CASE STUDY

Imaging embryo development at scale: 8× smaller files, zero information loss

Key results

913 GB to 115 GB (size of a full time-lapse movie dataset)

Transfer times cut from 2 hours to 15 minutes

$1M+ budget saving potential per 5-year project

The Challenge

The Oates Lab at EPFL's School of Life Sciences uses fluorescence live imaging to track hundreds of cells across developing 3D zebrafish embryos — generating 913 GB datasets per movie and up to 6 movies per week. Data must be retained for 5–15 years across on-premise servers and Amazon S3. With each transfer taking over 2 hours on a 1 Gbit connection, and storage costs scaling with every new project, the lab faced growing bottlenecks in both time and budget with no room to expand experiment throughput.

The Outcome

In 2021 with Jetraw integrated into their Viventis + Hamamatsu imaging pipeline, the Oates Lab reduced each 913 GB dataset to 115 GB with no loss of image information. Transfer times dropped from 2 hours to 15 minutes. Over a 5-year project with 10-year archival, this could translate to more than $1M in storage savings and a reduction in CO_2 emissions from 414 t to 39 t while freeing up capacity to run more experiments simultaneously and reduce animal use through data reuse.

> "We acquire large time-lapse movies to capture the dynamics of the growing zebrafish embryo and struggle to interact with our terabyte size data due to slow data transfer and expensive storage. With Jetraw we have solved these issues with the perk of not losing any information on the data."

— Dr. Arianne Bercowsky Rama
Oates Lab, EPFL

EPFL, OATES LAB

Headquarters	Lausanne, CH
Founded	2016

Imaging techniques: Fluorescence live imaging, 3D embryo development, segmentation clock, cell tracking

Instruments:
Viventis LS1 Live light sheet microscope;
Hamamatsu ORCA-Fusion BT

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Terabyte-scale live imaging created data bottlenecks

The Oates Lab generates up to 6 time-lapse movie datasets per week, each a 3D volumetric stack of 1.57 GB per frame totalling 913 GB per full movie. With data needing to be stored across short-term on-premise servers and long-term Amazon S3 archive for up to 15 years, the volume compounds rapidly. On a standard 1 Gbit connection, transferring a single dataset took more than 2 hours, slowing the pace at which scientists could move between acquisition, analysis, and collaboration.

Faster data flow, without compromising Hamamatsu image quality

Jetraw has been integrated into the Oates Lab's full imaging pipeline, sitting between the Viventis LS1 light sheet microscope, the Hamamatsu ORCA-Fusion BT camera, and downstream storage. Acting as middleware, it compresses raw image data at 8:1 while preserving metrological accuracy, meaning every pixel value captured by the Hamamatsu sensor is retained for downstream analysis in Fiji, Imaris, and Arivis. Compression happens automatically on upload, and files decompress transparently during processing — requiring no changes to existing acquisition or analysis workflows.

Transfers that once took hours now finish in minutes

With Jetraw, the Oates Lab cut transfer times from 2 hours to just 15 minutes per dataset an 8x improvement. Individual 3D stacks that previously occupied 1.57 GB now store at 196 MB. The lab can now work on more movies simultaneously, as freed-up local and cloud capacity allows parallel access across projects. For a lab generating 270 TB per year with 10-year archival requirements, this could amount potentially to over $1M in cost savings per 5-year project.

Lower environmental footprint - without sacrificing data integrity

For the Oates Lab, storing 270 TB/year over a 10-year archival period without compression would generate an estimated 414 tonnes of CO_2. With Jetraw, that figure drops to 39 tonnes, avoiding 375 tonnes of emissions per project, equivalent to planting over 12,000 trees. Beyond environmental impact, the ability to store more data means scientists can reuse existing datasets across studies, reducing the number of animals needed in experiments and enabling larger sample sizes for more statistically robust results.

HAMAMATSU
PHOTON IS OUR BUSINESS

HAMAMATSU ORCA-FUSION BT
Powering the Viventis LS1 Live light sheet microscope

BACK-ILLUMINATED SCMOS

High QE for low-light fluorescence imaging

ULTRA-LOW READOUT NOISE

CCD-like uniformity for clean signal

FAST FRAME RATES

Enables high-speed 3D volumetric acquisition

LARGE FIELD OF VIEW

Images entire early-stage embryos in a single FOV

Learn more

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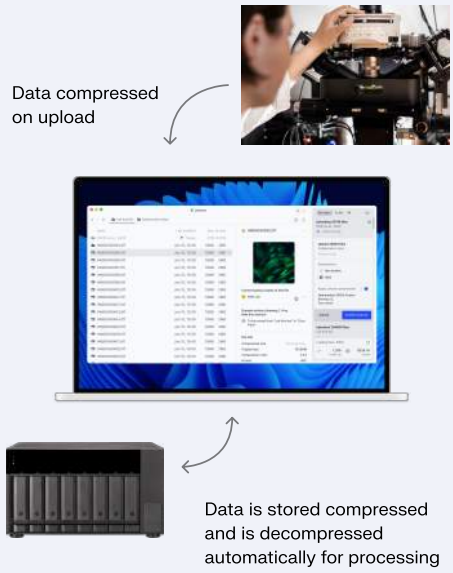
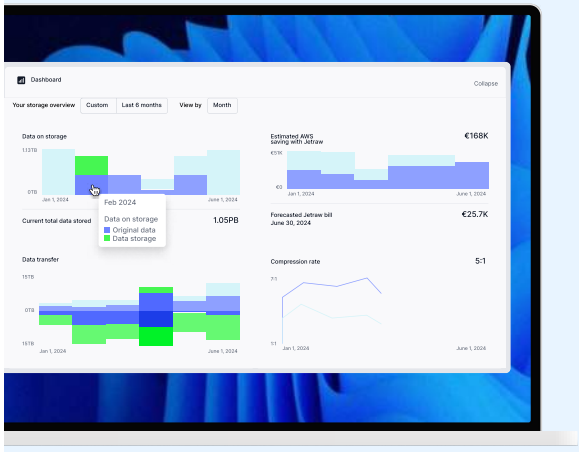
CASE STUDY

About Jetraw: built to manage large image data.

Jetraw is an image data management solution that sits between your microscopes and your storage systems.

- Streamlines the entire workflow: from acquisition to storage
- Accelerates data transfers and sharing by an average factor of 7
- Reduces storage requirements by an average factor of 7
- Preserves raw image quality in a compliant and secure way





Experience faster transfers and fewer bottlenecks. All without changing how you work.

dotphoton.com/jetraw

Collaborations and Partners:

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