

Using Galaxy to interact with OMERO for image analysis

Lucille Delisle

EPFL

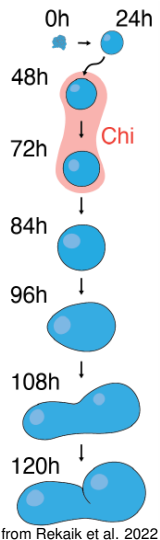
2023-10-03

Outline

- Introduction
 - Scientific context
 - OMERO
- Our current setup (not optimal)

Scientific context

- Study early mouse embryo development with gastruloids
 - Study impact of different treatments (genetic rearrangement, chemical, mechanical) on development and elongation
 - Need an automated 'quantitative' pipeline
 - Beginning of image analysis
 - Get Area of Gastruloids
 - Elongation index
 - Localisation of fluorescent proteins



OMERO server at EPFL



A screenshot of the OMERO web interface. The top bar shows the user 'updup Pierre Ostel' and tabs for 'General', 'Acquisition', and 'Preview'. The left sidebar has 'Explore', 'Tags', and 'Shares' sections, with a file tree listing various experiments (EXP044-054) and image files (Image_18915.tif to Image_18927.tif). The main area displays a grid of 30 microscopy images of a biological specimen, with the first image highlighted in blue. A 'Zoom:' slider is at the bottom of the grid. On the right, the 'Full viewer' shows a large image of the same specimen, with a 'Z: 1/1 T: 1/1' indicator. Below the viewer are controls for 'Save', 'Save to All', 'Undo', 'Redo', and 'Copy Paste'. At the bottom right, there are checkboxes for 'Grayscale' and 'Active', and two color calibration bars (red and green) with numerical values (0 and 255) and sliders.

OMERO server at EPFL



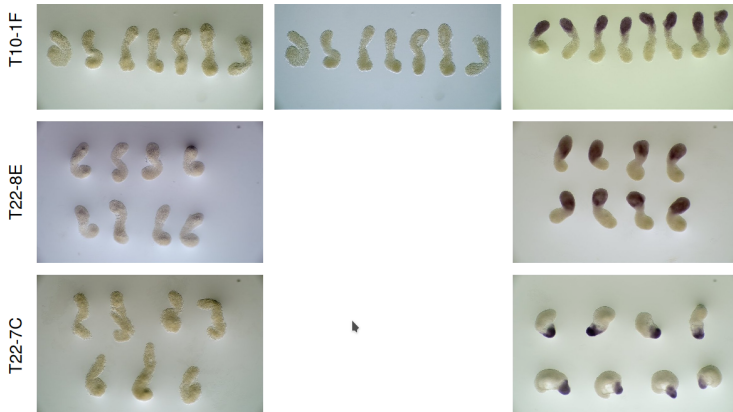
OMERO server at EPFL



The screenshot displays the OMERO web interface. On the left, a grid of 48 microscopy images is arranged in 6 rows (A-F) and 8 columns (1-8). A blue box highlights the image at row D, column 5. Below the grid, there are controls for "wrap" (set to "images per row"), "Fields from well", and a "Zoom" slider. A thumbnail of the selected image is shown below the grid.

On the right, the "Full viewer" panel shows a magnified view of the selected image. It includes a "Full viewer" title, a toolbar with zoom in (+), zoom out (-), and a 1:1 icon. The image shows a bright green spot surrounded by a diffuse green background. Below the image, there are navigation controls (Z: 1/1, T: 5/14), a "Save" button, and a "Save to All" button. A toolbar contains "Undo", "Redo", and "Copy/Paste" icons. Below that, there are checkboxes for "Grayscale", "Active", and "Show Histogram". A histogram is visible at the bottom left of the viewer, showing a peak at 1. The "Active" slider is set to 3, and the "Show Histogram" slider is set to 255. The "Grayscale" slider is set to 2244, and the "Show Histogram" slider is set to 3341.

OMERO server at EPFL



Duboule's lab setup

1. Backup and put to OMERO



High throughput images

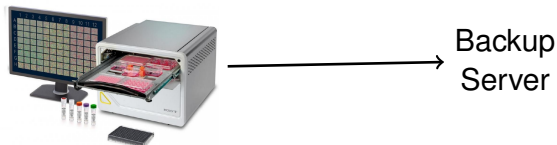
(whole plates, time-course)

A lot of metadata are in filename

One file per channel per time-point

Duboule's lab setup

1. Backup and put to OMERO



High throughput images

(whole plates, time-course)

A lot of metadata are in filename

One file per channel per time-point

Duboule's lab setup

1. Backup and put to OMERO



Backup
Server

High throughput images
(whole plates, time-course)
A lot of metadata are in filename
One file per channel per time-point



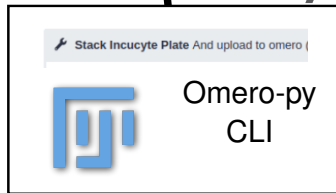
Duboule's lab setup

1. Backup and put to OMERO



Backup
Server

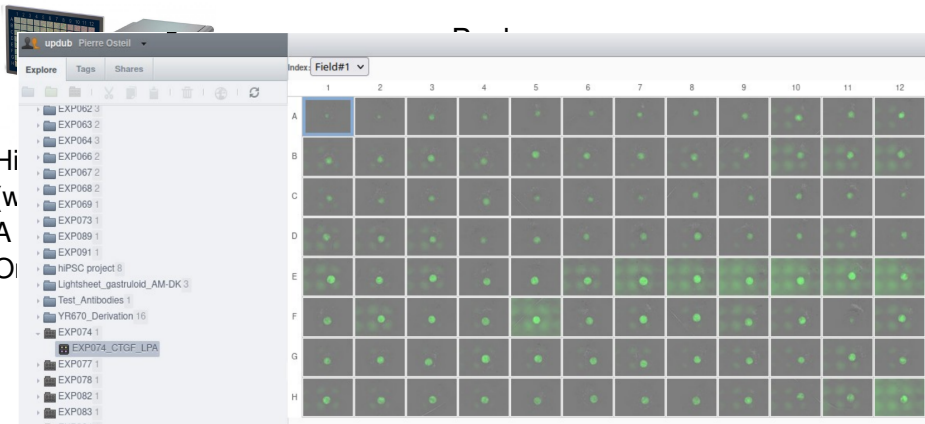
High throughput images
(whole plates, time-course)
A lot of metadata are in filename
One file per channel per time-point



Duboule's lab setup

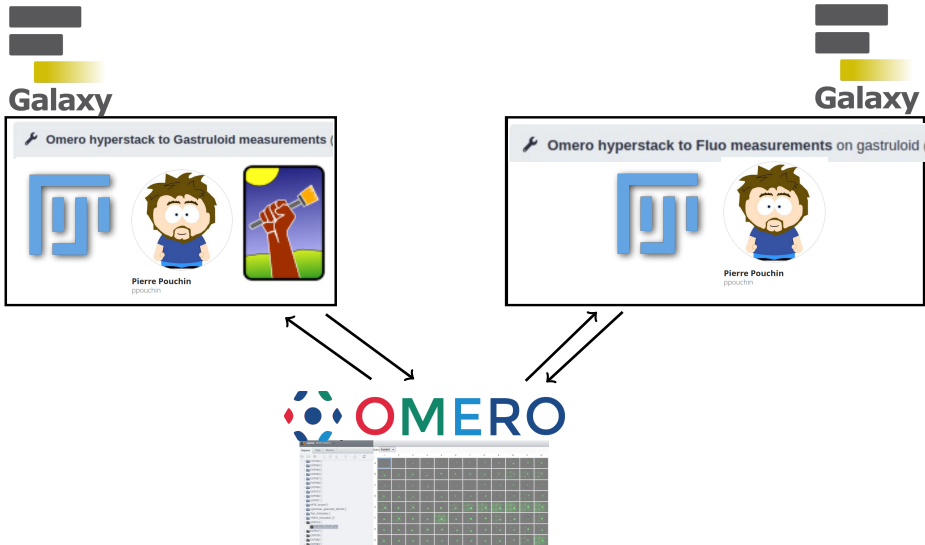
1. Backup and put to OMERO

Hi
(w
A
O)



Duboule's lab setup

2. Analysis (segmentation + measurement)



Duboule's lab setup

2. Analysis (segmentation + measurement)

The image displays a screenshot of the Galaxy-OMERO web interface. The central area shows a microscopy image of several green fluorescent cells, with yellow lines indicating segmentation. The interface includes a top navigation bar with 'Galaxy' labels, a left sidebar with 'Omero hypersta' and a logo, and a right sidebar with 'measurements on gastruloid' and a cartoon character. A bottom panel shows a grid of green markers.

Conclusion

- Galaxy enables to run the macros without GUI, keeping trace of what have been done.
- lldelisle-tools do not follow the 'galaxy spirit' (cut a pipeline into very small pieces)
 - To avoid read and write
 - To make sure what is sent back to OMERO comes from the same image.
- Everything is available on my github, tools are available on testtoolshed (unless you think they can be used by more people than my lab).

Acknowledgements

- Duboule's lab (Pierre)
- BIOP (Romain & Rémy)
- Pierre Pouchin

EPFL

 Swiss National
Science Foundation

