and an "Actions" dropdown menu on the right. Below the navigation bar are tabs for "Home", "Product list", "Map", and "Documents", with "Product list" being the active tab.

The main content area is divided into several sections:

- Filter:** A section on the left side of the map, currently empty.
- Site:** A list of sites with their respective counts: hesbania (17), litora (16), and sonia (10).
- Data Type:** A list of data types with their respective counts: ground data (27), airborne (14), and spaceborne (2).
- Campaign:** A list of campaigns with their respective counts: 2013 (37), 2015 (4), and 2014 (2).
- Keywords:** A list of keywords with their respective counts: St Truiden (12), ASD (11), and Brussels (0).

The central part of the interface is a map showing the LITORA-Lage Moere area. The map is overlaid with a dark, textured polygon representing the site boundary. The map includes labels for various roads (N307, N9, N377, N371, N367, N32, N50, N342, E40) and locations (Kruisabele, Zeveneke, Bruges, Jabbeke, Doornstraat, Expresweg, Risselestraat). The map is displayed in a satellite view.

On the right side of the map, there is a sidebar with the following content:

- Other actions:** A dropdown menu.
- vito logo:** The logo for vito, with the tagline "vision on technology".
- Product Information:** A section titled "sba" with a last update date of "2016-11-02".
- Map Thumbnail:** A small thumbnail map showing the location of the site within a larger geographic context.
- vito logo:** The logo for vito, with the tagline "vision on technology".
- Product Information:** A section titled "sba" with a last update date of "2016-11-02".

At the bottom of the screenshot, the Windows taskbar is visible, showing the system tray with the time "12:34" and the date "7/11/2016".

HESBANIA



http://belair.geoportal.vgt.vito.be/geonetwork/apps/tabsearch/?hl=eng

Belair Catalogue

Hello Ils Reusen Actions

Home **Product list** Map Documents

Filter

Site

- hesbania (17)
- litora (16)
- sonia (10)

Data Type

- ground data (27)
- airborne (14)
- spaceborne (2)

Campaign

- 2013 (37)
- 2015 (4)
- 2014 (2)

Keywords

- St Truiden (12)
- ASD (11)
- Brussel (9)

Other actions

vito
vision on technology

ekers Dries - Last update: 2016-11-02

vito

http://belair.vgt.vito.be/

12:30 7/11/2016

SONIA



The screenshot displays the BELAIR web application interface. At the top, a browser window shows the URL <http://belair.geoportal.vgt.vito.be/geonetwork/apps/tabsearch/?hl=eng>. The main header includes the BELAIR logo and navigation tabs for Home, Product list, Map, and Documents. A right-hand navigation bar contains the text "Hello Iis Reusen" and an "Actions" dropdown menu.

The central map shows Brussels, Belgium, with a large, dark, textured rectangular area overlaid on the city center, representing the data being viewed. The map includes labels for various districts and landmarks such as Jette, Ganshoren, Sint-Agatha-Berchem, Anderlecht, Forest, Uccle, and Ixelles.

On the left side, there is a "Filter" panel with a search input field and a "Site" section listing categories: hesbania (17), litora (16), and sonia (10). Below this is a "Data Type" section with options: ground data (27), airborne (14), and spaceborne (2). A "Campaign" section lists years: 2013 (37), 2015 (4), and 2014 (2). A "Keywords" section lists: St Truiden (12), ASD (11), and Brussels (0).

On the right side, there is a "vito" logo with the tagline "vision on technology" and a user profile for "ooms oomsba" with the text "Last update: 2016-11-02". Below this is a smaller map showing the same data overlay on a larger geographic context. The bottom of the screen shows a Windows taskbar with various application icons and a system tray displaying the time as 12:33 and the date as 7/11/2016.

BELAIR 2015 - UAV Campaigns

UAV data acquisition-overview

Ebee platform was used combined with multiple payloads:

-) RGB
-) Red Edge Camera
-) Multispec 4C



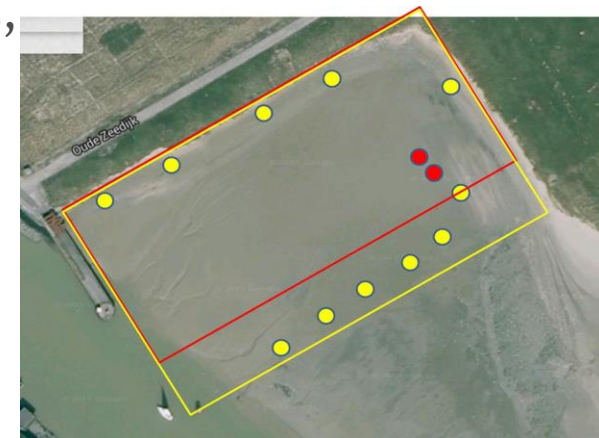
» Hesbania

-) Gembloux area's (several flights, 75 datasets acquired on several dates)
-) Sint-Truiden/PC fruit (5 acquisitions between May and Sept, RGB, Re and Multispec datasets,



» Litora

-) Zwin (11/07/2015, 6 flights Re, Multispec)
-) Lage Moere (30/06/2015, 5 flights Multispec)
-) Nieuwpoort (10/07/2015, 7 flights, Multispec)



BELAIR 2015 - UAV processing and delivery

UAV data processing



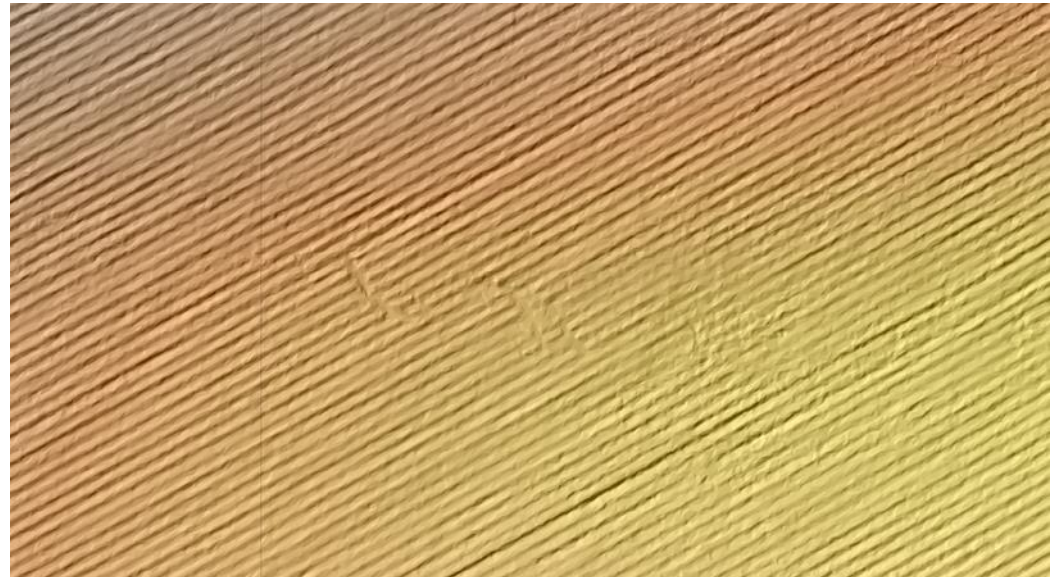
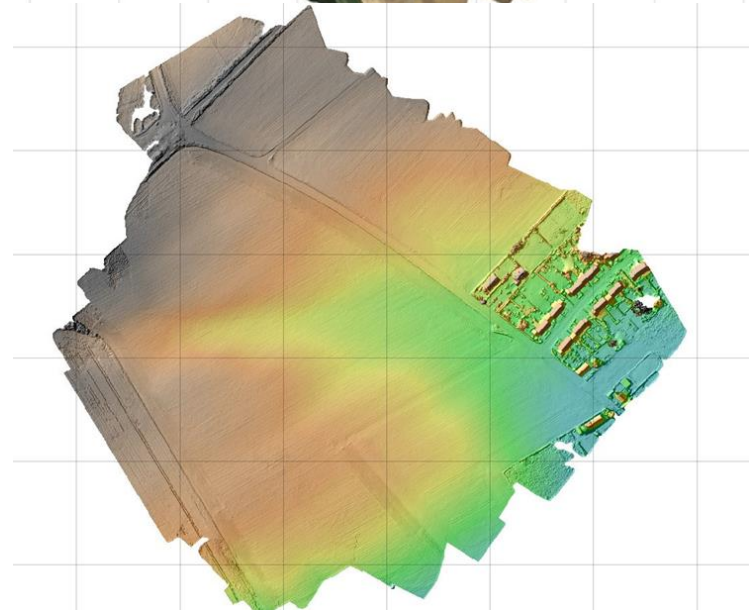
» What:

- » datasets acquired with the Ebee platform
- » Multiple sensor datasets: RGB, Red Edge and Multispec 4C
- » End products are orthophoto mosaics per band or combined
- » Digital Surface Model
- » Metadata: camera calibration report, kml, quality report

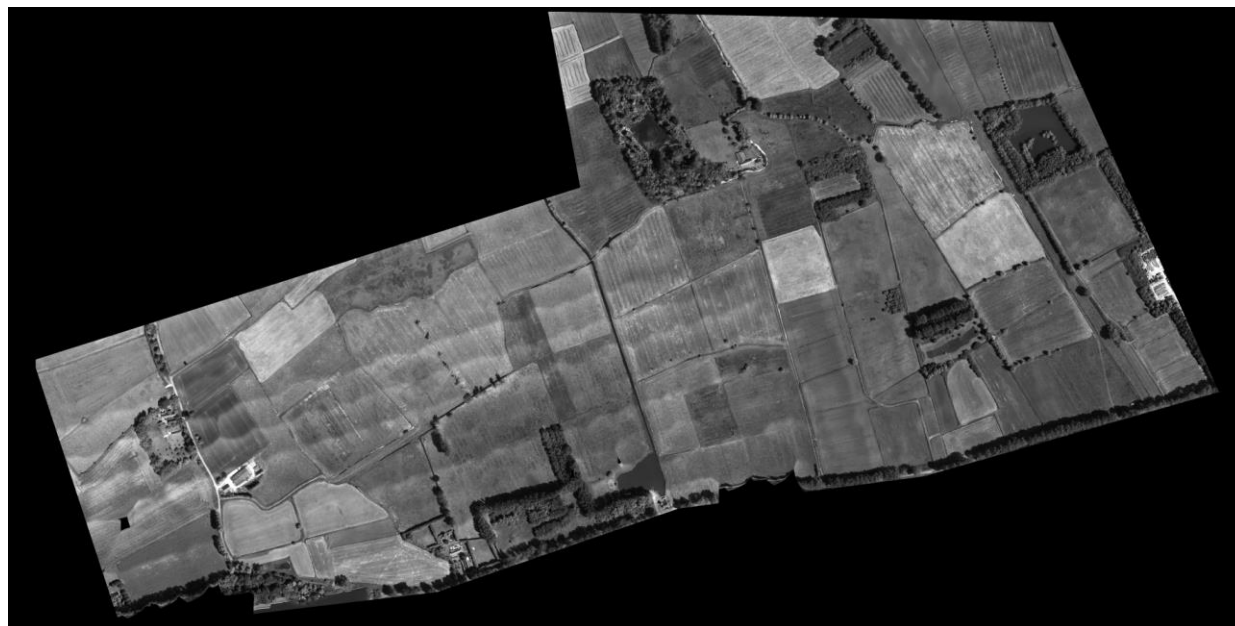
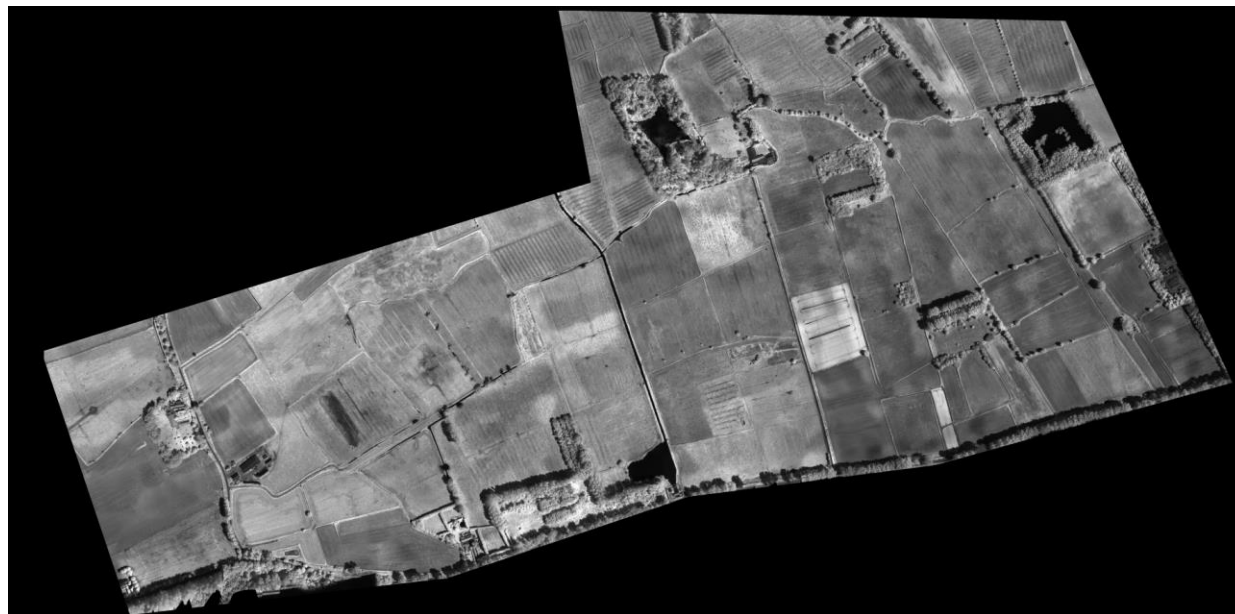
» How:

- » Huge amount of data which was acquired was overwhelming (also for VITO → New approach needed!
- » Data acquisition over difficult area's e.g Nieuwpoort (lessons learned!)
- » Multispec data processed with Pix4D (PostFlight Terra 3D)
- » Re, RGB data processed through automated chain via Photoscan

UAV data processing: Ortho and DSM

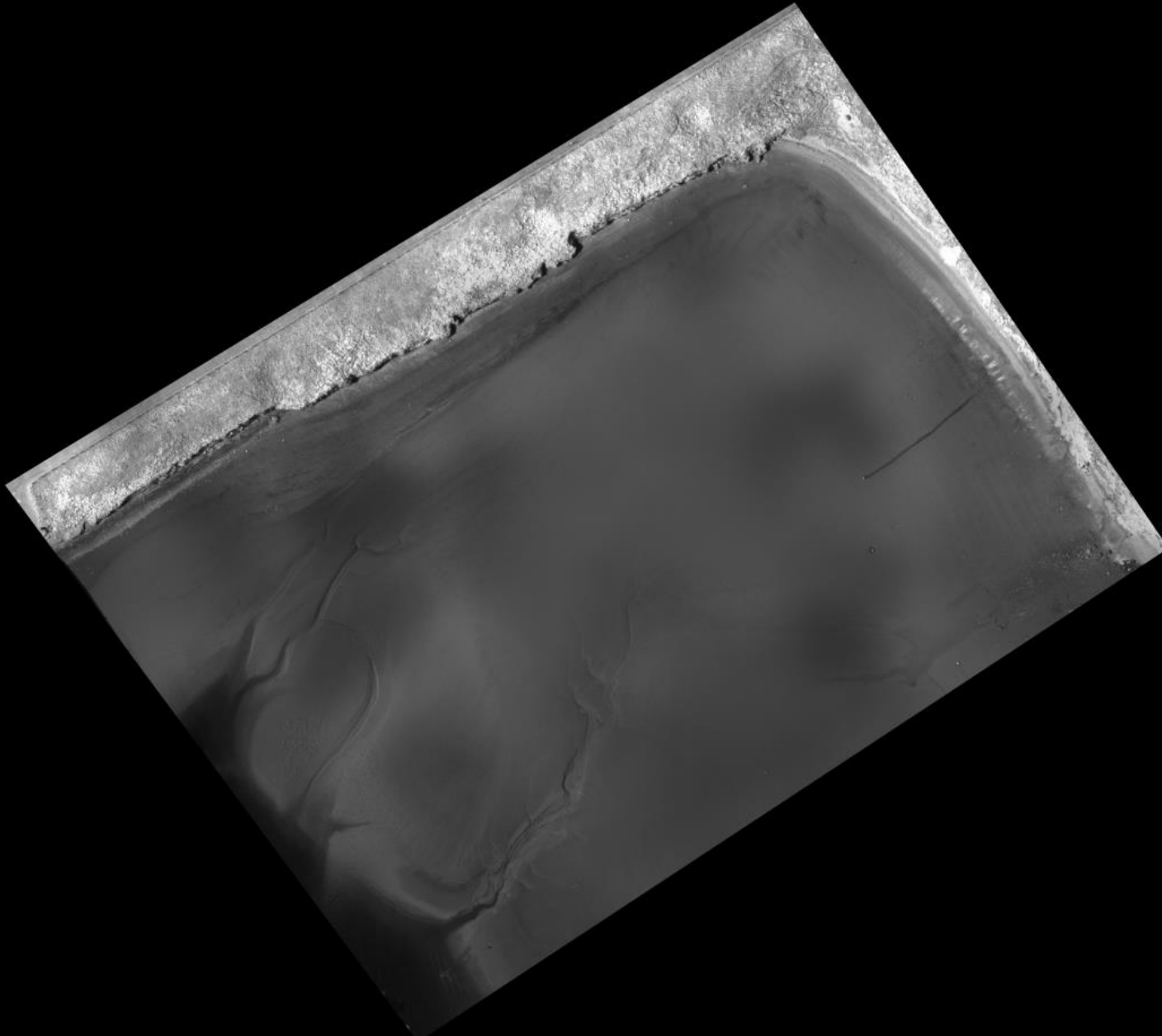


UAV data processing:



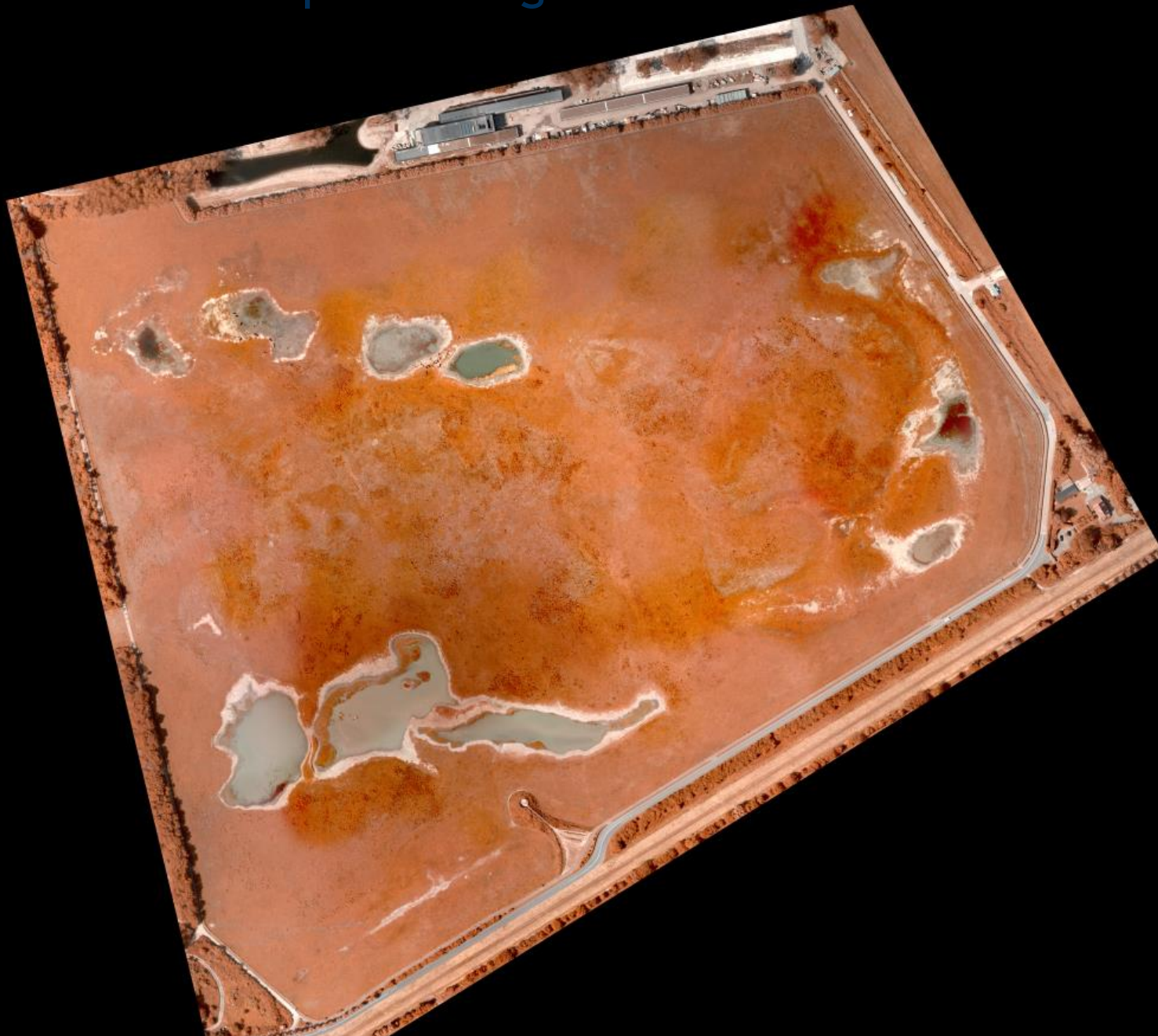
Lage Moere
Multispec bands:
NIR
Green

UAV data processing:



Nieuwpoort
Multispec bands:
NIR

UAV data processing:



Zwin
bands:
Red Edge

BELAIR Data distribution

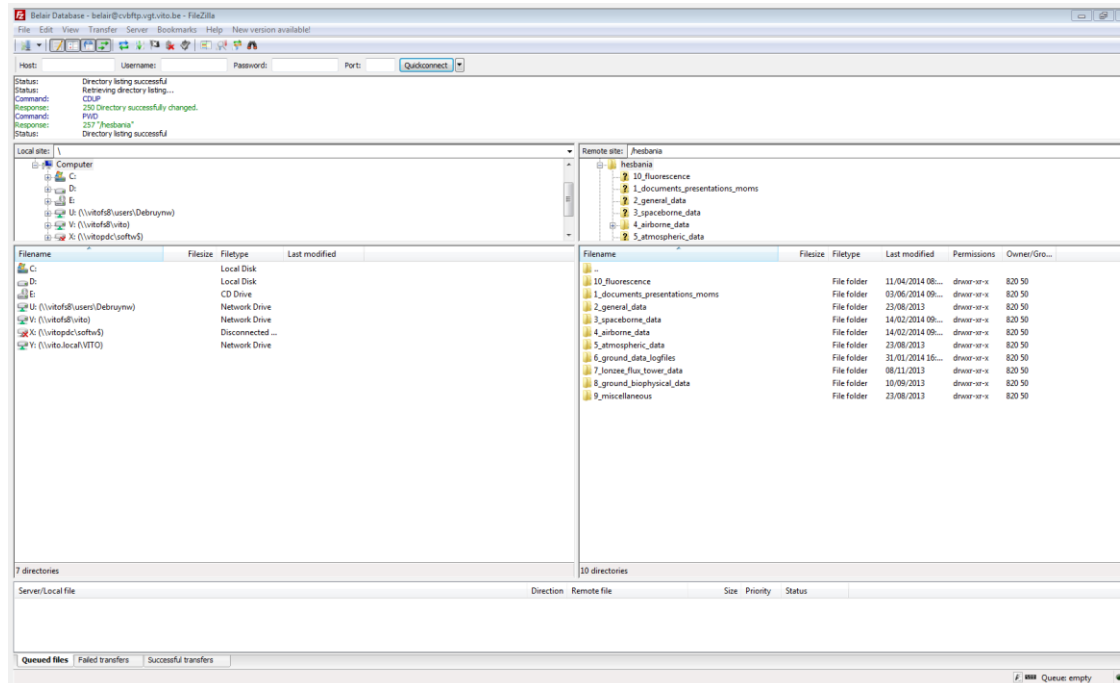
BELAIR 2015 - Data policy



- » **Satellite data** purchased by BELSPO (Pléiades, ASTER, DMC, ...) remain property of BELSPO
- » **Airborne APEX & UAV** (RGB, Multispectral and/or Red-edge) imagery acquired over **HESBANIA, LITORA and SONIA** and **in-situ data** are released stepwise, depending on user type:
 - » All Remote Sensing (RS) data immediately and free-of-charge available to all participating Users. In-situ field data available upon request to the owner of the data, i.e. to the lab which actually acquired the field data
 - » Two years after delivery of the APEX data to the PI, all BELAIR data available to the entire international Scientific Community. The APEX data was delivered to the PI in November-December 2015.

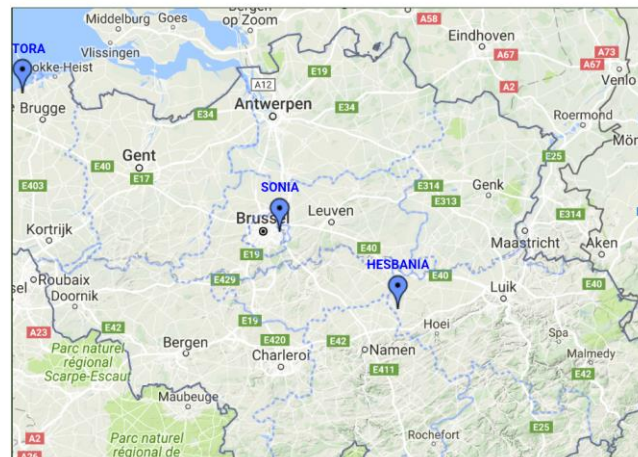
BELAIR 2015 - Data distribution

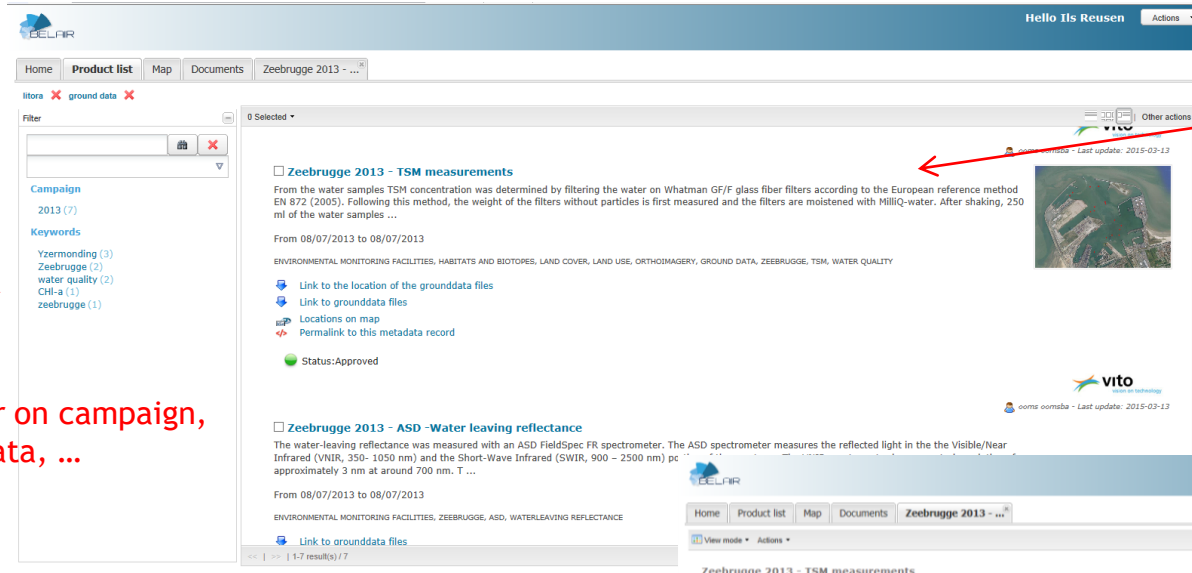
- » Secured FTP-directory for project partners
- » Owncloud and metadata for distribution through BELAIR geoportal



BELAIR - GEOPORTAL

- » <http://belair.geoportal.vgt.vito.be/geonetwork>
- » Web based portal to **discover** available (heterogeneous) data and metadata, **view** data, **download** data via Owncloud or FTP/PDF (for APEX) when applicable
- » **Manual for data providers**





HELLO IS REUSEN

Home Product list Map Documents Zeebrugge 2013 - ...

litro X ground data X

Filter

Campaign

2013 (7)

Keywords

Yzermondung (3)

Zeebrugge (2)

water quality (2)

CHI-4 (1)

zeebrugge (1)

0 Selected

Zeebrugge 2013 - TSM measurements

From the water samples TSM concentration was determined by filtering the water on Whatman GF/F glass fiber filters according to the European reference method EN 872 (2005). Following this method, the weight of the filters without particles is first measured and the filters are moistened with MilliQ-water. After shaking, 250 ml of the water samples ...

From 08/07/2013 to 08/07/2013

ENVIRONMENTAL MONITORING FACILITIES, HABITATS AND BIOTOPES, LAND COVER, LAND USE, ORTHOMAGERY, GROUND DATA, ZEEBRUGGE, TSM, WATER QUALITY

Link to the location of the grounddata files

Link to grounddata files

Locations on map

Permalink to this metadata record

Status: Approved

Zeebrugge 2013 - ASD -Water leaving reflectance

The water-leaving reflectance was measured with an ASD FieldSpec FR spectrometer. The ASD spectrometer measures the reflected light in the Visible/Near Infrared (VNIR, 350- 1050 nm) and the Short-Wave Infrared (SWIR, 900 - 2500 nm) portion of the spectrum. The VNIR spectrometer has a resolution of approximately 3 nm at around 700 nm. T ...

From 08/07/2013 to 08/07/2013

ENVIRONMENTAL MONITORING FACILITIES, ZEEBRUGGE, ASD, WATERLEAVING REFLECTANCE

Link to grounddata files

<< | >> | 1-7 result(s) / 7

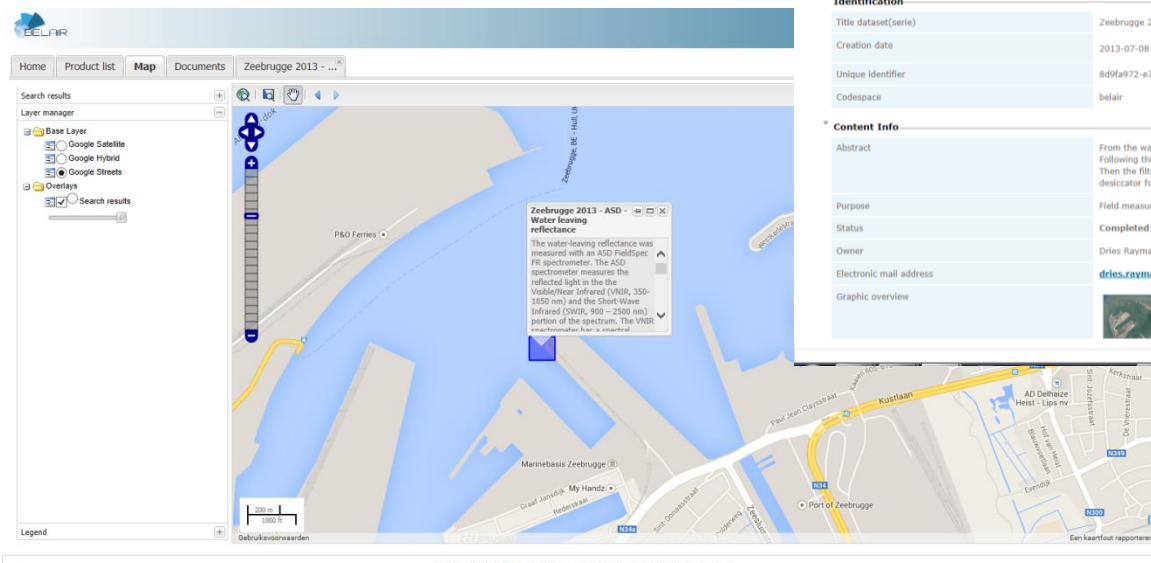
List of 'matching products' with:

- Abstract, date, ...
- Link to download (incl. documents)
- Link to view data
- ...

Easy filter on campaign, type of data, ...

Detailed metadata

View data on map (where applicable)



HELLO IS REUSEN

Home Product list Map Documents Zeebrugge 2013 - ...

Search results

Layer manager

Base Layer

Google Satellite

Google Hybrid

Google Streets

Overlays

Search results

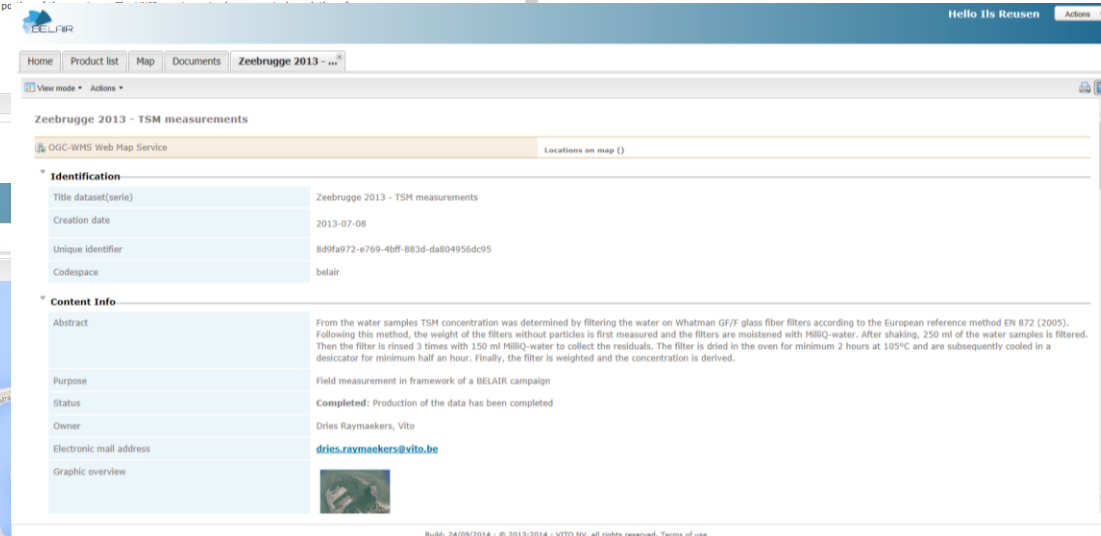
Zeebrugge 2013 - ASD - Water leaving reflectance

The water-leaving reflectance was measured with an ASD FieldSpec FR spectrometer. The ASD spectrometer measures the reflected light in the Visible/Near Infrared (VNIR, 350- 1050 nm) and the Short-Wave Infrared (SWIR, 900 - 2500 nm) portion of the spectrum. The VNIR spectrometer has a resolution of approximately 3 nm at around 700 nm. T ...

Legend

Debruikswaarden

Build: 24/09/2014 - © 2013-2014 - VITO NV. all rights reserved. Terms of use



HELLO IS REUSEN

Home Product list Map Documents Zeebrugge 2013 - ...

View mode Actions

Zeebrugge 2013 - TSM measurements

OGC-WMS Web Map Service

Locations on map (0)

Identification

Title dataset(serie) Zeebrugge 2013 - TSM measurements

Creation date 2013-07-08

Unique Identifier 8d9fa972-e769-4bf8-b83d-da804956dc95

Codespace belair

Content Info

Abstract

From the water samples TSM concentration was determined by filtering the water on Whatman GF/F glass fiber filters according to the European reference method EN 872 (2005). Following this method, the weight of the filters without particles is first measured and the filters are moistened with MilliQ-water. After shaking, 250 ml of the water samples is filtered. Then the filter is rinsed 3 times with 150 ml MilliQ-water to collect the residuals. The filter is dried in the oven for minimum 2 hours at 105°C and are subsequently cooled in a desiccator for minimum half an hour. Finally, the filter is weighted and the concentration is derived.

Purpose

Field measurement in framework of a BELAIR campaign

Status

Completed: Production of the data has been completed

Owner

Dries Raymaekers, Vito

Electronic mail address

dries.raymaekers@vito.be

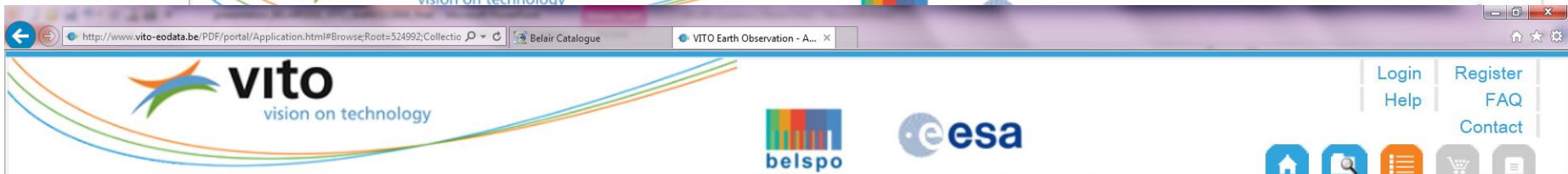
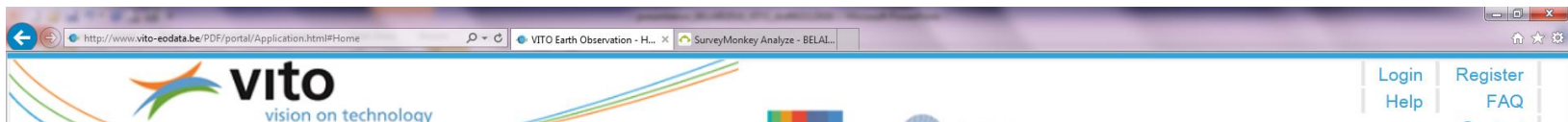
Graphic overview

Build: 24/09/2014 - © 2013-2014 - VITO NV. all rights reserved. Terms of use

FOR APEX: SUPPORTED BY 'PRODUCT DISTRIBUTION FACILITY (PDF)'



<http://www.vito-eodata.be>



APEX BELAIR - HESBANIA - Free

2 products selected on a total of 2 100 Per page << < 1 of 1 >>

Select all 2 products

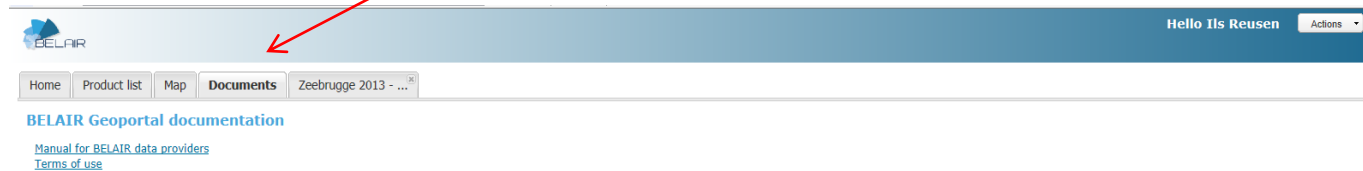
Download	Product ID	Start Date	Stop Date	Size
	APEX_GmSTRU12_130707_v2	07/07/2013 11:43:18	07/07/2013 11:44:37	19.2 GB
	APEX_GmSTRU11_130707_v2	07/07/2013 10:41:36	07/07/2013 10:43:05	34.6 GB

The interface also includes a map of Belgium with a green rectangular selection box over a specific area, and various navigation and search tools.

METADATA AND DATA



- » Providers should provide metadata and data
 - » Manual for BELAIR data providers available at BELAIR GEOPORTAL



BELAIR 2015 - Survey

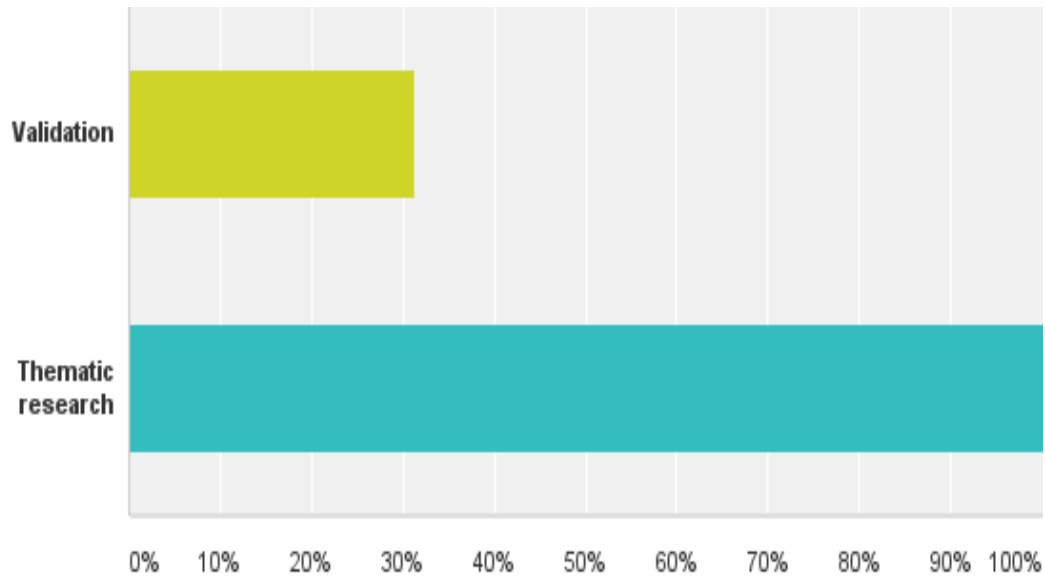
BELAIR 2015 - Survey and Future



- » **BELAIR Survey October 2016**
 - feedback on what went right/wrong during the preparation phase, campaign and post-campaign
 - recommendations for improvements
- » **Further discussion on future directions of BELAIR, 8 Nov 2016, Bruges**

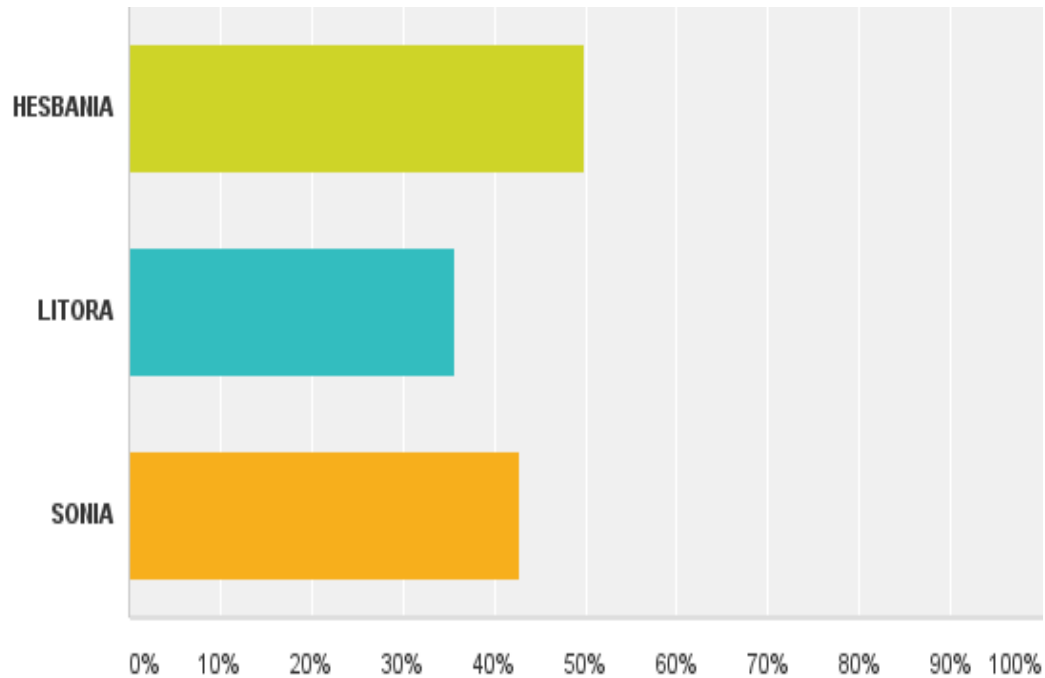
Q1: BELAIR is of interest to you for

» Answered: 16 Skipped: 0



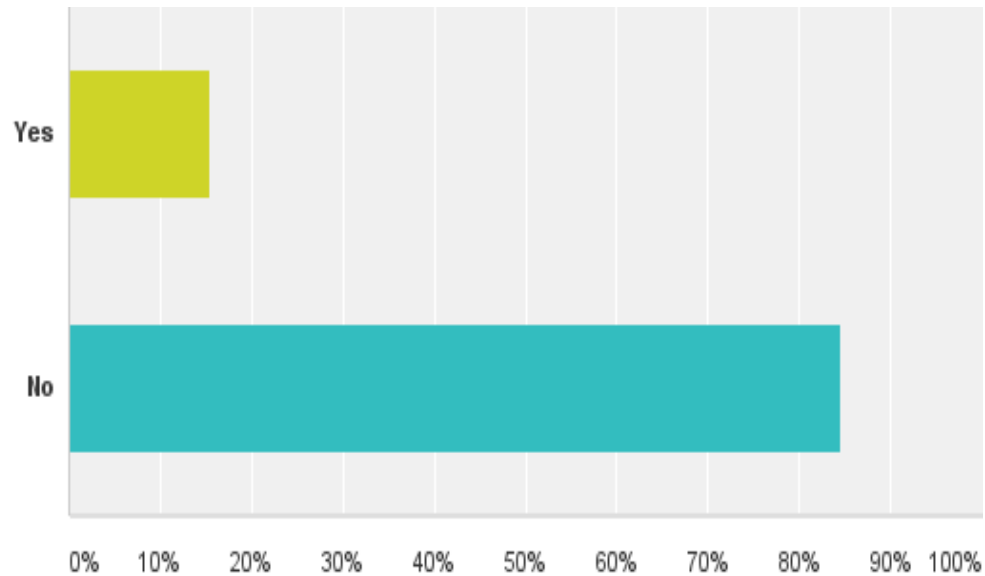
Q2: Which BELAIR site is of interest to you?

» Answered: 14 Skipped: 2



Q6: Is your spectroradiometer calibrated in the last 12 months?

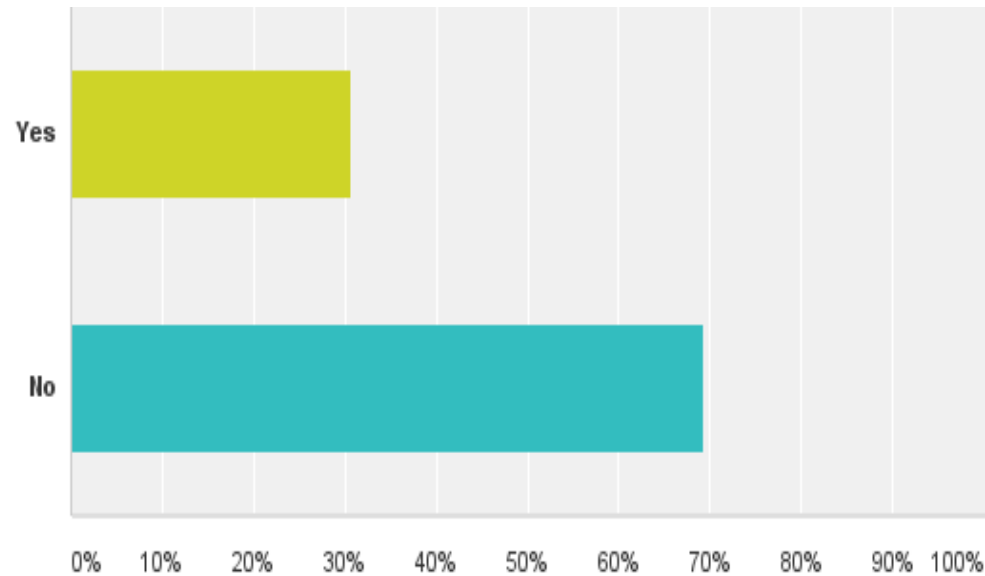
» Answered: 13 Skipped: 3



Q7: Do you have a need for spectroradiometer calibration verification by VITO?



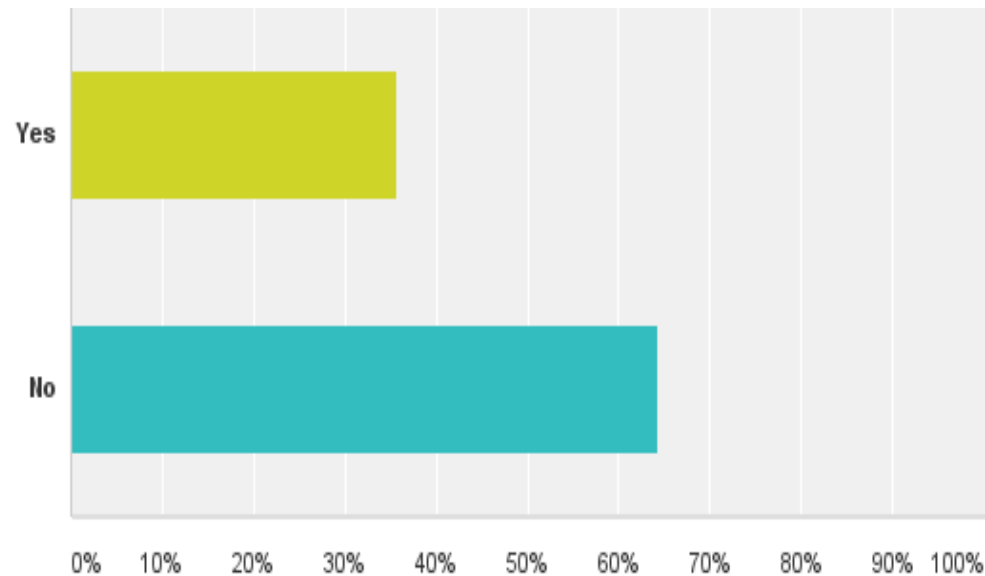
» Answered: 13 Skipped: 3



Q8: Do you have a need for training in field measurements (GPS, spectroradiometer, sun photometer) supporting the image processing



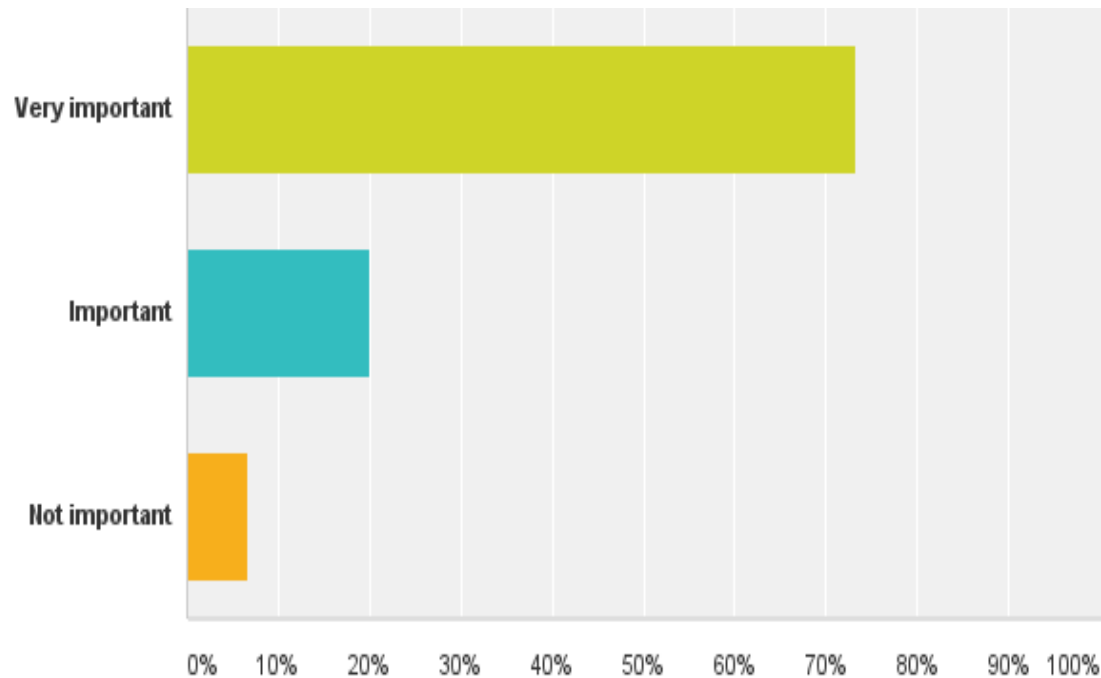
» Answered: 14 Skipped: 2



Q9: How important is a sampling strategy of field measurements for your research?



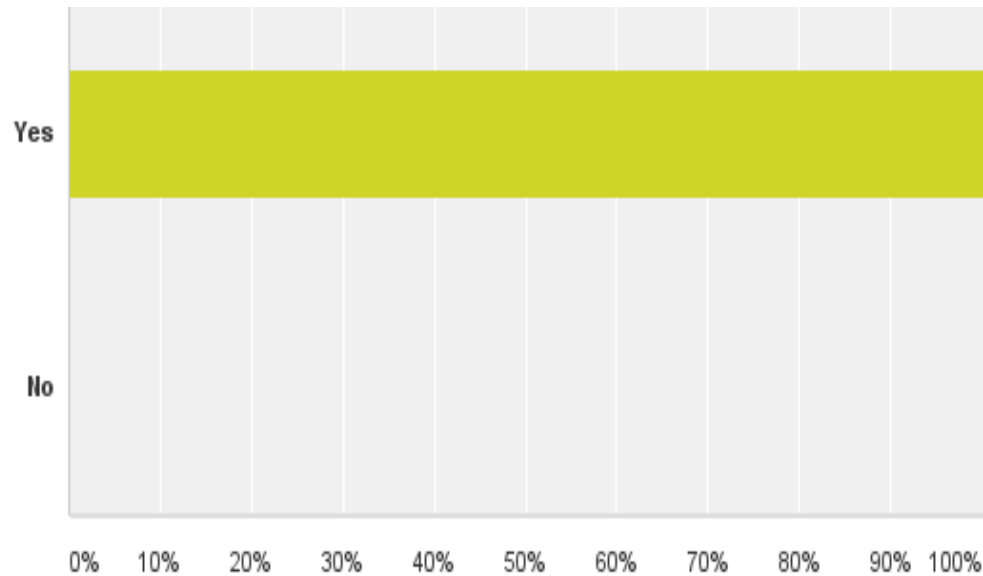
» Answered: 15 Skipped: 1



Q10: Have you developed a sampling strategy for your field measurements?



» Answered: 14 Skipped: 2



Q11 Describe briefly your sampling strategy.



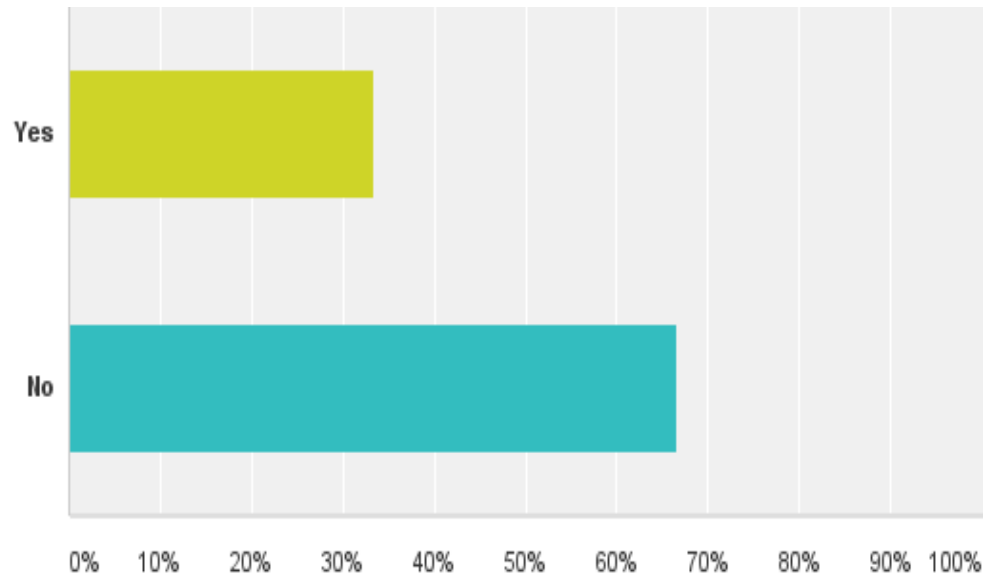
Did you follow an existing protocol? Which one?

- » Stratified random sampling approach
- » Validation of f_{cover} , f_{APAR} , LAI for 3 fields based on UAV and field measurements (DHP): DHP every 20 rows and 40 steps within selected row
- » Protocol to measure bright and dark targets for APEX processing
- » 2-3 replicas for soil samples
- » For each plot (8x8m) we consider 16 sub-pixels (2x2m) for which we perform measurements (spectra, LAI, soil moisture, etc.) which can be aggregated to have a representative measurement for the plot.
- » 2 protocols for taking hemispherical pictures for f_{Cover} , f_{APAR} ,... validation: standard sampling (INRA guidelines) for BELCAM, more dense sampling for iPot (focus on intra-field variability)

Q12: If you answered "no", would you need expert support for developing a sampling strategy?



» Answered: 3 Skipped: 13



Q14: How satisfied are you with the preparation of the



» Answered: 13 Skipped: 3

	0%	20%	40%	60%	80%	100%	N/A	Total
Reference field measurements	0.00% 0	0.00% 0	0.00% 0	0.00% 0	33.33% 4	33.33% 4	33.33% 4	12
Thematic field measurements	0.00% 0	0.00% 0	0.00% 0	0.00% 0	33.33% 4	25.00% 3	41.67% 5	12
APEX campaign	0.00% 0	0.00% 0	0.00% 0	15.38% 2	53.85% 7	7.69% 1	23.08% 3	13
UAV campaign	0.00% 0	0.00% 0	0.00% 0	16.67% 2	25.00% 3	16.67% 2	41.67% 5	12

Q17: How satisfied are you with the

» Answered: 12 Skipped: 4

	0%	20%	40%	60%	80%	100%	N/A	Total	Weighted Average
Reference field measurements	9.09% 1	0.00% 0	0.00% 0	0.00% 0	18.18% 2	36.36% 4	36.36% 4	11	5.73
Thematic field measurements	8.33% 1	0.00% 0	0.00% 0	0.00% 0	25.00% 3	25.00% 3	41.67% 5	12	5.75
UAV measurements	8.33% 1	0.00% 0	0.00% 0	0.00% 0	41.67% 5	16.67% 2	33.33% 4	12	5.50
APEX measurements	25.00% 3	0.00% 0	0.00% 0	16.67% 2	25.00% 3	16.67% 2	16.67% 2	12	4.33

Q20: How satisfied are you with the

» Answered: 12 Skipped: 4

	0%	20%	40%	60%	80%	100%	N/A	Total
BELAIR FTP site	0.00% 0	0.00% 0	0.00% 0	20.00% 2	40.00% 4	20.00% 2	20.00% 2	10
BELAIR Owncloud	0.00% 0	0.00% 0	0.00% 0	0.00% 0	30.00% 3	0.00% 0	70.00% 7	10
BELAIR Geoportail	0.00% 0	0.00% 0	0.00% 0	0.00% 0	45.45% 5	9.09% 1	45.45% 5	11
BELAIR Website	0.00% 0	0.00% 0	0.00% 0	25.00% 3	41.67% 5	8.33% 1	25.00% 3	12
BELAIR Newsletter	0.00% 0	0.00% 0	8.33% 1	8.33% 1	50.00% 6	8.33% 1	25.00% 3	12

Q24 Add all your projects using BELAIR data and add from which BELAIR site



- » UrbanEARS (SONIA)
- » BELCAM (HESBANIA)
- » BeLSAR (HESBANIA)
- » iPOT (HESBANIA)
- » BIO-TIDE (LITORA)
- » HYPERTEMP (HESBANIA)

**Q25: Did you share your BELAIR data with external users (Belgian or international)?
If yes, please specify the user**



- » Humboldt Universitaet zu Berlin
- » ESA, MetaSensing
- » Univ. of Notre Dame, Libanon
- » Nantes University (BIO-TIDE)

6 PhD, 12 MSc (Nov. 2016)



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[BELAIR 2016 Workshop, 8 November 2016, Bruges](#)

[BELAIR 2015 APEX data of LITORA-Lage Moere delivered to LITORA users](#)
[BELAIR 2015 APEX data of SONIA and HESBANIA sites delivered to BELAIR](#)

BELAIR MSc/PhD

HESBANIA

- » MSc KULeuven: Yasmin Vanbrabant, "Crop load monitoring in apple orchards through UAVs: a feasibility study", September 2016, promotor Laurent Tits, co-promotor Ben Somers
- » MSc UCL: Marie Mestdagh, MSc thesis: "Estimation du contenu en chlorophylle chez la pomme de terre par télédétection hyperspectrale aéroportée", September 2016, promotors: Defourny Pierre and Curnel Yannick
- » MSc KULeuven: Pieters Catheline, "De integratie van drone, vliegtuig- en satellietobservaties voor het opvolgen van fruitboomgaarden", expected June 2017, promotor Ben Somers, co-promotor Laurent Tits
- » PhD ULg: F. Ben Abdallah, "Etude des potentialités des indices basés sur la concentration en composés phénologiques des feuilles pour l'évaluation du status azoté de la culture de pomme de terre", promotor Jean Pierre Goffart
- » PhD UCL: Cindy Delloye, "BELCAM", promotor Pierre Defourny

SONIA

- » MSc VUB: Khanh, "Vegetation Parameterization in Urban Catchments Using Remote Sensing", 2014, promotor: Boud Verbeiren & Ann van Griensven
- » MSc VUB: Nahad Helmi, "Impact of resolution on urban hydrological response simulation", 2015, promotor: Boud Verbeiren and Ann van Griensven
- » MSc VUB: Wouter Vermeyen, "Hyperspectral analysis of surface materials for water balance estimation in urbanized areas. A case study on the Brussels Capital Region", September 2015, promotor: Frank Canters, co-promotor: Boud Verbeiren, Department of Geography, Vrije Universiteit

» PhD VUB: Luca Demarchi, "Mapping impervious surface cover from hyperspectral imagery using per-pixel and sub-pixel classification approaches: impact on water balance estimation", March 2015, promotors: Frank Canters and Jonathan Cheung-Wai Chan, co-promotor: Okke Batelaan, Cartography and GIS Research Group, Vrije Universiteit Brussel

» MSc KULeuven: William Oulette, "Characterizing urban green and its functional properties using hyperspectral airborne sensors", June 2015, promotor Ben Somers, co-promotor Martin Hermy

» MSc KULeuven: Adrien Compère, "Mapping urban green through the combined use of LIDAR and hyperspectral airborne sensors", expected February 2017, promotor Ben Somers, co-promotor Martin Hermy

» MSc KULeuven: Enyo Vanmontfort, "Characterizing urban trees through hyperspectral and LIDAR data", expected February 2017, promotor Jos Van Orshoven, co-promotor Frank Canters (VUB) and Ben Somers

» PhD VUB: Charlotte Wirion, "Hydrological Urban Ecosystem Analysis supported by Remote Sensing", expected 2018, promotor Boud Verbeiren and Willy Bauwens

» PhD VUB: Frederik Priem, "Assessing the impact of urbanization on heat and water regulation through integration of remote sensing, hydrological-climatological modelling and agent-based simulation of urban growth", expected end 2018, promotor: Frank Canters, Cartography and GIS Research Group, Vrije Universiteit Brussel

» MSc VUB: Eline Smets, "Urban land-cover fraction estimation using machine learning based unmixing approaches and synthetic mixing of training data: a case study on Brussels", expected January 2018, promotor: Frank Canters, Department of Geography, Vrije Universiteit Brussel

» PhD KULeuven: Vincent Smets, "Modelling the hydrological response of urban vegetation", expected 2019, promotor Ben Somers, co-promotor Boud Verbeiren

LITORA

» MSc KULeuven: Camille Christiansen, "Exploring spectroscopy as a method for the quantification", September 2015, promotor Ben Somers, co-promotor Jeroen Vandendorpe (INBO)

» MSc KULeuven: Medart Sam, "Ontwikkelen van een Remote Sensing gebaseerd monitoringssysteem voor beschermde grasland- en heidegebieden in Vlaanderen", expected June 2017, promotor Ben Somers, co-promotor Stien Heremans (INBO)



NL

NL

Survey feedback and recommendations - for further discussion



- » Preparation of campaign
 - » Earlier announcement and kick-off of overall campaign for better overall preparation and also involvement of other/new teams
 - » Include radar
 - » Include thermal observations
 - » Expert support for sampling design needed: For the multi-scale validation > how design sampling scheme?
 - » UAV: availability of cameras with more bands (hyperspectral?)

- » Campaign
 - » UAV: Move campaigns to zones with less flight constraints?
 - » APEX: Communication (by telephone?) of exact time of overpass for near simultaneous sampling
 - » APEX: Feedback from VITO on how good or bad our previous calibration measurements were

- » Post-campaign
 - » APEX+UAV: Preprocessing of data takes a lot of time
 - » Data are available from different sources (ftp, Owncloud, geoportal) (discard FTP ?)
 - » Website is rather static. Include also include info on thematic work done on the different sites and scientific output
 - » Newsletter looks great, but links should be provided for those looking for more info on work put in focus

BELAIR - Info & contacts

- » More info at <http://belair.vgt.vito.be/>
- » BELAIR: Ils Reusen (ils.reusen@vito.be)
- » BELAIR HESBANIA: Stephanie Delalieux (stephanie.delalieux@vito.be)
- » BELAIR LITORA: Liesbeth De Keukelaere (liesbeth.dekeukelaere@vito.be)
- » BELAIR SONIA: Boud Verbeiren (bverbeir@vub.ac.be)
- » BELAIR geoportal: Bart Ooms (bart.ooms@vito.be)

THANK YOU

GRACIAS
ARIGATO
SHUKURIA
JUSPAXAR
DANKSCHEEN
TASHAKKUR ATU
YAQHANYELAY
SUKSAMA
EKHMET
MEHRBANI
PALDIES
BOLZIN
MERCIE
BIYAN
SHUKRIA
TINGKI
WADEEJA MAITEKA
HUI
UNALCHEESH
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