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AGILE Doctoral Training Event #3

FAIR practices in image data management and introduction to image analysis

Lecturers: Jean-Marie Burel, University of Dundee, UK. Virginie Uhlmann, University of Zürich, CH. Célia Baroux, University of Zürich, CH; Christophe Tatout, University of Clermont Auvergne, Joana Delgado Martins, ZMB University of Zürich; Marco Stucchi, Bitplane AG

Location: Online
Dates: December 2026-January 2027
Credit Points: 1 ECTS

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Learning objectives

This course equips the participants with fundamental image data management and processing skills applied to bioimaging examples in plant sciences.

By the end of this course, participants will be able to:

- Explain core concepts of image documentation, annotation, and processing, and describe common computational approaches for denoising and segmentation
- Open bioformat images and perform basic rendering, display adjustment, denoising, and simple segmentation using Fiji and Python
- Use Imaris to perform image format conversion, 3D rendering, deconvolution, denoising, and spot/surface segmentation
- Apply FAIR (Findable, Accessible, Interoperable, Reusable) data principles to an imaging workflow, from acquisition to analysis
- Document, annotate, and organise image datasets in OMERO according to REMBI (Recommended Metadata for Biological Images) guidelines
- Log in to and use the AGILE OMERO server, and prepare a publication-ready figure from OMERO-managed data

Course content

(1) Basics of image analysis, Tools and Concepts

Lectures cover the fundamentals of image analysis concepts and computational approaches for signal quantification, denoising, and segmentation. Hands-on sessions provide guided practice with basic commands and scripts in Fiji and Python for handling, visualizing, and processing microscopy image data.. Participants are also introduced to Imaris (Bitplane AG / Oxford Instruments), a script-free interface for image format conversion, 3D rendering, deconvolution, denoising, and spot/surface segmentation.

Learning objectives:

- Become familiar with common tools (Fiji, Python, Imaris) for image analysis
- Perform basic image processing on sample images using scripted (Fiji/Python) and script-free (Imaris) workflows.

Topic	Instructors	Lecture	Hands-On	Duration
Introduction to image analysis	V.Uhlmann	x		2h
Basics of Image analysis using Fiji	J.Delgado		x	4h
Basics of Image analysis using Python	V.Uhlmann		x	4h
Interacting with the bioimage analysis community	V.Uhlmann	x		1h
Basics of Image analysis using Imaris	Bitplane, C.Baroux		x	5h
Total				**16h**

Recommended Reading / Online tutorials

- Culley S et al. (2023) “Made to measure: an introduction to quantifying microscopy data in the life sciences.” *Journal of Microscopy* (doi:10.1111/jmi.13208)
- Senft RA et al. (2023) “A biologist’s guide to planning and performing quantitative bioimaging experiments.” *PLOS Biology* 21: e3002167 (doi:10.1371/journal.pbio.3002167)
- Bankhead P (2022–2025) *Introduction to Bioimage Analysis.* Online textbook, CC-BY 4.0 (bioimagebook.github.io)

(2) FAIR practices in biomedical imaging

Lectures, in the form of short theoretical primers, present the concepts and importance of FAIR (Findable, Accessible, Interoperable, Reusable) principles in bioimaging, from image acquisition to analysis. Specific guidelines for the AGILE consortium are presented during hands-on sessions, using the template files required for image data documentation in the host lab and at submission to the OMERO server.

Learning objectives:

- Learn about the FAIR principles and their relevance to bioimaging workflows
- Complete an AGILE-compliant Image Database and a REMBI metadata file for a sample dataset

Topic	Instructors	Lecture	Hands-On	Duration
FAIR concepts in Bioimaging	JM Burel	x		2h
FAIR guidelines for AGILE	C Baroux		x	1h
Custom REMBI file for AGILE	C Tatout		x	1h
Total				**4h**

Recommended Reading / Online tutorials

- Wilkinson MD et al. (2016) “The FAIR Guiding Principles for scientific data management and stewardship.” *Scientific Data* 3: 160018 (doi:10.1038/sdata.2016.18)
- Euro-BioImaging (2023–2026) “Guide to FAIR BioImage Data.” Annual workshop series; recordings on YouTube (eurobioimaging.eu)

(3) Image Data Management using OMERO

This session offers a guided introduction to OMERO. Participants learn to find, upload, organise, and annotate images according to REMBI guidelines; to perform simple image analysis in OMERO using Fiji or Python scripts; and to prepare a publication-ready figure. Participants are also introduced to the AGILE OMERO server, including login and navigation.

Learning objectives:

- Upload, organise, and annotate an image dataset in OMERO according to REMBI guidelines
- Run a simple batch image analysis in OMERO using Fiji or Python
- Prepare a publication-ready figure from OMERO and connect to the AGILE OMERO server

Topic	Instructors	Lecture	Hands-On	Duration
Introduction to OMERO	JM Burel		x	2h
Image analysis in OMERO	JM Burel		x	4h
Preparing Figures in OMERO	JM Burel		x	2h
Using the AGILE OMERO server	C Tatout		x	2h
Total				**10h**

Recommended Reading / Online tutorials

- Allan C et al. (2012) “OMERO: flexible, model-driven data management for experimental biology.” *Nature Methods* 9: 245–253 (doi:10.1038/nmeth.1896)
- Burel J-M et al. (2015) “Publishing and sharing multi-dimensional image data with OMERO.” *Mammalian Genome* 26: 441–447 (doi:10.1007/s00335-015-9587-6)
- Sarkans U et al. (2021) “REMBI: Recommended Metadata for Biological Images — enabling reuse of microscopy data in biology.” *Nature Methods* 18: 1418–1422 (doi:10.1038/s41592-021-01166-8)
- Schmidt C et al. (2025) “Research data management for bioimaging: the 2021 NFDI4BIOIMAGE community survey.” *F1000Research* (doi:10.12688/f1000research.121714.2)
- OMERO guides (omero-guides.readthedocs.io) official step-by-step manual.
- OME YouTube channel: www.youtube.com/@OpenMicroscopyEnvironment/search?query=OMERO .

Detailed Programme

Zoom link: Unless specified by the instructor, this link is valid throughout the course: https://sl1nk.com/zsp71u2

Day 1 : December 11th 2026

8:00 - 10:00 Introduction to image analysis (V. Uhlmann).
10:30 - 12:30 Image analysis using Fiji (ZMB) part I (J.Delgado).
14:00 - 16:00 Image analysis using Fiji (ZMB) part II (J.Delgado).

Day 2 : December 15th 2026

8:00 - 12:00 Image analysis using Python (V. Uhlmann).
13:00 - 14:00 Interacting with the bioimage analysis community (V. Uhlmann).

Day 3 : December 17th 2026

9:00 - 11:00 Introduction to image rendering and basic functions in Imaris (Marco Stucchi, Bitplane AG).

13:00 - 16:00 Guided Practice on own images (3D rendering, simple image segmentation) (C.Baroux)

Day 4 - January 18th 2027

9:00 - 11:00 FAIR practices: from image acquisition to analysis (JM Burel).
12:00 - 13:00 FAIR guidelines: Image database and REMBI files (C.Tatout)
14:00 - 16:00 Introduction to OMERO and image annotation (JM Burel)

Day 5 - January 19th 2027

9:00 - 13:00 Image analysis in OMERO - Fiji , python, batch (JM Burel)

14:00 - 16:00 Preparing Figures in OMERO (JM Burel)

Day 6 - January 20th 2027

9.00 - 11:00 Connecting to the AGILE OMERO server (C Tatout)
11:00 - 12:00 **Course wrap-up, feedback and outlook** (All Instructors)