Guillaume **Lobet**

Assistant Professor - Functional structural modelling of crop systems

Informations

28-12-1984 [33]

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www.guillaumelobet.be

Keywords

Computational modelling
Image analysis
Data analysis
Web technologies
Science communication
Open Science

Languages

French ★★★★★
English (C1/C2) ★★★★☆
Sign language ★☆☆☆☆

Note:
All my articles, presentations and projects can be viewed at www.guillaumelobet.be

Research statement

Plants are fascinating. They form complex and plastic networks (both above- and below-ground), ever integrating and adapting to endogenous and exogenous clues. Manipulation of these networks brings the promise to unlock plant productivity in limiting environments. My primary research interests lie in the understanding of these interconnected, multi-scale regulations pathways in crop plants.

The incredible complexity of plants calls for integrative research strategies such as **combining innovative plant phenotyping pipelines with powerful data analysis and modelling tools**. My belief is that combining computational tools with the latest biological knowledge will open new horizons for plant research. Which is why I spend most of my time developing new tools, connecting them to existing ones and making them available for the plant science community.

Current position

2016–now **Assistant Professor**
Forschungszentrum Jülich | University of Louvain

We use and develop computational tools to understand how plants regulate their growth through long distance signals (such as water and carbon flows).

Bibliometrics

Peer-review publications: **26**
Total number of citations: **596**
H-index: **13**
Guest editor: **GigaScience**

Reviews performed: **58**
Invitations to conferences/workshops: **15**
Organisation of conferences/workshops: **3**
Academic editor: **Plant Direct**

Professional experiences

2016–now	**Assistant Professor**	Forschungszentrum Jülich | University of Louvain
2014–2016	**FNRS post-doctoral fellow**	Plant Physiology, PhytoSYSTEMS, ULg
2013–2014	**Post-doctoral fellow**	Plant Physiology, PhytoSYSTEMS, ULg
2008–2012	**PhD student**	Ecophysiology and Plant Breeding, UCL
2010-2012	**President of the ACELI**	Earth and Life Insititue, UCL

Professional experiences

2014–2016 **FNRS post-doctoral fellow** PhytoSYSTEMS, Univeristé de Liège, Belgium
Advisor: Prof. Claire Périlleux
Fellowship: Fonds de la Recherche Scientifique - FNRS

Understand allometric relationships in maize, both at the plant and root system level. The project combines phenotyping, modelling and transcriptomic approaches.

2015–2016 **FNRS post-doctoral fellow** Forschungszentrum Jülich IBG-3, Germany
Advisor: Prof. Andrea Schnepf
Fellowship: Fonds de la Recherche Scientifique - FNRS

Improve an existing plant model and couple it to a soil water movement model in order to explicitly simulate water and carbon fluxes in the plant.

2013–2014 **Post-doctoral fellow** PhytoSYSTEMS, Univeristé de Liège, Belgium
MARS project: www.iap-mars.be
Advisor: Prof. Claire Périlleux
Fellowship: Belgian Science Policy, Inter-university Attraction Pole

Better understand how root and shoot influence each other and how this interaction contributes to the development of the plant.

2008–2012 **PhD student** Earth and Life Institute, UCL, Belgium
Regulation of water flow in the soil-root domain.
Supervisor: Prof. Xavier Draye
Fellowship: FNRS-FRIA + DROPS (EU-FP7)

The objective of the thesis was to (1) analyse the water flows in the soil-root domain (2) quantify the contribution of plant regulatory processes.

2010-2012 **President of the ACELI** Earth and Life Institute, UCL, Belgium
The ACELI is the Earth and Life Institute Researchers' Association. It represents more than 300 researchers from multiple fields such as agronomy, microbiology, environmental sciences or climatology.

Computational skills

Plant phenotyping Java, ImageJ, R
Implementation of several plant image analysis tools.
Integration of modelling tools within phenotyping pipelines

Plant modelling Java, R
Implementation of a functional-structural plant model, PlaNet-Maize.
Creation of a model of tomato inflorescence development.

Public database creation and management SQL, HTML5, PHP, Javascript
www.plant-image-analysis.org
www.flor-id.be

Web-based tools R, HTML
MECHA: mecharoot.github.io
CRootBox: bit.ly/crootbox-web
ArchiDART: https://archidart.github.io
Water Tool Network: bit.ly/water-network-app

Awards, distinctions and grants

2015 **Teaching Tools in Plant Biology Competition - Plant Cell** Winner
Root System Architecture quantification. Why and How?

2015 **Roundtable organisation competition** Winner
Rhizosphere 4 Meeting

2014 **FNRS Post-doctoral fellowship** ~ 160 000 € (3 years salary)
Fonds de la Recherche Scientifique - FNRS, Belgium

2012 **Honorary fellowship**
Belgian American Educational Fundation

2012 **Best oral communication** Second prize
17^{th} symposium on Applied Biological Sciences, Leuven, Belgium

2010 **Best poster** First prize
Plant Science Doctoral School, Liège, Belgium

2010 **FRIA fellowship** ~ 96 000 € (4 years salary)
Fonds de la Recherche Scientifique - FNRS, Belgium

Education

2008–2012 **PhD** in agronomical sciences Ecophysiology and Plant Breeding, UCL

2012 **Teaching formation** for higher education IPM, UCL

2003–2008 **Master** in bio-engineering Université catholique de Louvain

2007 **Erasmus** Exchange program University of Manchester, UK

Other informations

Teaching experience
Plant-soil interactions, Root modelling, Scientific figures, LaTeX and ImageJ course

Thesis supervision
Supervision of 3 PhD (ongoing) and 6 master theses

Boy-scout leader
Organisation of projects abroad (Ireland, Czech Republic, Morocco)

Personal interests
Sign languages and deaf culture, reading, technology, running, hiking, environment

Work overview

Publications

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Academic editor: **Plant Direct**

- Journal names were intentionally left blank.
- Link to all articles can be found on www.guillaumelobet.be.
- Bibliometric data are coming from dimensions.ai and altmetric.com.
- The Field Citation Ratio (FCR) indicates the relative citation performance of an article, when compared to similarly-aged articles in its subject area (1 = average).
- The Altmetric Score is an automatically calculated, weighted count of all of the attention a research output has received online.

Pre-print articles

Connecting the dots between computational tools to analyse soil-root water relations
Passot, S., C. Couvreur, F. Meunier, X. Draye, M. Javaux, D. Leitner, L. Pagès, A. Schnepf, J. Vanderborght, and G. Lobet
2018 | Citation(s): | FCR: | Altmetric score: 19
URL: `http://dx.doi.org/10.1101/312918`

Novel multiscale insights into the composite nature of water transport in roots
Couvreur, V., M. Faget, G. Lobet, M. Javaux, F. Chaumont, and X. Draye
2017 | Citation(s): 1 | FCR: | Altmetric score: 10
URL: `http://dx.doi.org/10.1101/147314`

Articles in peer-reviewed journals

archiDART v3.0, A new data analysis pipeline allowing the topological analysis of plant root systems
Delory, B. and M. Li
2018 | Citation(s): 2 | FCR: | Altmetric score: 36
URL: `http://dx.doi.org/10.12688/f1000research.13541.1`

Impact of crop residue management on crop production and soil chemistry after seven years of crop rotation in temperate climate, loamy soils
Hiel, M., S. Barbieux, J. Pierreux, C. Olivier, G. Lobet, C. Roisin, S. Garré, G. Colinet, B. Bodson, and B. Dumont
2018 | Citation(s): - | FCR: - | Altmetric score: 2
URL: `http://dx.doi.org/10.7717/peerj.4836`

Measuring root system traits of wheat in 2D images to parameterize 3D root architecture models
Landl, M., A. Schnepf, J. Vanderborght, G. Bengough, S. Bauke, G. Lobet, R. Bol, and H. Vereecken
2018 | Citation(s): | FCR: | Altmetric score:
. URL: `http://dx.doi.org/10.1007/s11104-018-3595-8`

A spatio-temporal analysis of early root system development reveals three types of lateral roots

Passot, S., B. Moreno-Ortega, D. Moukouanga, C. Balsera, S. GUYOMARC'H, M. Lucas, G. Lobet, L. Laplaze, B. Muller, and Y. Guédon

2018 | Citation(s): | FCR: | Altmetric score: 24

URL: http://dx.doi.org/10.1104/pp.17.01648

CRootBox, A Structural-Functional Modelling Framework For Root Systems

Schnepf, A., D. Leitner, M. Landl, G. Lobet, T. Hieu Mai, S. Morandage, C. Sheng, M. Zoerner, J. Vanderborght, and H. Vereecken

2018 | Citation(s): 2 | FCR: | Altmetric score: 70

URL: http://dx.doi.org/10.1093/aob/mcx221

Combining semi-automated image analysis techniques with machine learning algorithms to accelerate large scale genetic studies

Atkinson, J., G. Lobet, M. Noll, P. Meyer, M. Griffiths, and D. Wells

2017 | Citation(s): 4 | FCR: | Altmetric score: 43

URL: http://www.ncbi.nlm.nih.gov/pubmed/29020748

Image analysis in plant science. Publish then perish

Lobet, G.

2017 | Citation(s): 13 | FCR: | Altmetric score: 50

URL: http://www.ncbi.nlm.nih.gov/pubmed/28571940

This is a timely article, and one which correctly characterises key issues facing those creating and using image analysis tools in the biological sciences. The data presented is interesting and informative, and biologists using image analysis tools should be made aware of the issues raised in this paper.

[Anonymous Reviewer 2]

Using a structural root system model to evaluate and improve the accuracy of root image analysis pipelines

Lobet, G., T. Koevoets I, P. Tocquin, L. Pagès, and C. Périlleux

2017 | Citation(s): 8 | FCR: | Altmetric score: 72

URL: http://www.ncbi.nlm.nih.gov/pubmed/28421089

An evaluation of inexpensive methods for root image acquisition when using rhizotrons

Mohamed, A., Y. Monnier, G. Lobet, J.-L. Maeght, M. Ramel, and A. Stokes

2017 | Citation(s): 3 | FCR: | Altmetric score: -

URL: http://www.ncbi.nlm.nih.gov/pubmed/28286541

Teaching Tools in Plant Biology, Phenomics of root system architecture

2017 | Citation(s): 1 | FCR: | Altmetric score: 18

URL: http://www.ncbi.nlm.nih.gov/pubmed/29018159

Integrating roots into a whole plant network of flowering time genes in Arabidopsis thaliana

Bouché, F., M. D Alioa, P. Tocquin, G. Lobet, N. Detry, and C. Périlleux

2016 | Citation(s): 4 | FCR: 1.65 | Altmetric score: 9

URL: http://www.ncbi.nlm.nih.gov/pubmed/27352932

Environmental Control of Root System Biology

Rellan-Alvarez, R., G. Lobet, and J. Dinneny

2016 | Citation(s): 22 | FCR: 8.65 | Altmetric score: 8

URL: http://www.ncbi.nlm.nih.gov/pubmed/26905656

FLOR-ID, an interactive database of flowering-time gene networks in Arabidopsis thaliana

Bouché, F. and G. Lobet

2015 | Citation(s): 23 | FCR: 8.53 | Altmetric score: 31

URL: http://www.ncbi.nlm.nih.gov/pubmed/26476447

F1000 Recommended: *FLOR-ID presents an impressive effort in bringing together literature on flowering-time regulation in Arabidopsis. Pathways are presented as interconnected schemes with*

the possibility of accessing individual gene information such as mutant phenotype or post-translational regulation. Every scheme presents data in a very explicit way, making this database ideal for newcomers to the field or for teaching.

[F. Parcy, CNRS]

archiDART, an R package for the automated 2D computation of plant root architectural traits

Delory, B., C. Baudson, Y. Brostaux, G. Lobet, and P. du Jardin

2015 | Citation(s): 6 | FCR: 4.91 | Altmetric score: 24

URL: `http://dx.doi.org/10.1007/s11104-015-2673-4`

Root System Markup Language. Toward an unified root architecture description language

Lobet, G., M. Pound, J. Diener, C. Pradal, X. Draye, C. Godin, M. Javaux, D. Leitner, F. Meunier, and P. Nacry

2015 | Citation(s): 31 | FCR: 16.5 | Altmetric score: 34

URL: `http://www.ncbi.nlm.nih.gov/pubmed/25614065`

It is clear that the language will help empower plant biologists and computation scientist working in root phenotyping and modeling fields to leverage and share work more efficiently with others.

[Anonymous Reviewer 2]

Rhizoponics, a novel hydroponic rhizotron for root system analyses on mature Arabidopsis thaliana plants

Mathieu, L. and G. Lobet

2015 | Citation(s): 16 | FCR: 4.21 | Altmetric score: 4

URL: `http://www.ncbi.nlm.nih.gov/pubmed/25657812`

GLO-Roots, an imaging platform enabling multidimensional characterization of soil grown root systems

Rellán-Álvarez, R., G. Lobet, H. Hildner, P. Pradier, J. Sebastian, C. Yee, G. Yu, T. LaRue, C. Trontin, and R. Nieu

2015 | Citation(s): 43 | FCR: 16.01 | Altmetric score: 120

URL: `http://www.ncbi.nlm.nih.gov/pubmed/26287479`

Comparative analysis of Cd and Zn impacts on root distribution and morphology of Lolium perenne and Trifolium repens. Implications for phytostabilization

Lambrechts, T., G. Lequeue, G. Lobet, and B. Godin

2014 | Citation(s): 6 | FCR: 1.27 | Altmetric score: -

URL: `http://dx.doi.org/10.1007/s11104-013-1975-7`

A modeling approach to determine the importance of dynamic regulation of plant hydraulic conductivities on the water uptake dynamics in the soil-plant-atmosphere system

Lobet, G.

2014 | Citation(s): 8 | FCR: 1.69 | Altmetric score: 1

URL: `http://dx.doi.org/10.1016/j.ecolmodel.2013.11.025`

Plant Water Uptake in Drying Soils

Lobet, G., C. Couvreur, and F. Meunier

2014 | Citation(s): 34 | FCR: 7.47 | Altmetric score: 3

URL: `http://www.ncbi.nlm.nih.gov/pubmed/24515834`

In summary, the update delivers a very useful overview of this complex, fast moving multidisciplinary area, that will be invaluable to non-specialists and specialists alike.

[Anonymous Reviewer 2]

Inflorescence development in tomato, gene functions within a zigzag model

Périlleux, C.

2014 | Citation(s): 15 | FCR: 2.74 | Altmetric score: 3

URL: `http://www.ncbi.nlm.nih.gov/pubmed/24744766`

Root systems biology, integrative modeling across scales, from gene regulatory networks to the rhizosphere

Hill, K., S. Porco, G. Lobet, S. Zappala, and S. Mooney

2013 | Citation(s): 20 | FCR: 2.55 | Altmetric score: 4
URL: http://www.ncbi.nlm.nih.gov/pubmed/24143806

An online database for plant image analysis software tools
Lobet, G.
2013 | Citation(s): 72 | FCR: 29.86 | Altmetric score: 36
URL: http://www.ncbi.nlm.nih.gov/pubmed/24107223

The database has a visiting rate of 10 000 page views / month

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Guillaume did the community of plant biologists a huge favor by creating a webpage that describes and links to a large number of image analysis tools that have been designed to solve a measurement problem in plant biology. Nobody knows more about what's already out there than Guillaume.
[E. Spalding, University of Madison]

Novel scanning procedure enabling the vectorization of entire rhizotron-grown root systems
2013 | Citation(s): 46 | FCR: 7.88 | Altmetric score:
URL: http://www.ncbi.nlm.nih.gov/pubmed/23286457

A novel image-analysis toolbox enabling quantitative analysis of root system architecture
Lobet, G.
2011 | Citation(s): 133 | FCR: 49.84 | Altmetric score: 3
URL: http://www.ncbi.nlm.nih.gov/pubmed/21771915

Model-assisted integration of physiological and environmental constraints affecting the dynamic and spatial patterns of root water uptake from soils
Draye, X. and Y. Kim
2010 | Citation(s): 84 | FCR: 9.66 | Altmetric score: -
URL: http://www.ncbi.nlm.nih.gov/pubmed/20453027

Invited presentations in international conferences

Alternative plants, why we need models to understand the complexity of plants
CRAG Seminar, Barcelona, Spain, 2018
URL: https://doi.org/10.6084/m9.figshare.6188372.v1

Non-linear plant phenotyping pipelines. How can structural models and machine learning can help us analyse large plant image datasets
Phenome 2018, Tucson, USA, 2018
URL: https://doi.org/10.6084/m9.figshare.5885329.v2

Alternative plants, why we need models to understand the complexity of plants
IPG Symposium, Missouri, USA, 2017
URL: http://dx.doi.org/10.6084/m9.figshare.5089900.v1

Using machine learning and growth models to streamline large scale root phenotyping
JST International Workshop on Field Phenotyping, Tokyo, Japan, 2017
URL: https://doi.org/10.6084/m9.figshare.5682775.v1

Open Science. A view from the Bench
Open Belgium Conference, Antwerpen, Belgium, 2016
URL: http://dx.doi.org/10.6084/m9.figshare.3020170

Introducing Root System Markup Language
Modeling plant development from the organ to the whole plant scale, Montpellier, France, 2015
URL: http://dx.doi.org/10.6084/m9.figshare.1379862

Plant Image Analysis tools. Current trends and limitations

Plant Image Analysis Problems and Solution, Madison, Wisconsin, 2015
URL: http://dx.doi.org/10.6084/m9.figshare.1169928

Science Valorisation
Communiquer sa recherche, Brussels, Belgium, 2015
URL: http://dx.doi.org/10.6084/m9.figshare.1057995

Science Valorisation
Let's Talk Science, Leuven, Belgium, 2015
URL: http://dx.doi.org/10.6084/m9.figshare.1057995

Structural Root Modelling
Winter School on Root Phenotyping, Jülich, Germany, 2015
URL: http://dx.doi.org/10.6084/m9.figshare.1594792

Modelling water relations in the soil-plant-atmosphere system
SEB Main Meeting, Manchester, UK, 2014
URL: http://figshare.com/articles/Modelling_water_relations_in_the_soil_plant_atmosphere_system/1091425

Water relations in the soil-plant system. What can we learn from functional-structural plant models
BASF Top Science Meeting, Mannheim, Germany, 2014
URL: http://figshare.com/articles/Modelling_water_relations_in_the_soil_plant_atmosphere_system/1091425

Water relations in the SPAC. What can we learn from functional-structural plant models
Soil Science Society Belgium, Brussels, Belgium, 2014
URL: http://figshare.com/articles/Modelling_water_relations_in_the_soil_plant_atmosphere_system/1091425

A Novel Image Analysis Toolbox Enabling Quantitative Analysis of Root System Architecture.
International Workshop on Image Analysis Methods for Plant Science, Nottingham, UK, 2012
URL: http://dx.doi.org/10.6084/m9.figshare.95665

New insights on the role of root radial conductivity on the overall uptake dynamics
Roots for improving resource acquisition in crops, Grasmere, UK, 2011
URL: http://dx.doi.org/10.6084/m9.figshare.95591

Presentations in international conferences

How to deal with the complexity of plants, a modelling vision
CPIB Seminar, Nottingham, UK, 2016
URL: http://dx.doi.org/10.6084/m9.figshare.4239140.v3

plant-image-analysis.org, A platform referencing plant image analysis tools
Neubias Taggathon, Barcelona, Spain (video-conference), 2016
URL: http://dx.doi.org/10.6084/m9.figshare.3826488

Using structural models to validate and improve root image analysis pipelines
International Plant Phenotyping Symposium, Mexico City, Mexico, 2016
URL: http://dx.doi.org/10.6084/m9.figshare.4311848.v1

FLOR-ID, an interactive database of flowering gene network in Arabidopsis
Workshop on Mechanisms Controling Flower Development, Aiguablava, Spain, 2015
URL: http://orbi.ulg.ac.be/handle/2268/180776

Inflorescence development in tomato. Gene functions within a zigzag model.
Genetic Variation of Flowering Time Genes and Applications for Crop Improvement, Bielefeld, Germany, 2014

URL: http://dx.doi.org/10.6084/m9.figshare.976039

Plant Image Analysis tools. Current trends and limitations
International workshop on Image analysis methods for the plant sciences, Aberythwyth, UK, 2014
URL: http://dx.doi.org/10.6084/m9.figshare.1169928

First steps towards an explicit modeling of aba production and translocation in relation with the water uptake dynamics
9th International Workshop on Sap Flow, Ghent, Belgium, 2013
URL: http://dx.doi.org/10.6084/m9.figshare.713568