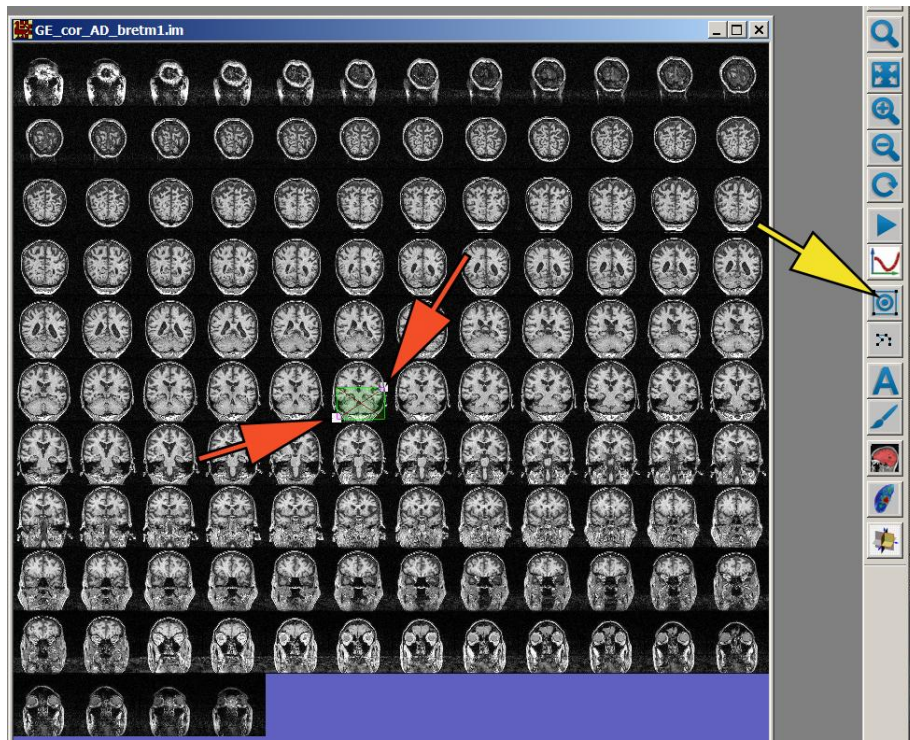


## Creating and modifying vector ROIs in *FireVoxel*

Vector ROI or VROI is a tool for defining box-like (or rectangular) subregions. It is used for landmarking, distance measurement, and cropping.

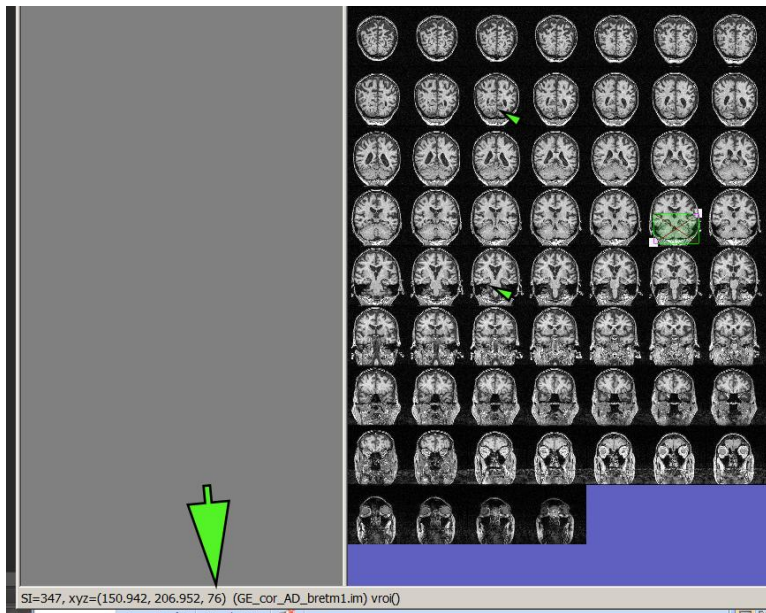
You create a new VROI by clicking on the **Draw VROI** icon (circle in the square, see yellow arrow in the figure below). Then click on the lower-left coordinate of the box, drag the mouse to the upper-right coordinate, release the mouse button and click. A new green rectangle will appear on the image.



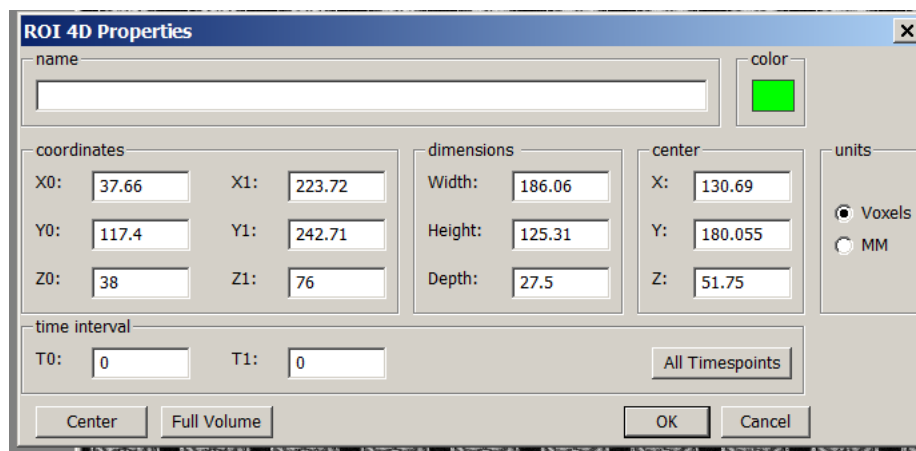
The VROI can be activated by clicking on it. This brings up two white corners or "handles" shown by the red arrows in the above image. You can use the mouse to adjust the handles and change the box dimensions. With the right mouse pressed, you can move VROI without changing its dimensions. You de-activate VROI by clicking on the image (or on another existing VROI).

The new rectangle initially spans one slice in Z-dimension. If your image has 4 dimensions, the new VROI spans one time point in T-dimension.

To extend the VROI to more than 1 slice it will be convenient to quickly estimate its first and last slice on the film view. If for example we want to enclose the cerebellum inside VROI, we could hover the mouse on the first and the last slice and read the corresponding slice numbers on the mouse tracker panel in the lower left margin of the image window (see green arrows below).



Then type the slice numbers as z0 and z1 coordinates of the VROI. Begin by left double-click on the VROI. A VROI parameter dialog box will appear.



**Name pane:** allows you to assign a name to the VROI. The name is required if VROI is used for fiducial landmarks.

**Coordinates Pane:** contains the coordinates of the corners of the VROI rectangle. The coordinates are expressed in voxels. Each field can be changed by typing in a new value and leaving that edit box by pressing Tab.

**Dimensions Pane:** contains the dimensions of the VROI expressed in voxels or millimeters. These values can also be changed -- the center of the VROI remains fixed.

**Time Interval Pane:** This makes sense only for 4D images. It allows us to specify the starting and ending time point. You can also press "All Timepoints" button.

**Full Volume button:** includes the entire field of view in VROI.

**Center button:** attempt to move ROI so its 3D center would match the 3D center of the Volume.

Also note **Crop** commands under Volume menu. These commands are used to crop current image.

After generating a VROI, it might be useful to inspect its extent in 3 dimensions. This is done by clicking on 3 orthogonal projections icon -- the lowest icon on *FireVoxel* toolbar.

## Finding and managing VROIs

The first five items under ROI menu are helpful in managing multiple ROIs.

**List** -- displays the list of current VROIs

**Load** -- retrieves previously saved VROI from a file

**Save** -- saves all existing VROIS in a text file. The file extension is .vroi. Note that saving the entire document in FireVoxel .fvx format will also save VROIs.

**Next or F11** -- displays the next VROI and makes it active

**Delete** -- deletes VROIs. You also delete an active VROI by pressing the Delete key.

There is also a tool to convert a raster ROI (created using paintbrush) to VROI:

**ROI -> Enclose connected components by VROIs**

## How to use VROI for cropping

This is a simple two-step operation.

1. Define your VROI. If your base image is 4D, pay attention at which timepoints (frames) are included.
2. Select the desired cropping operation under  
Volume -> Crop

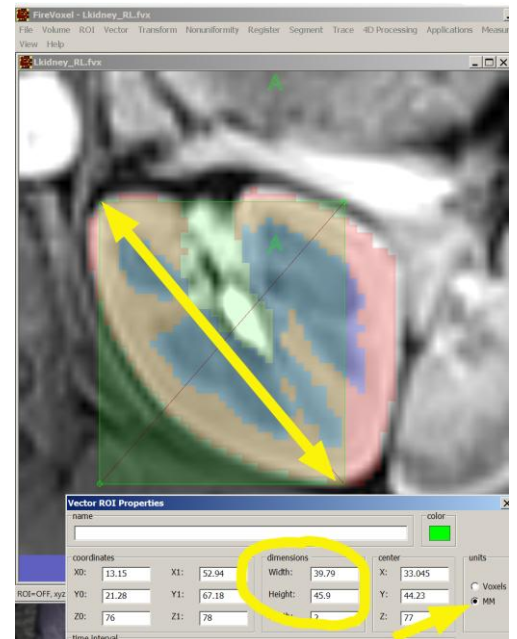
Note that some cropping tools operate on selected image layers, other will crop all the layers. Simple cropping, like single slice cropping, don't need VROI.

## How to use VROI to measure distances

Distance between two points on a slice can be measured with the help of a VROI and an external calculator. The picture shows measuring the kidney size as:

$$\text{Size} = \sqrt{\text{width}^2 + \text{height}^2}$$

Make sure the units in VROI box are set to mm.



## How to use VROI for landmark-based coregistration

The last section of *FireVoxel* guide Coregistration\_QuickStart.pdf explains how multiple VROIs are used for 3D image coregistration based on corresponding landmarks. In this setting the user needs to enter VROI names to label matching landmarks.