

# Running Vaa3D on macOS

## Run Vaa3D on Mac.wiki

Yimin Wang edited this page on Apr 6 · 2 revisions

### Steps to run Vaa3D:

- First download the pre-compiled Qt 4.7.1 from <https://home.penglab.com/tmp/qt7.tar.gz> and extract it to the /usr/local/Trolltech directory;
- Download Vaa3D 3.458 from GitHub [https://github.com/Vaa3D/Vaa3D\\_Wiki/wiki/Download-Vaa3D-executables](https://github.com/Vaa3D/Vaa3D_Wiki/wiki/Download-Vaa3D-executables);
- Go to vaa3d64.app package contents, go to macOS and run vaa3d64 inside;
- Then you can run vaa3D successfully.

### Notes:

- If you don't download the pre-compiled Qt 4.7.1 beforehand, you will get the error that Vaa3D is trying to call "QtGUI" from a location that doesn't exist. Another solution is to find these files and put them in the appropriate location.

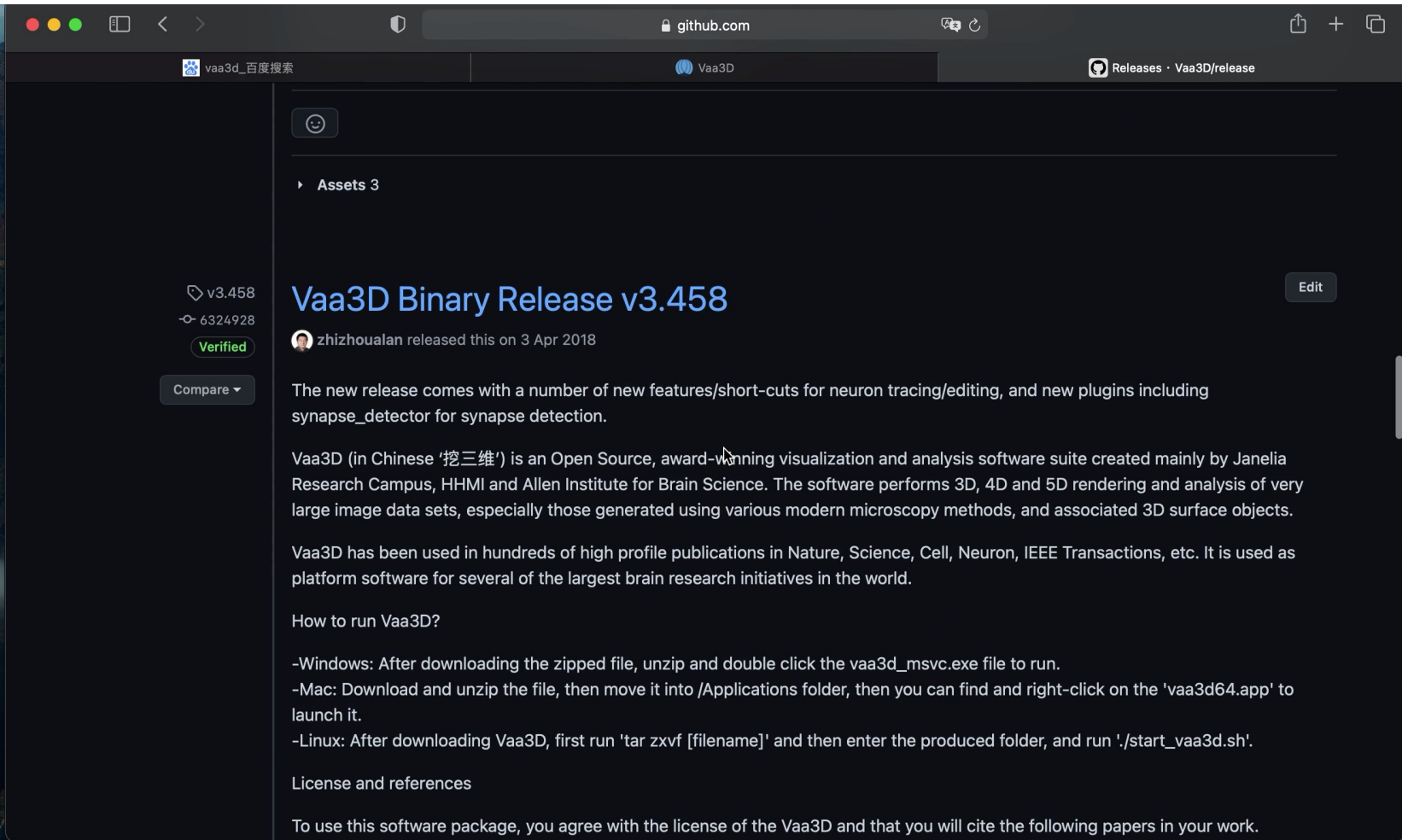
### To run plugins:

Some people found that for new Mac OS there is an issue to detect and run the DLL (plugins), which is due to the OS's gatekeeper

You may disable it by typing at a command line Terminal window

```
sudo spctl --master-disable
```

# Running Vaa3D on macOS



The screenshot shows a macOS desktop with a browser window open to the Vaa3D GitHub release page. The browser's address bar shows 'github.com' and the page title is 'Releases · Vaa3D/release'. The main content of the page is for 'Vaa3D Binary Release v3.458', released by 'zhizhoualan' on 3 Apr 2018. The release description states: 'The new release comes with a number of new features/short-cuts for neuron tracing/editing, and new plugins including synapse\_detector for synapse detection.' Below this, it explains that Vaa3D is an Open Source, award-winning visualization and analysis software suite created by Janelia Research Campus, HHMI, and Allen Institute for Brain Science. It performs 3D, 4D, and 5D rendering and analysis of large image data sets. The page also includes instructions on how to run Vaa3D on Windows, Mac, and Linux, and a section for license and references.

**Vaa3D Binary Release v3.458**

zhizhoualan released this on 3 Apr 2018

The new release comes with a number of new features/short-cuts for neuron tracing/editing, and new plugins including synapse\_detector for synapse detection.

Vaa3D (in Chinese '挖三维') is an Open Source, award-winning visualization and analysis software suite created mainly by Janelia Research Campus, HHMI and Allen Institute for Brain Science. The software performs 3D, 4D and 5D rendering and analysis of very large image data sets, especially those generated using various modern microscopy methods, and associated 3D surface objects.

Vaa3D has been used in hundreds of high profile publications in Nature, Science, Cell, Neuron, IEEE Transactions, etc. It is used as platform software for several of the largest brain research initiatives in the world.

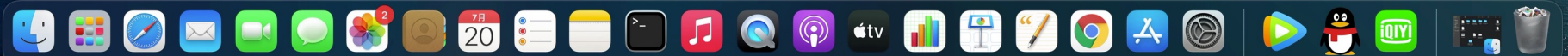
How to run Vaa3D?

- Windows: After downloading the zipped file, unzip and double click the vaa3d\_msvc.exe file to run.
- Mac: Download and unzip the file, then move it into /Applications folder, then you can find and right-click on the 'vaa3d64.app' to launch it.
- Linux: After downloading Vaa3D, first run 'tar zxvf [filename]' and then enter the produced folder, and run './start\_vaa3d.sh'.

License and references

To use this software package, you agree with the license of the Vaa3D and that you will cite the following papers in your work.

Firstly, download version 3.458 on vaa3d github



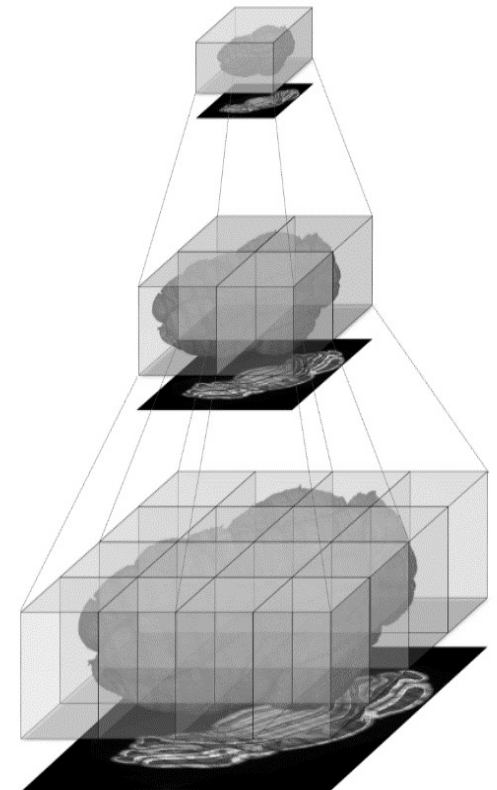
# Visualizing big bio data using Vaa3D-TeraFly

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2021-07-26

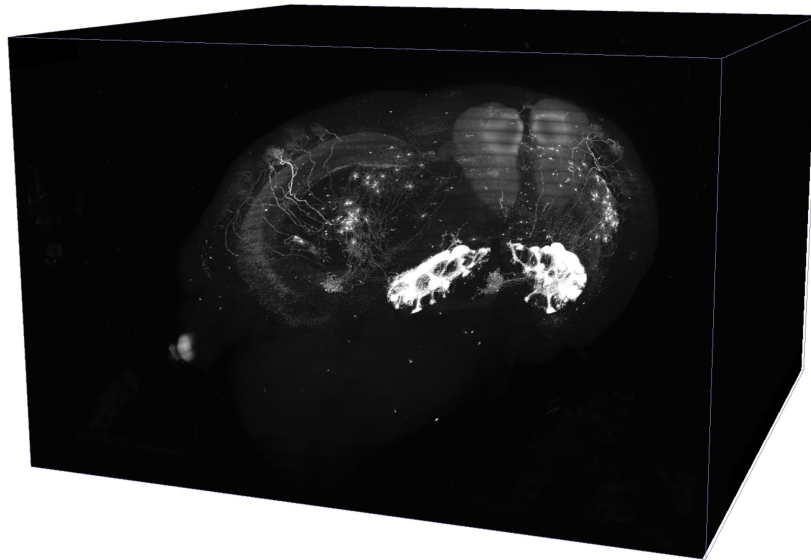


# In this tutorial, you're going to learn

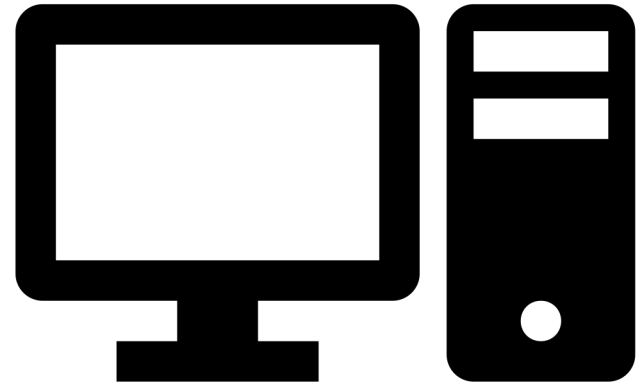
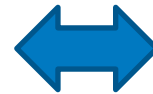
- How TeraFly work
- How to convert imaging data from conventional representations to TeraFly-compatible format
- How to use TeraFly to visualize and interact with big imaging data

# The explosion of imaging data size

- A whole mouse brain imaged at sub-micron resolution could result in  $50000 \times 40000 \times 10000$  voxels, which is too large to be loaded at once by mainstream PC / workstations.



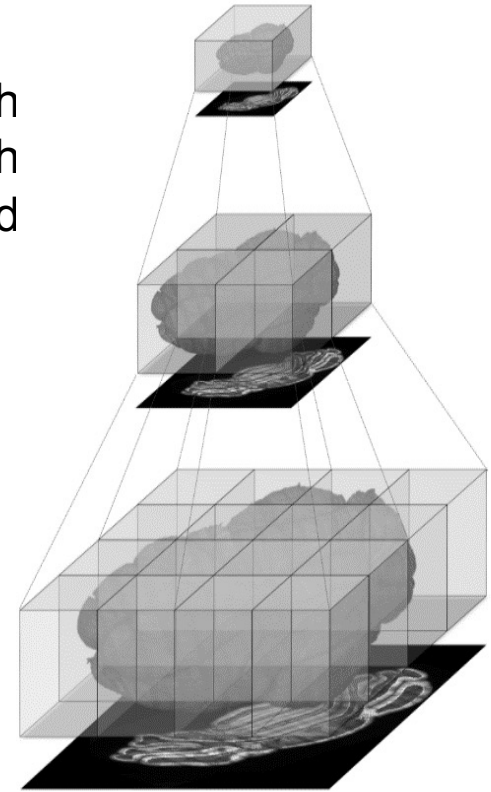
Unlimited data size



Limited memory / storage

# Vaa3D-TeraFly: Overview

- **TeraFly** extends the Vaa3D software to cope with (potentially) **unlimited** sized bioimages even on laptops with a limited amount of system memory ( $\leq 4$  GB) and video card memory ( $\leq 1$  GB)
  - fast rendering/visualization of **3/4/5D TeraByte**-scale microscopy images
  - **instant** zoom-in/out with mouse-scroll
  - visualization-assisted **annotation** of 3D objects at different scales
  - image format conversion tool (**TeraConverter**) included

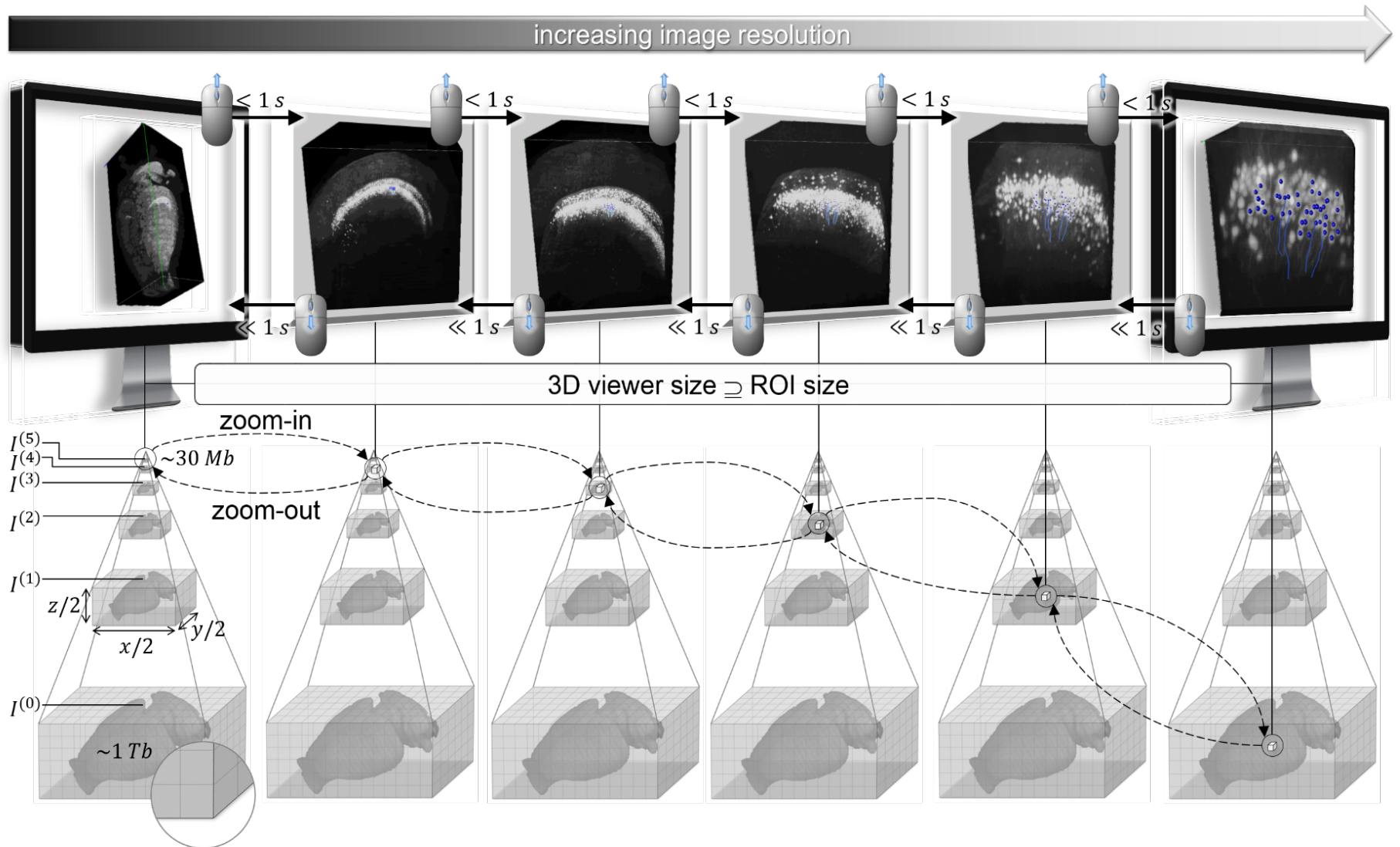


- the underlying idea is to mimic the behavior of Google Earth
  - what you see is what you need (WYSIWYN)
  - multiresolution representation

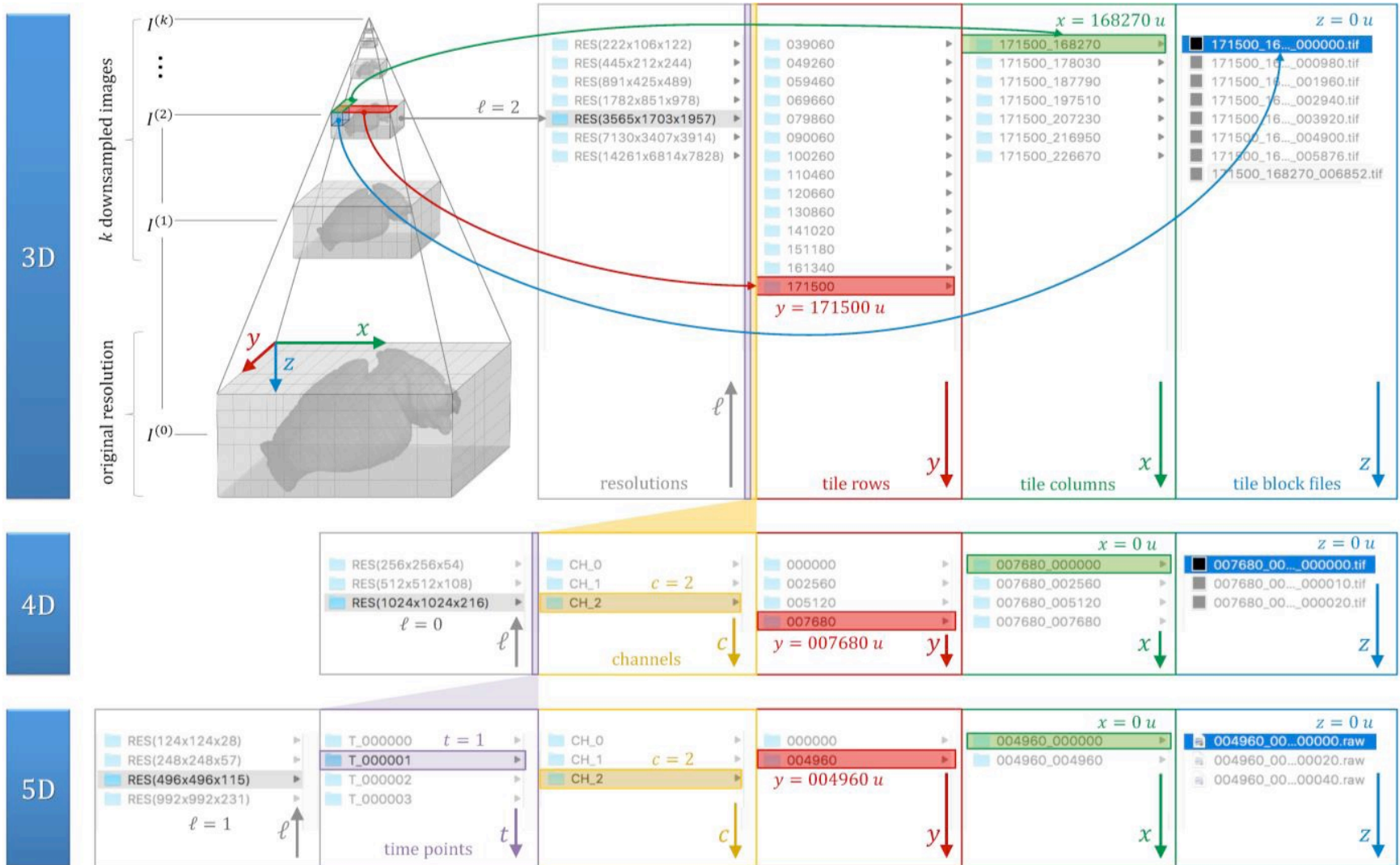




# Vaa3D-TeraFly: Architecture



# Vaa3D-TeraFly: Schema of 3D - 5D Formats





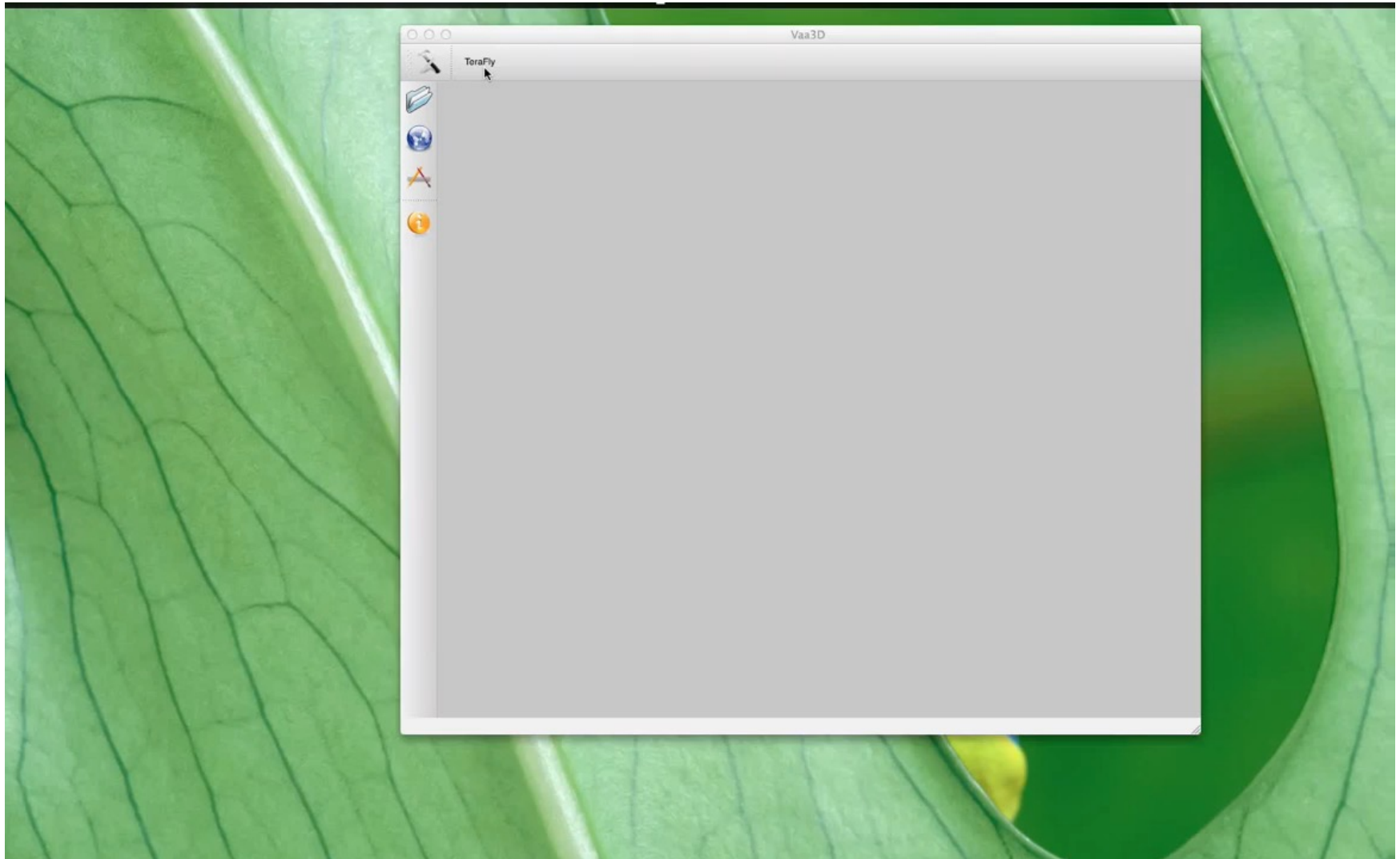
# Vaa3D-TeraFly: User Interface

The screenshot displays the Vaa3D-TeraFly user interface. The main window, titled "3D View [ID(0), Res(250 x 250 x 250), Volume X=[1,250], Y=[1,250], Z=[1,250], T=[0,0], 1 channels\_processed]", shows a 3D visualization of a neuron with its cell body and branching processes. The neuron is rendered in white and light gray against a dark blue background. A red wireframe box is overlaid on the neuron, indicating a volume of interest (VOI). The control panel on the right, titled "TeraFly v2.5.11", contains several sections:

- Viewer:** Resolut: 250×250×250 (voxel: 4.0×4.0×4.0 μm). Max dim: 256(x), 256(y), 256(z), 1(t). Buttons: See in VR, Collaborate in VR.
- Zoom-in/out:** Z/i met: Mean-shift of mean-shift (MSMS). Z/i thr: [slider]. Z/i cac: [slider]. Z/o thr: [slider]. Z/o met: By Default.
- Volume Of Interest (VOI)'s coordinates:** x: 1 to 1000, y: 1 to 1000, z: 1 to 1000, t: [slider]. Lock Magnification: .
- Raw Image Voxelsize:** x: 0.20 μm, y: 0.20 μm, z: 1.00 μm.
- Proofreading:** Start: [slider], Block 0 of 0.
- Overview:** total length: 0.00 voxels / 0.00 μm, number of segments: 0. A small 3D diagram of a cube is shown with an "update" button below it.
- What's this?:** A question mark icon and text: "Move the mouse over an object and its description will be displayed here."
- Ready:** A status bar at the bottom.

The Vaa3D logo and "vaa3d.org" are visible in the bottom right corner of the 3D view window.

# Vaa3D-TeraFly: Basic Usage

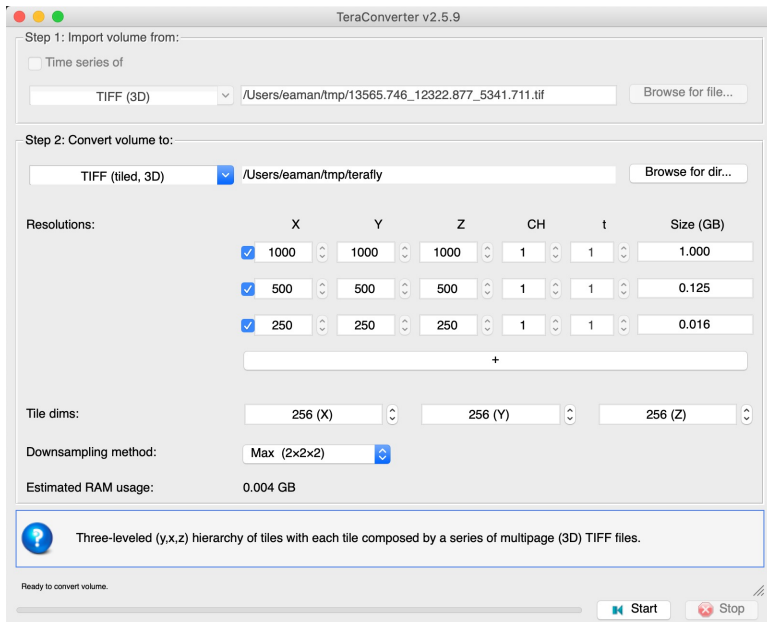


# Vaa3D-TeraFly: 5D image visualization

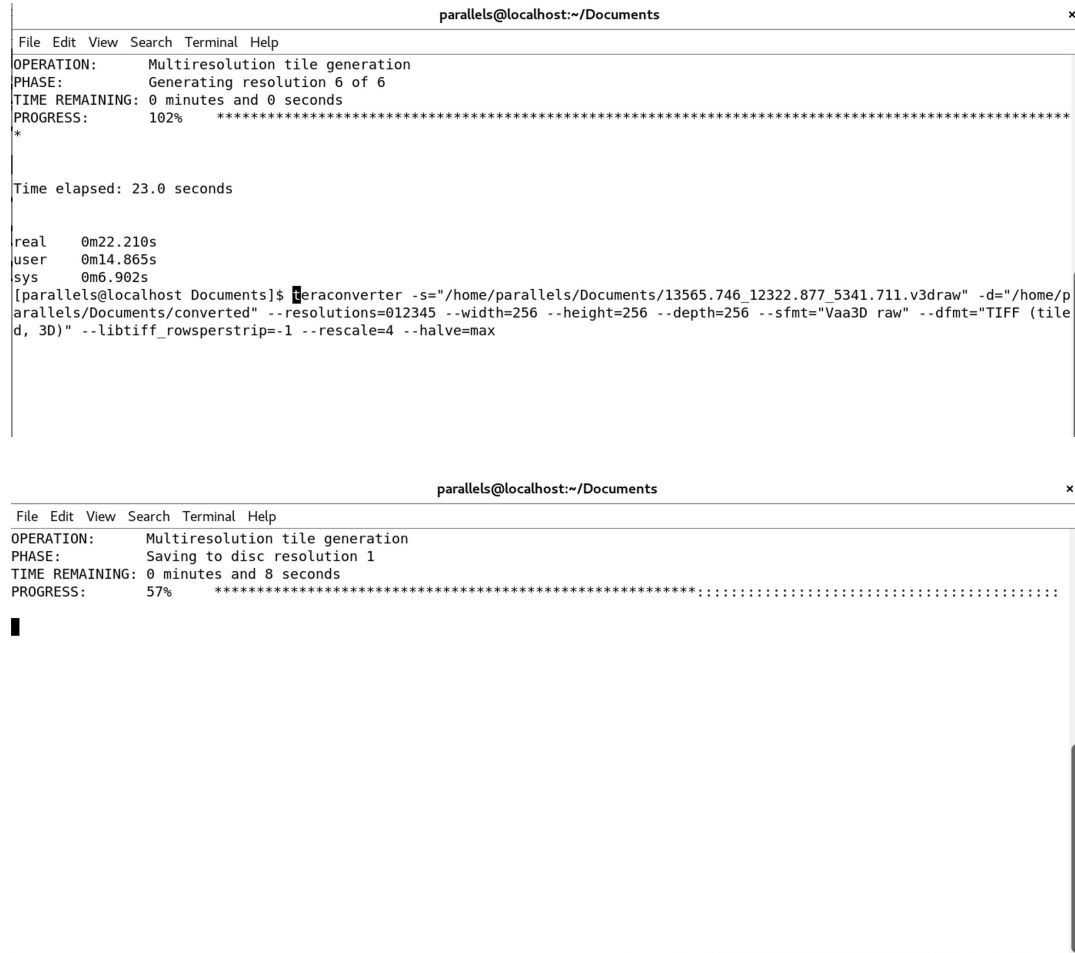
The screenshot displays the Vaa3D-TeraFly software interface, which is used for 5D image visualization. The main window is titled "3D View [ID(0), Res(124 x 124 x 28), Volume X=[1,124], Y=[1,124], Z=[1,28], T=[0,9], 2 channels\_processed]". The central 3D view shows a complex, multi-colored volume (red, green, yellow) with a mouse cursor pointing at it. The interface is divided into several control panels:

- Volume Controls:** Includes tabs for "Surf/Object" and "Others". Options include "MIP" (selected), "mIP", "Alpha", and "X-section". A "Threshold" slider is present. "Z-thick" is set to "x1,00" and "M-chan" is set to "all (only fo)". Checkboxes for "R", "G", and "B" are checked, and "Compress" is unchecked. Buttons for "Vol Colormap" and "Object Manager" are available.
- Volume Cut / Surface Cut:** Features sliders for "X-cut", "Y-cut", and "Z-cut". A "Front" slider is also present.
- Rotation / Zoom & Shift:** Includes three rotation dials for X, Y, and Z axes. The X-axis is set to 26°, Y to 18°, and Z to 355°. Buttons for "Freeze", "Go", and "Zero" are provided.
- Viewer Controls:** Includes a "Resolution" dropdown set to "124x124x28 (voxel: 8.0x8.0x8.0 μm)". "Max dims" are set to 256 (X), 256 (Y), 128 (Z), and 10 (t). "Zoom-In/out" controls include a "Z/i method" dropdown set to "Foreground (1 marker)", "Z/i thres" and "Z/i cache" sliders, and a "Z/o thres" slider.
- Volume Of Interest (VOI) coordinates:** A 3D coordinate system shows X, Y, and Z axes. X ranges from 1 to 992, Y from 1 to 992, and Z from 1 to 231. Time (t) ranges from 0 to 9. The current time is t = 0/9.
- Proofreading:** Includes a "Start" button and a "Block 0 of 0" dropdown.
- Help/Info:** A "What's this?" section with a question mark icon and text: "Move the mouse over an object and its description will be displayed here." Below it is a "Ready." status bar.

# Live Demo: teraconverter



GUI



Command line

# Live Demo: TeraFly

- Load imaging data
- Visualize data
- Annotate data
- Save/load annotations
- Control panel



# Thank you!

Acknowledgements go to our developers, collaborators, and the user community.