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BELAIR 2013

BEODayS Feluy, November 19th 2013

BELAIR

BELAIR 2013 - Concept

- Part of **STEREO II's** component **scientific support**
- **BELAIR2013 project** aims to converge the Belgian Scientific Community by identifying a Belgian "multisite" **servicing remote sensing (calibration & validation as well as innovative) research activities**
- While ESA's Barrax site is in essence an agricultural site, BELAIR intends to strengthen research capabilities in **various thematic areas** such as environmental, water quality, soil monitoring, agriculture, forestry
- To this end **satellite data, airborne hyperspectral (APEX) imagery, UAV imagery, in-situ measurements and assorted ancillary data** were collected at the BELAIR multisite to support algorithm development, thematic validation, radiometric calibration, validation and simulation of spaceborne data etc.

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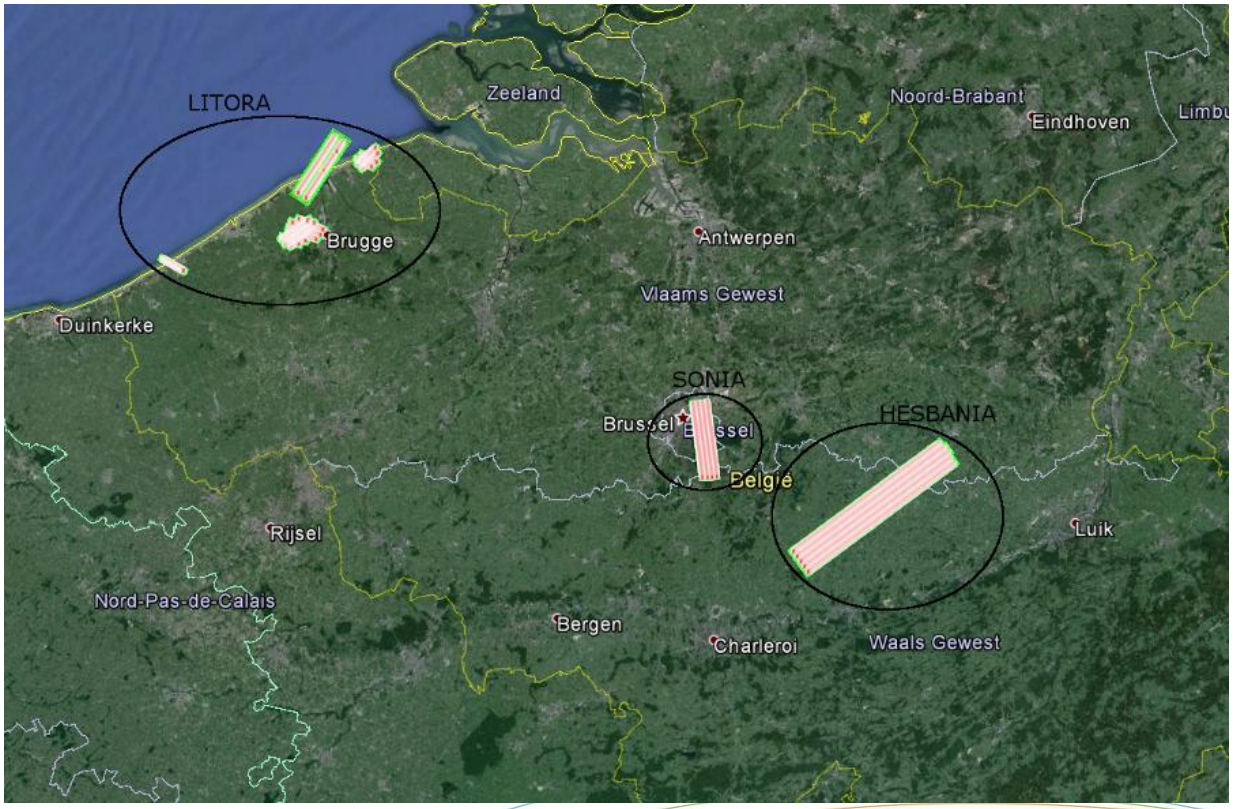
BELAIR 2013 - Objectives

» Identify together with STEREO II's research community **a Belgian multisite, covering relevant thematic activities**. Kick-off on May 7th 2013; thematic sites clustered in 3 regions, **"Litora", "Sonia" and "Hesbania"**



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BELAIR 2013 - Objectives

- Organize **spaceborne, APEX and UAV** acquisitions
- Simultaneously perform **in-situ measurements** at
  - **“Litora”**
  - **“Sonia”**
  - **“Hesbania”**

  in collaboration with all key users responding
- **Process, archive and distribute** all 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

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BELAIR 2013 - Data policy

- At a BELAIR2013 follow-up meeting on June 3rd 2013, the data policy was defined :
- **Satellite data** bought by BelSPO (Landsat, Pléiades, ASTER, DMC…) remain property of BelSPO
- **Airborne APEX & UAV** (RGB, thermal, tetracam) imagery acquired over **"Litora", "Sonia" and "Hesbania"** and **concurrent in-situ data** are released stepwise, depending on user type:
  - Each of the 3 consortia, e.g. Hesbania, has exclusive access for a period of one year starting after the delivery of the APEX data
  - Subsequently, the other 2 consortia, i.e. Sonia and Litora, have exclusive access for a period of one year
  - Afterwards all DATA are available to all users

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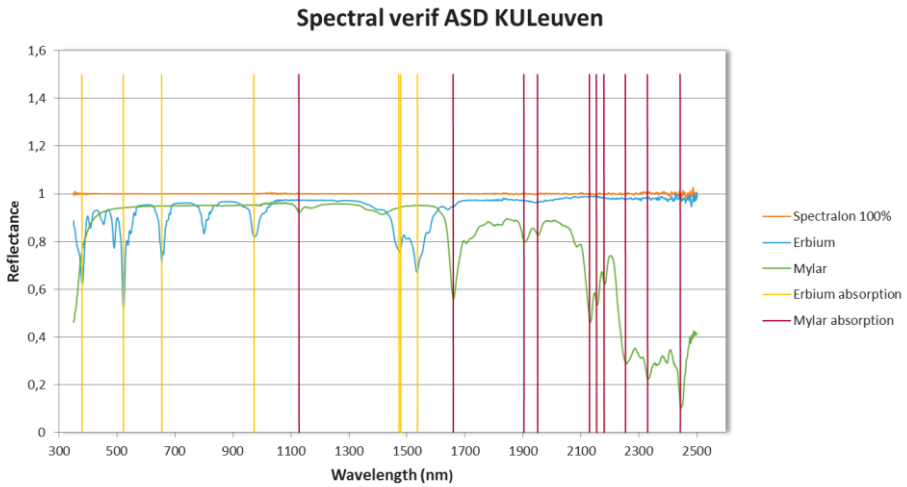
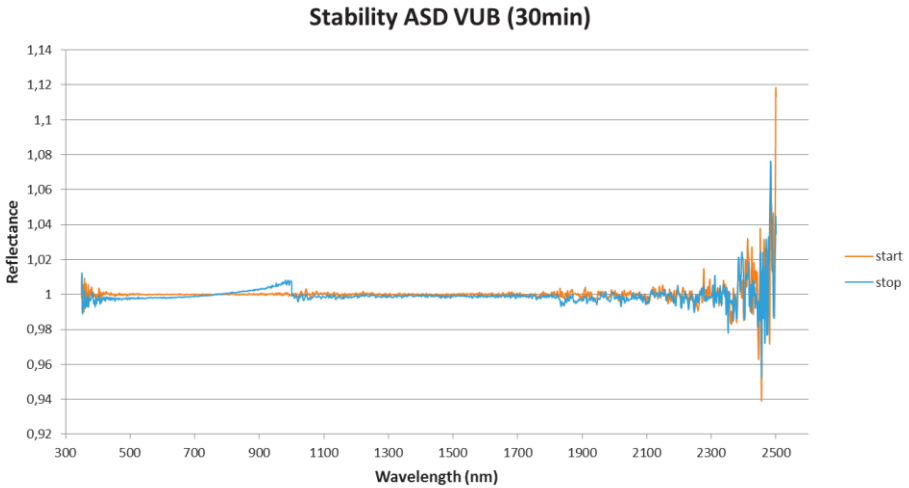
BELAIR 2013 - Logistics

- **Local coordinators** at each of the three sites: Dries Raymaekers (VITO) @ “Litora”, Boud Verbeiren (VUB) @ “Sonia” and Stephanie Delalieux (VITO) @ “Hesbania”
- **Uniform measurement protocol and verification of** spectral and radiometric **performance of ASD spectroradiometers** KUL, UCL, VUB and VITO: spectral (Erbium, Mylar), radiometric (synthetic panels, stability)





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BELAIR 2013 - Litora

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BELAIR 2013 - Litora

- **Theme**: coastal & environmental
- **Goal:** water quality at Port of Zeebrugge, sediment deposition at Yzer estuary and biodiversity at natural parks of Zwin and Laege Moere
- **Team**: INBO (Jeroen Vanden Borre), KULeuven (Jaak Monbaliu), UGent (Koen Sabbe), VITO (Dries Raymaekers)

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BELAIR 2013 - Litora

- **In-situ**: ranging from algae measurements in the water to sediment composition analysis over plant species inventory at national parks and intertidal zone. Special attention = standardization to extrapolate in space - via remote sensing techniques -, and time
- **Air**: hyperspectral APEX imagery of Laege Moere, Zeebrugge and Zwin on July 8th 2013; Yzer estuary and Zwin on July 9th 2013. Quicklooks on http://www.apex-esa.org/content/quicklooks
- **Space**: Landsat (04/08/1984-04/08/2013), Pléiades (09/07/2013)

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BELAIR 2013 - Sonia

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BELAIR 2013 - Sonia

- **Theme**: urban & forestry
- **Goal**: spatiotemporal estimation and monitoring of water and energy fluxes in urban areas and forest ecosystems
- **Team**: VUB (Boud Verbeiren & Frank Canters), UGent (Frieke Van Coillie & Wouter Maes), INBO (Kris Vandekerckhove) + supporting team members

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BELAIR 2013 - Sonia

- **In-situ**: top-soil characteristics, surface temperature and spectral characterization of urban green and artificial surfaces, tree characterization and sap flow measurements, …
- **Air**: hyperspectral APEX images of Sonia on July 8th 2013. Quicklooks available on http://www.apex-esa.org/content/quicklooks
- **Space**: ASTER (requested, no successful acquisition)

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BELAIR 2013 - Hesbania

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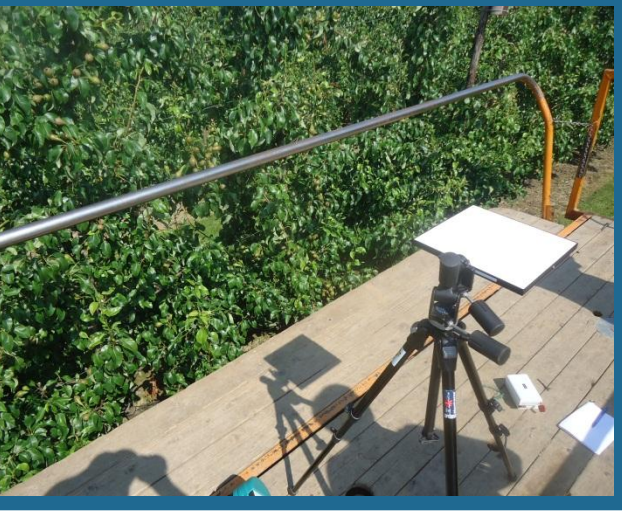
BELAIR 2013 - Hesbania

- **Theme**: agriculture and horticulture
- **Goal**: optimizing fruit orchard management, crop monitoring and anomaly detection from parcel to local and regional scale
- **Team:** KULeuven (Jonathan van Beek), UHasselt (Roland Valcke), UGent (Wouter Maes), VITO (Stephanie Delalieux), UA (Paul Scheunders), PcFruit (Tom Deckers), CRA-W (Viviane Planchon), UCL (Bas Van Wesemael)



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BELAIR 2013 - Hesbania

- **In-situ**: physiological measurements, chlorophyll fluorescence, stem diameter, hyperspectral measurements, hemispherical photography … *and many many more*
- **Air**: Thermal, RGB and Tetracam UAV. APEX imagery on July 7th 2013. Quicklooks available on http://www.apex-esa.org/content/quicklooks.
- **Space**: Aster (01/10/2013), DMC (07/07/2013, 23/07/2013, 01/08/2013 and 21/08/2013)

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BELAIR 2013 - Additional data

» **RMI**
(Françoise Meulenberghs): temperature in °C, humidity in %, wind speed in m/s, wind direction and radiation in Wh/m² at closest station possible

» **LONZEE ULg**
(Christine Moureaux):

Fc	CO2 flux (eddy covariance)	µmol.m-2.s-1
H	sensible heat flux(eddy covariance)	W.m-2
E	water vapour flux (eddy covariance)	mmol.m-2.s-1
LE	latent heat flux(eddy covariance)	W.m-2
MOMENTUM_FLUX	Momentum flux (eddy covariance)	kg.m-1.s-2
Sc	CO2 storage	µmol.m-2.s-1
Ustar	U star	m.s-1
St_tau	test stationnarité momentum flux	(0 = diff > 30%, 1 = 30%<diff<50%, 3 = diff > 50%)
St_C	test stationnarité Fc	(0 = diff > 30%, 1 = 30%<diff<50%, 3 = diff > 50%)
St_LE	test stationnarité flux chaleur latente	(0 = diff > 30%, 1 = 30%<diff<50%, 3 = diff > 50%)
St_H	test stationnarité flux chaleur sensible	(0 = diff > 30%, 1 = 30%<diff<50%, 3 = diff > 50%)
Pluie	rainfall	mm
Tair	air temerature	°C
RH	relative humidity	%
TS2	soil temperature at 2.5cm depth	°C
TS5	soil temperature at 5cm depth	°C
TS10	soil temperature at 10cm depth	°C
TS25	soil temperature at 25cm depth	°C
TS50	soil temperature at 50cm depth	°C
Rnet	net radiation	W.m-2
Rg	global radiation	W.m-2
PPFD	PAR	µmol.m-2.s-1
PPFDg	global PAR	µmol.m-2.s-1
PPFDd	diffuse PAR	µmol.m-2.s-1

SM5	SWC at 5cm depth	%
SM20	SWC at 20cm depth	%
SM50	SWC at 50cm depth	%
FLS	soil heat flux (1heat flux plate)	W.m-2
G	soil heat flux (computed from Tsol et SWC)	W.m-2
Patm	atmospheric pression	kPa
Dsat	Déficit saturation (computed from RH sensor)	hPa
DLicor	Déficit saturation (computed from LICOR)	hPa
wv_hor	horizontal wind velocity	m.s-1
wd_hor	wind direction	°
CO2h20	Concentration CO2 profil à 20cm au dessus sol	µmol.mol-1
CO2h50	Concentration CO2 profil à 50cm au dessus sol	µmol.mol-1
CO2h100	Concentration CO2 profil à 100cm au dessus sol	µmol.mol-1
CO2h200	Concentration CO2 profil à 200cm au dessus sol	µmol.mol-1
SWdw	Downward short wave radiation (=Rg) (305-2800 nm)	W.m-2
SWuw	Upward short wave radiation (305-2800 nm)	W.m-2
LWdw	Downward long wave radiation (5-50 µm) corrected by temperature	W.m-2
LWuw	Upward long wave radiation (5-50 µm) corrected by temperature	W.m-2
LWnet	LW net	W.m-2

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BELAIR 2013 - What's next

- **BELAIR Debriefing Meeting in Les Voussettes at 16:15**
  - feed-back on what went right/wrong during the campaign and to summarize opinions on actions to improve the BelAir preparation, data acquisition and data dissemination phases
- **Disseminate APEX data** by end January 2014
- **Workshop to discuss preliminary results** in May-June 2014
- **File a STEREO III recurrent BELAIR campaign !**

- More info at **http://belair.vgt.vito.be/**

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Thank you for your attention