



DIARS

DIARS - Mapping, modelling
and impact assessment of
invasive alien species with

Belgian Earth Observation 2018 2.0 -
13/11/2018





Study species



Prunus serotina

- N-America
- Timber, wind breaks
- RS of understory species



Campylopus introflexus

- S. Hemisphere
- Heath land, dunes systems
- RS of cryptic species



Rosa rugosa

- East Asia
- Ornamental plant
- Benchmark remotesensing.vito.be



DIARS - BiodivERsA project

R. Van De Kerchove

S. Schmidtlein

B. Somers
O. Honnay

D. Rocchini

vito
vision on technology

UNIVERSITÉ de Picardie Jules Verne

KIT
Karlsruher Institut für Technologie

FAU
FRIEDRICH-ALEXANDER
UNIVERSITÄT
ERLANGEN-NÜRNBERG

KU LEUVEN

FONDAZIONE EDMUND MACH

CARNEGIE INSTITUTION FOR SCIENCE

J. Lenoir

H. Feilhauer

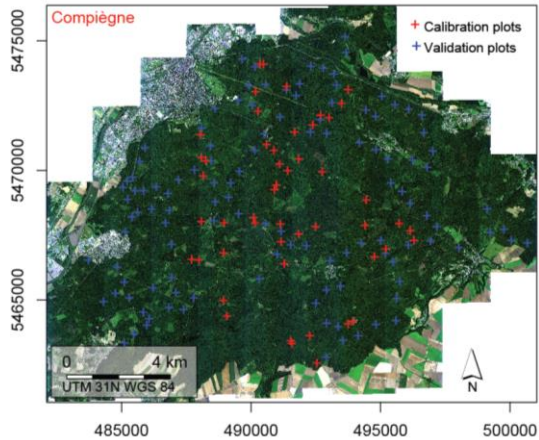
G. Asner



Remote sensing data

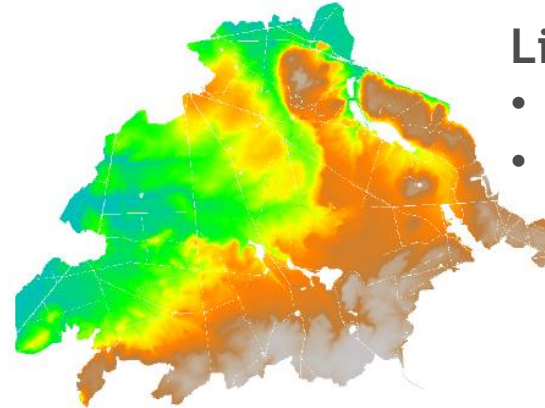
Compiègne (FR)

P. serotina



APEX

- July 24th 2014
- 3m pixel size
- 244 bands

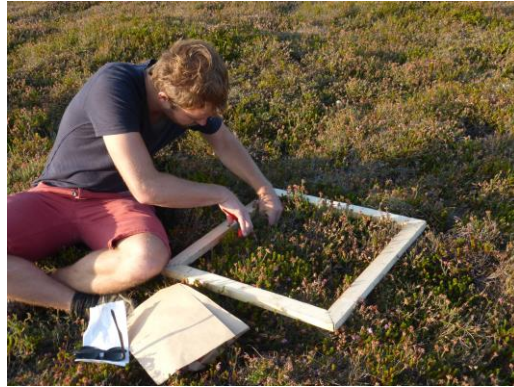


LiDAR

- Feb/Mar 2014
- > 20 pts/m²

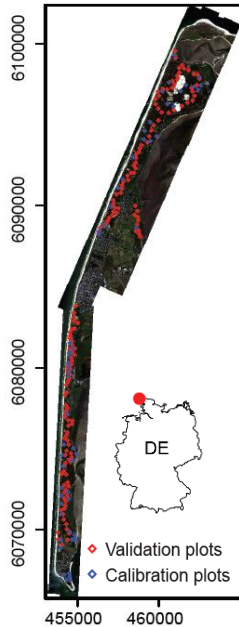


Field data





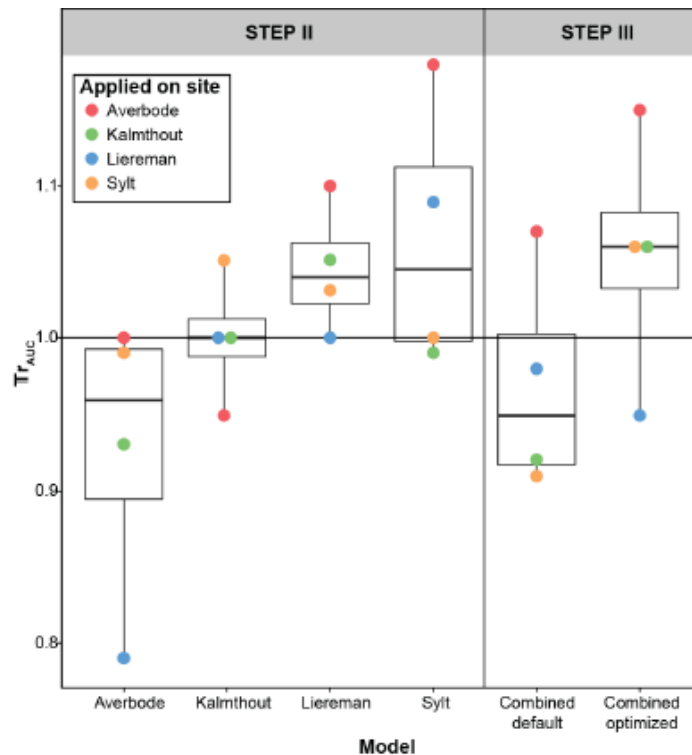
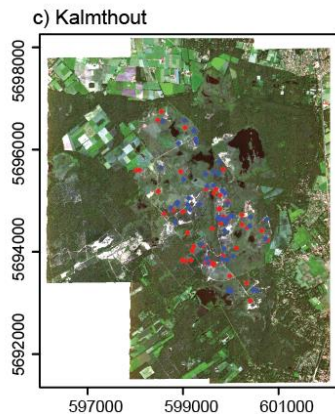
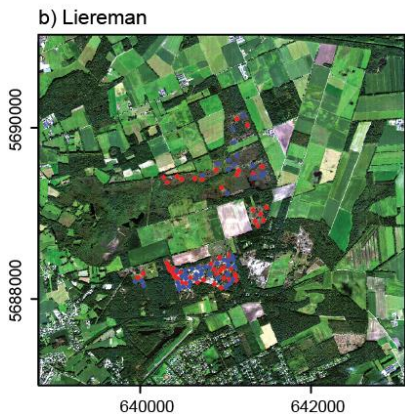
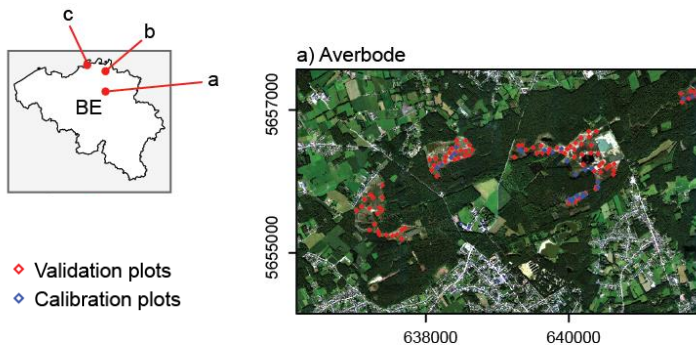
Can we detect a moss? Yes we can.



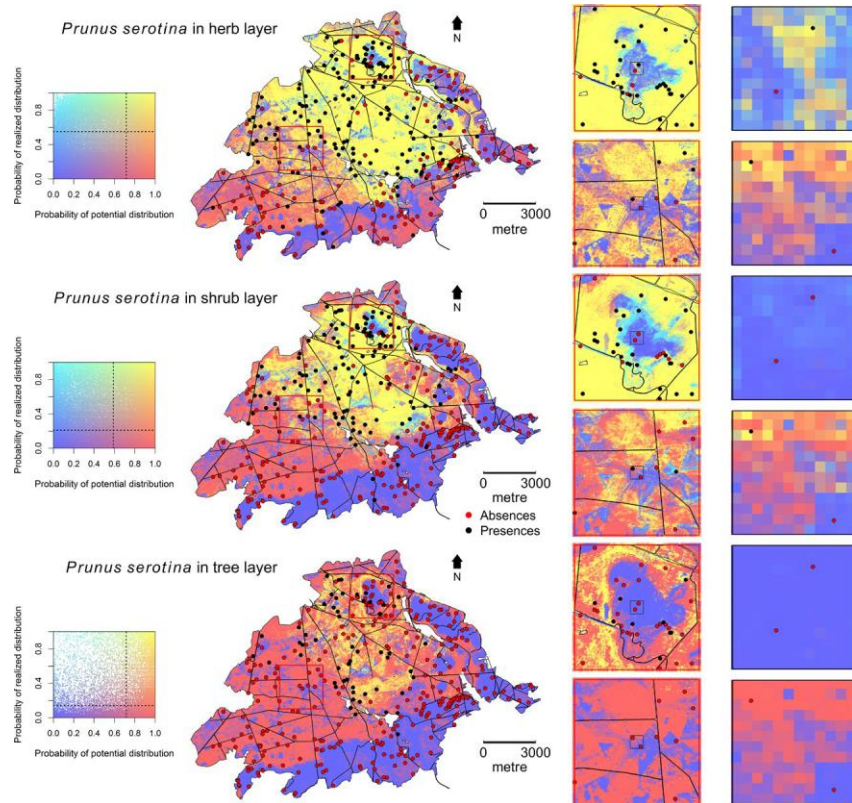
AUC: 0.87 - Overall Accuracy: 0.75

01010101
 0101
 01 101
 10101
 01010101

How transferable are these models?

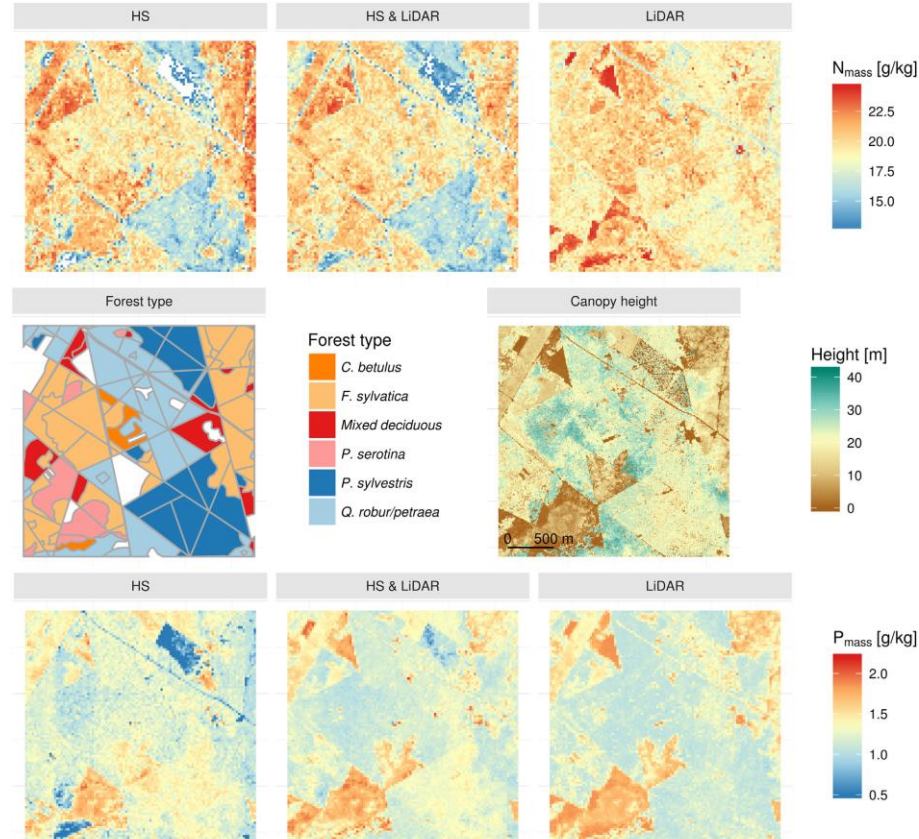


Model the potential and realized distributions



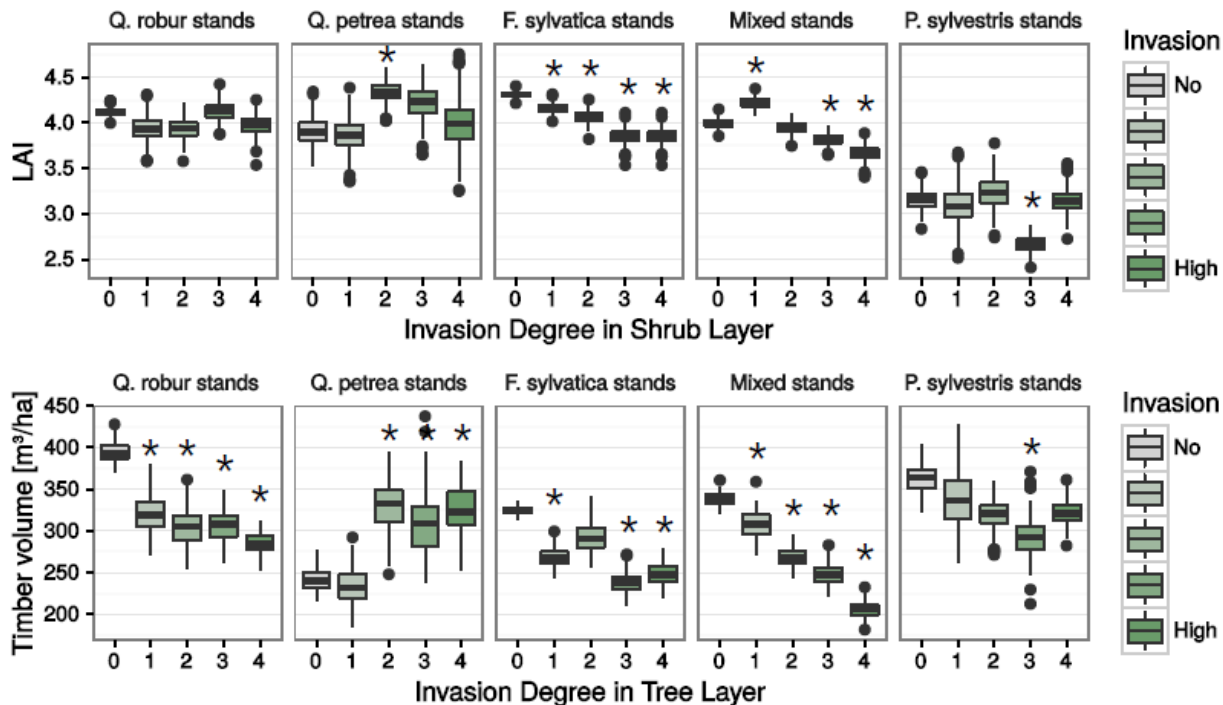


Mapping leaf biochemistry





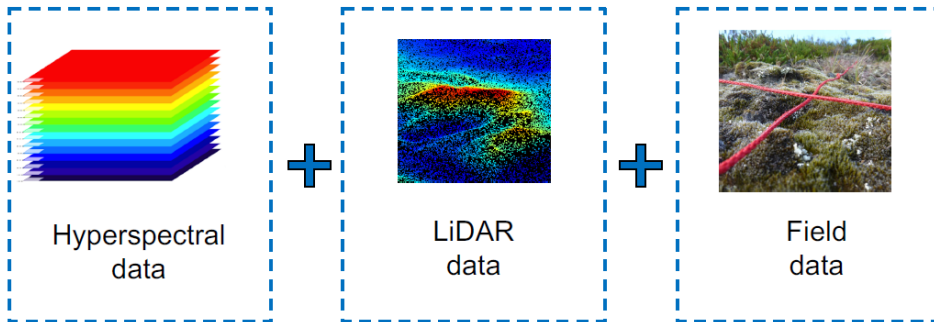
Impact assessment





The DIARS toolbox

<http://diarsproject.github.io/DIARS/HomeDIARS.html>



Home	Data processing	Hyperspectral images
		LiDAR images
		Sampling design
	Applications	Mapping
		Modeling
		Impact assessment

Scientific outcome

- Aerts R., Ewald M., Nicolas M., Piat J., Skowronek S., Lenoir J., Hattab T., Garzón-López C.X., Feilhauer H., Schmidtlein S., Rocchini D., Decocq G., Somers B., Van De Kerchove R., Deneff K., Honnay O. (2017) Invasion by the alien tree *Prunus serotina* alters ecosystem functions in a temperate deciduous forest. [Frontiers in Plant Science](#), 8: 179
- Hattab T., Garzón-López C.X., Ewald M., Skowronek S., Aerts R., Horen H., Brasseur B., Gallet-Moron E., Spicher F., Decocq G., Feilhauer H., Honnay O., Kempeneers P., Schmidtlein S., Somers B., Van De Kerchove R., Rocchini D., Lenoir J. (2017). A unified framework to model the potential and realized distributions of invasive species within the invaded range. [Diversity and Distribution](#), 23: 806-819
- Skowronek S., Ewald M., Isermann M., Van De Kerchove R., Lenoir J., Aerts R., Warrie J., Hattab T., Honnay O., Schmidtlein S., Rocchini D., Somers B., Feilhauer H. (2017). Mapping an invasive bryophyte species using hyperspectral remote sensing data. [Biological Invasions](#), 19: 239-254
- Skowronek S., Asner G.P., Feilhauer H. (2017). Performance of one-class classifiers for invasive species mapping using airborne imaging spectroscopy. [Ecological Informatics](#), 37: 66-76
- Ewald M., Aerts R., Lenoir J., Fassnacht F.E., Nicolas M., Skowronek S., Piat J., Honnay O., Garzón-López C.X., Feilhauer H., Van De Kerchove R., Somers B., Hattab T., Rocchini D., Schmidtlein S. (2018). LiDAR derived forest structure data improves predictions of leaf N and P concentrations from imaging spectroscopy. [Remote Sensing of Environment](#), 211:13-25
- Ewald M., Skowronek S., Aerts R., Dolos K., Lenoir J., Nicolas M., Warrie J., Hattab T., Feilhauer H., Honnay O., Garzón-López C.X., Decocq G., Van De Kerchove R., Somers B., Rocchini D., Schmidtlein S. (2018). Analyzing remotely sensed structural and chemical canopy traits of a forest invaded by *Prunus serotina* over multiple spatial scales. [Biological Invasions](#), 1-15,
- Garzón-López C.X., Hattab T., Skowronek S., Ewald M., Aerts R., Feilhauer H., Honnay O., Decocq G., Van De Kerchove R., Somers B., Schmidtlein S., Rocchini D., Lenoir J. (2018). The DIARS toolbox: a spatially explicit approach to monitor alien plant invasions through remote sensing. [Research Ideas and Outcomes](#), 4: e25201
- Skowronek S., Van De Kerchove R., Ewald M., Lenoir J., Aerts R., Warrie J., Schiefer F., Rombouts B., Hattab



THANK YOU

remotesensing.vito.be