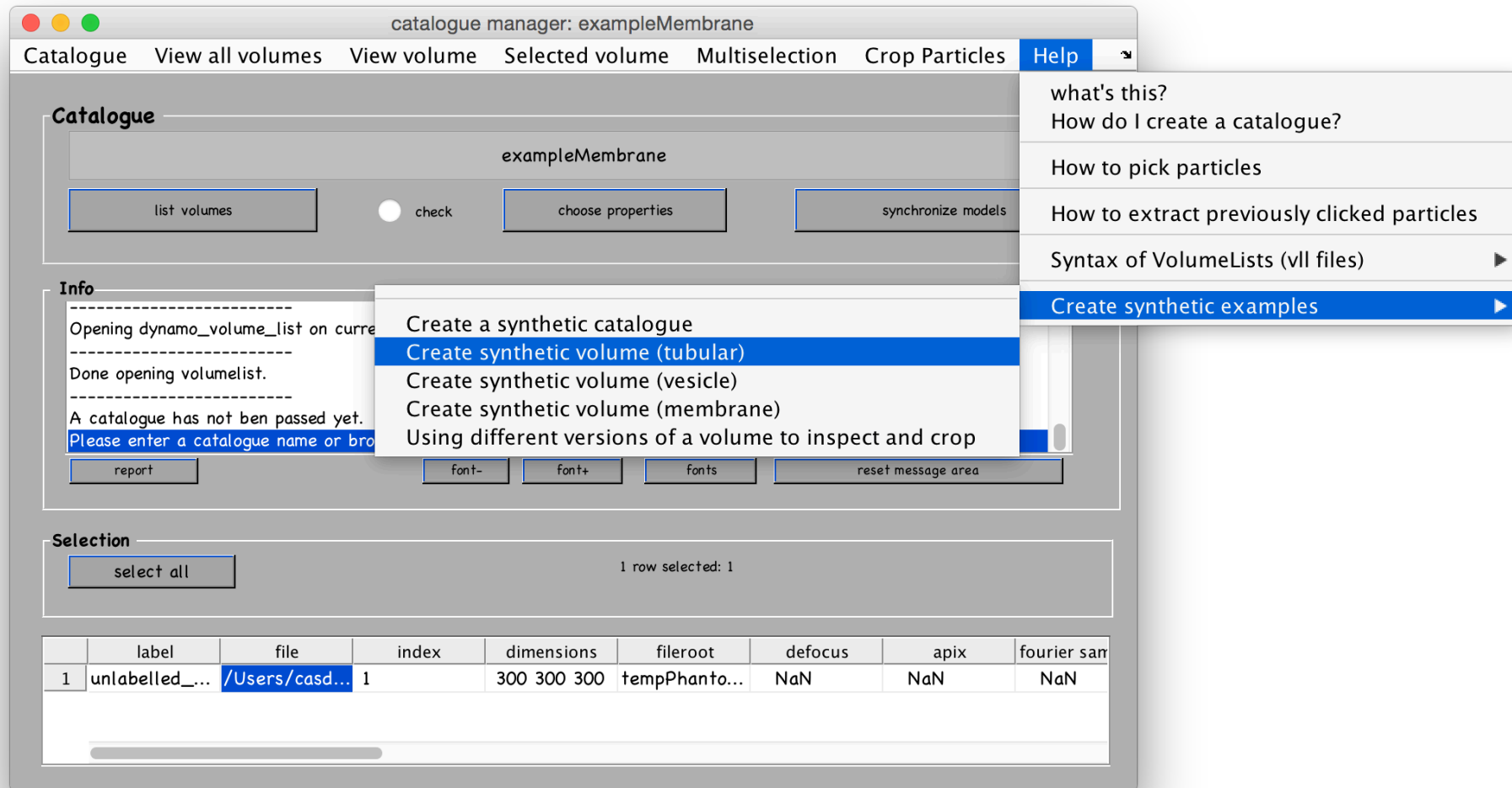# Model management with *Dynamo*:
Filament geometry:

We are going to demonstrate the basic ideas and tools on synthetic data sets.

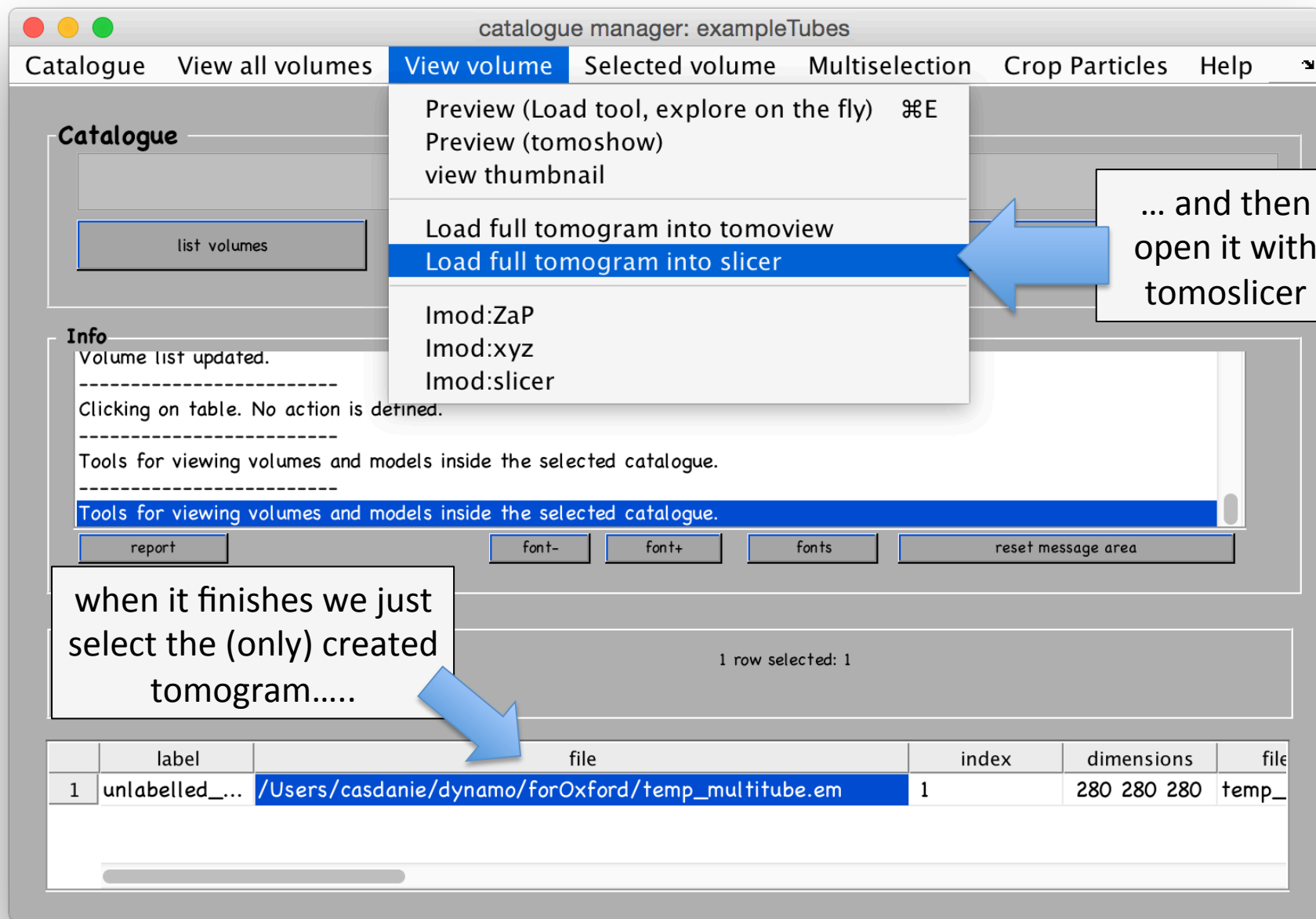Those data sets are available through the catalogue manager, thus:
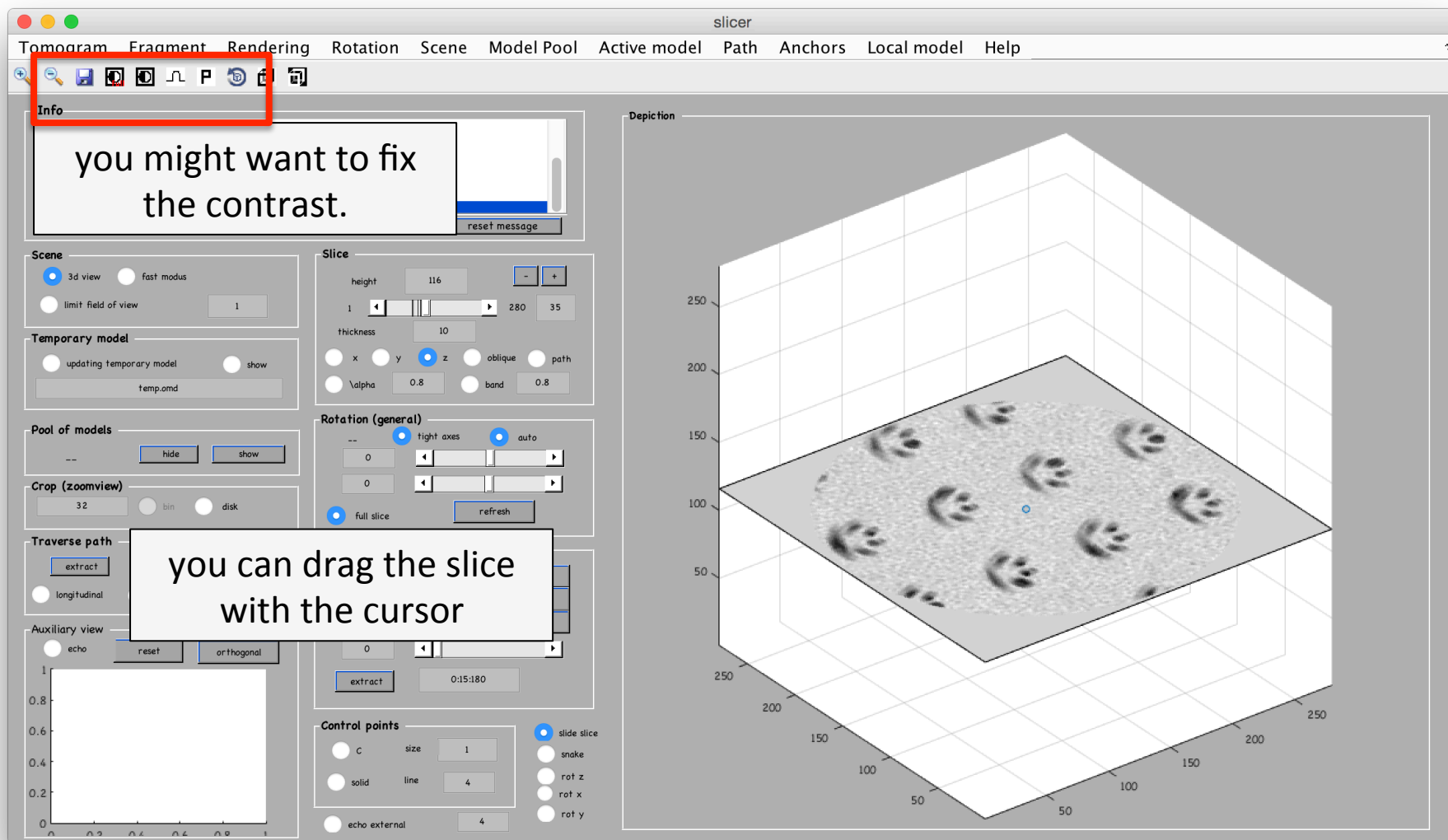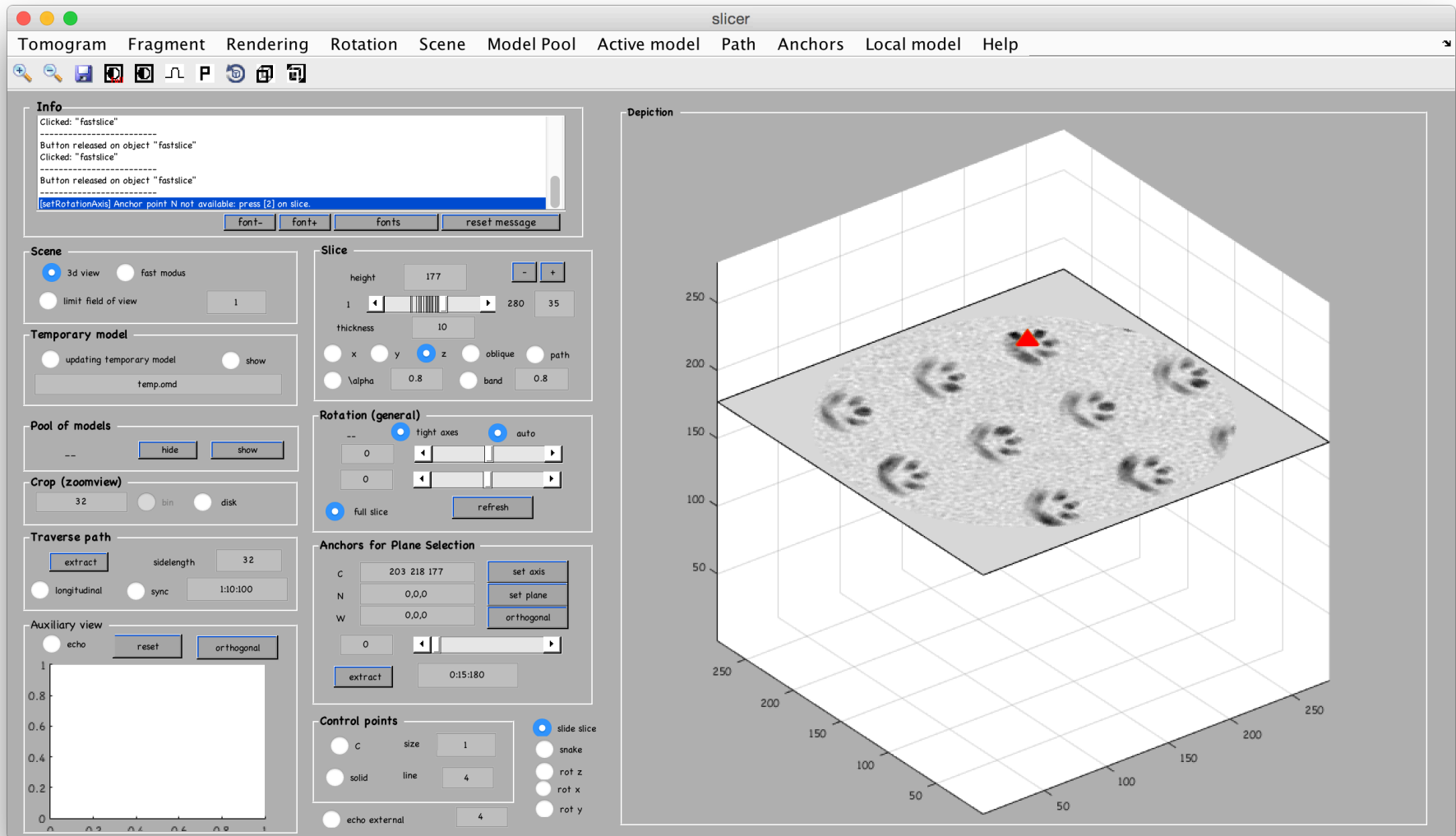
```
>> dcm
```

to start the catalogue manager:

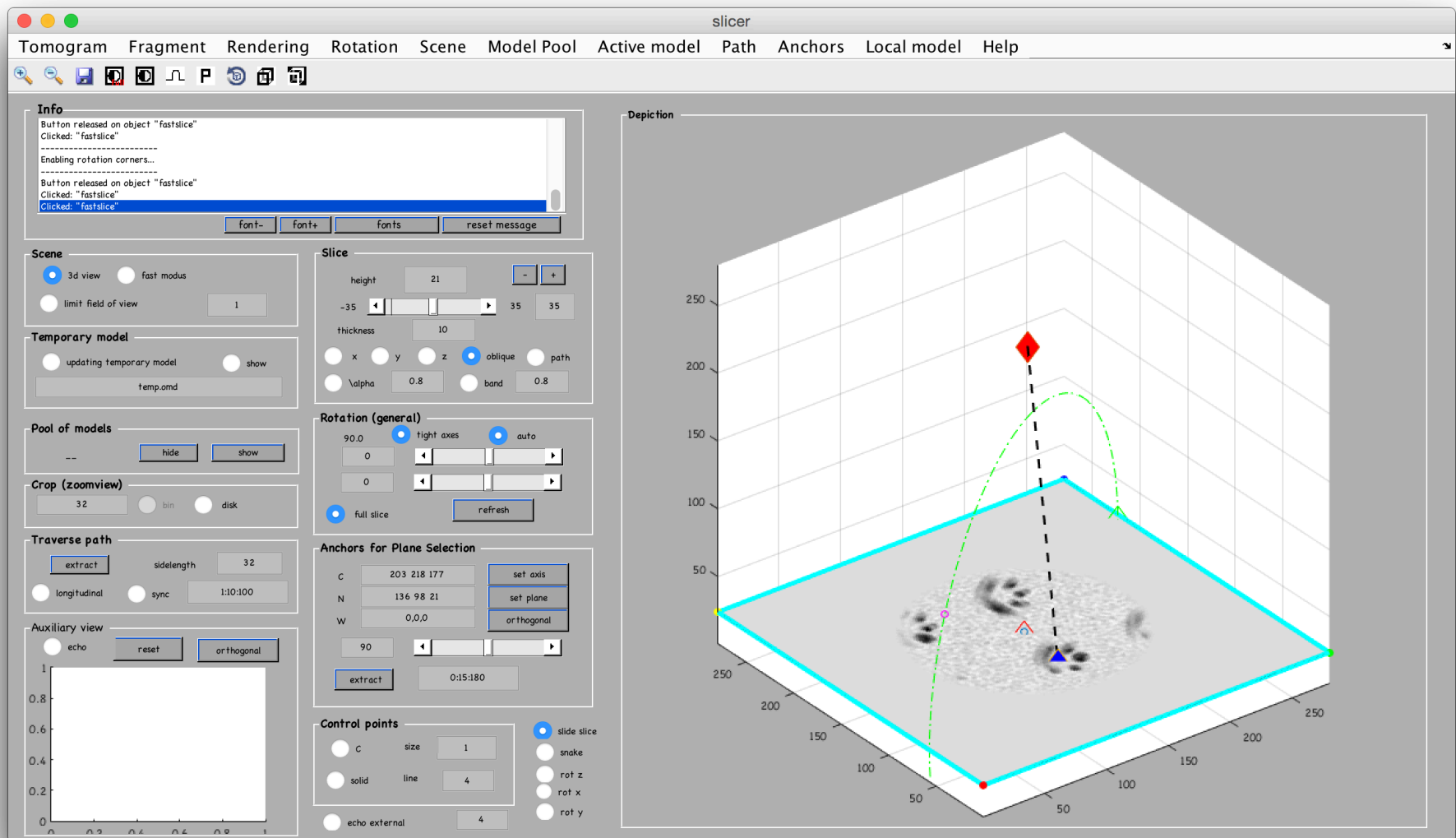# We create a tomogram that includes tubular looking objects.

The catalogue manager will create a catalogue to archive the created tomogram and also the models that we will create around it.

catalogue manager: exampleTubes

Catalogue | View all volumes | **View volume** | Selected volume | Multiselection | Crop Particles | Help

Preview (Load tool, explore on the fly) ⌘E
Preview (tomoshow)
view thumbnail

Load full tomogram into tomoview
Load full tomogram into slicer

Imod:ZaP
Imod:xyz
Imod:slicer

Catalogue

list volumes

Info

Volume list updated.

Clicking on table. No action is defined.

Tools for viewing volumes and models inside the selected catalogue.

Tools for viewing volumes and models inside the selected catalogue.

report | font- | font+ | fonts | reset message area

... and then open it with tomoslicer

when it finishes we just select the (only) created tomogram.....

1 row selected: 1

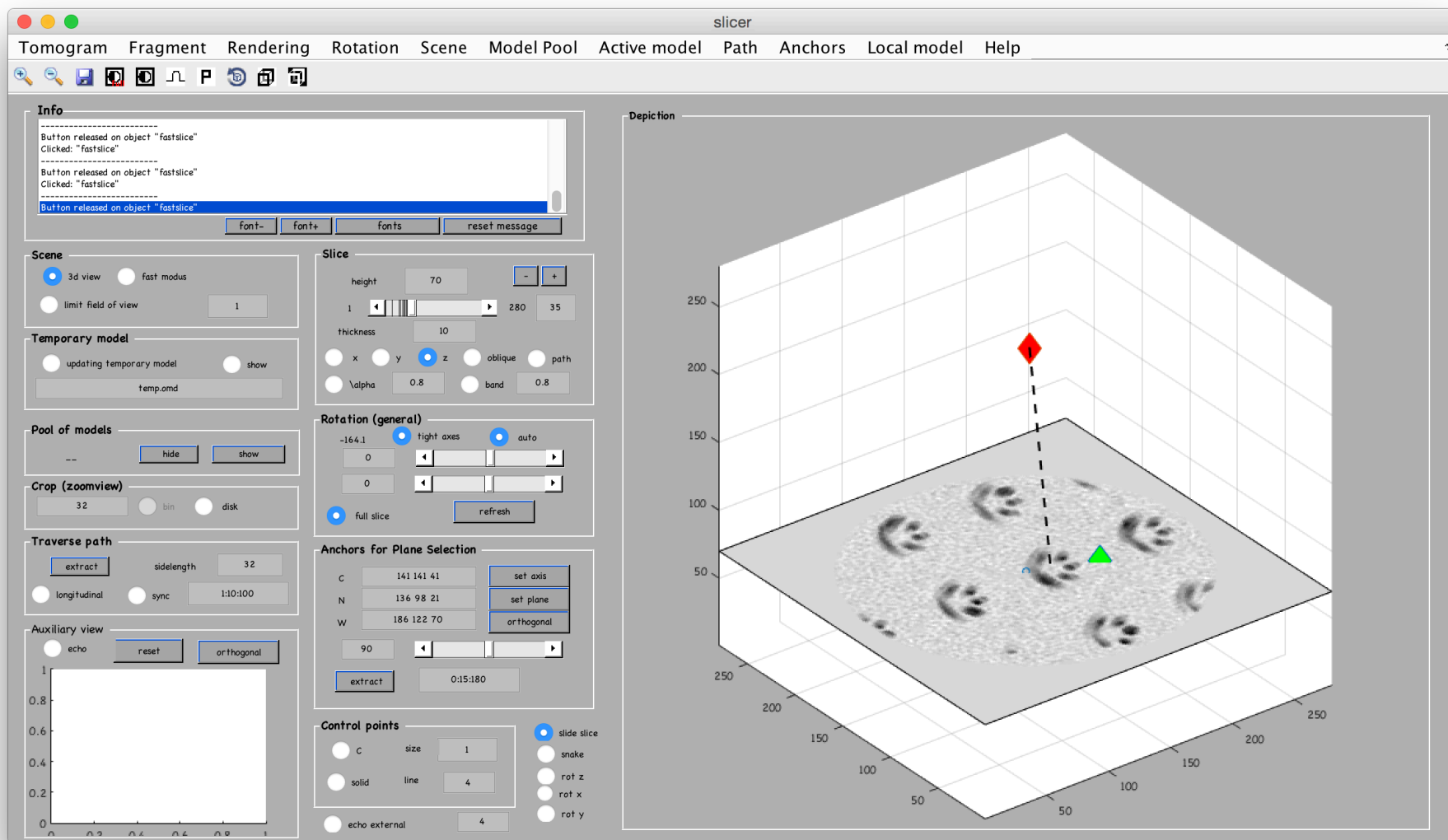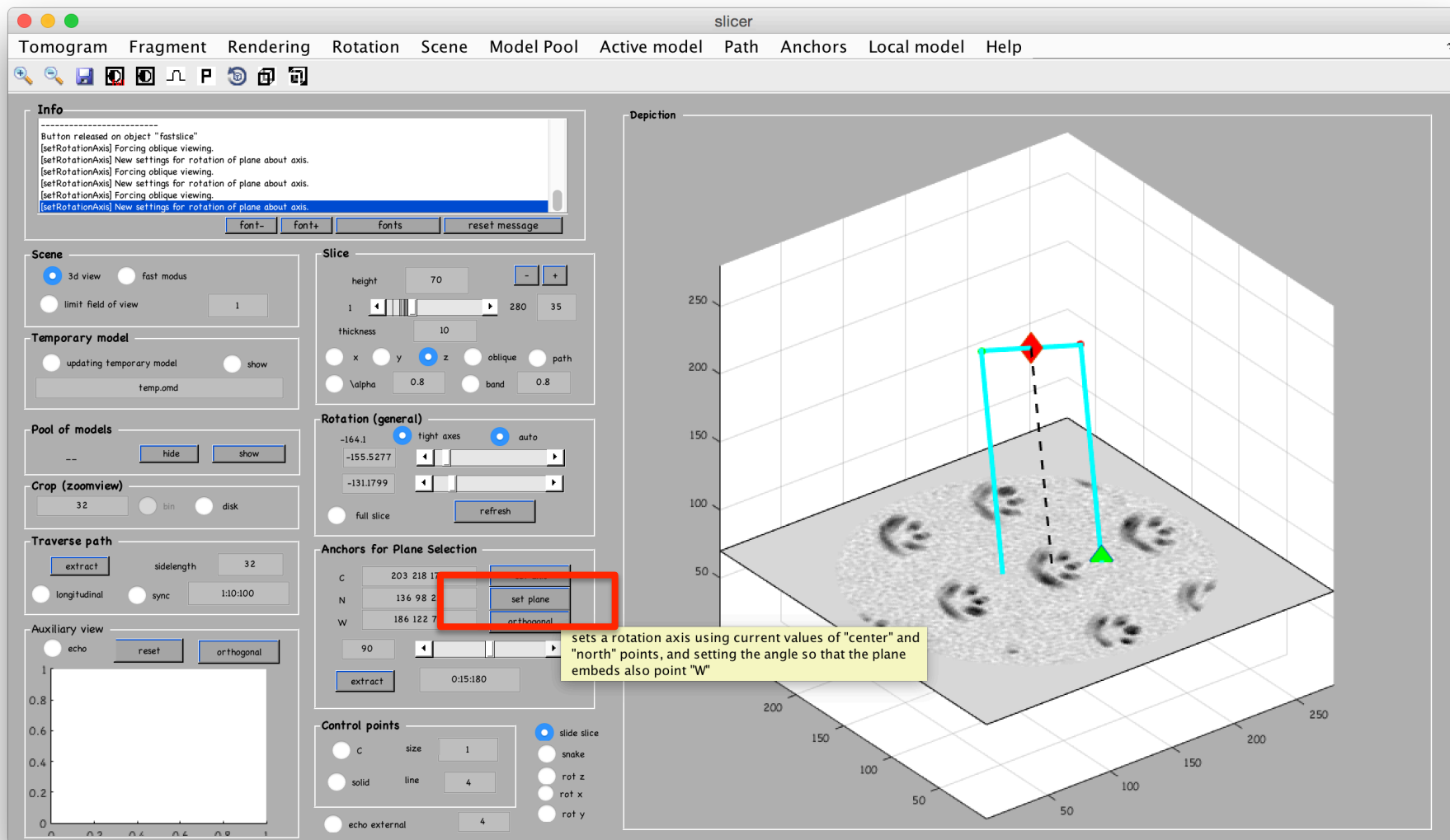|	label	file	index	dimensions	file
1	unlabelled_...	/Users/casdanie/dynamo/forOxford/temp_multitube.em	1	280 280 280	temp_

We pick with [1] one of the tips of one filament. It is called 'North' point in the [Anchors] Menu
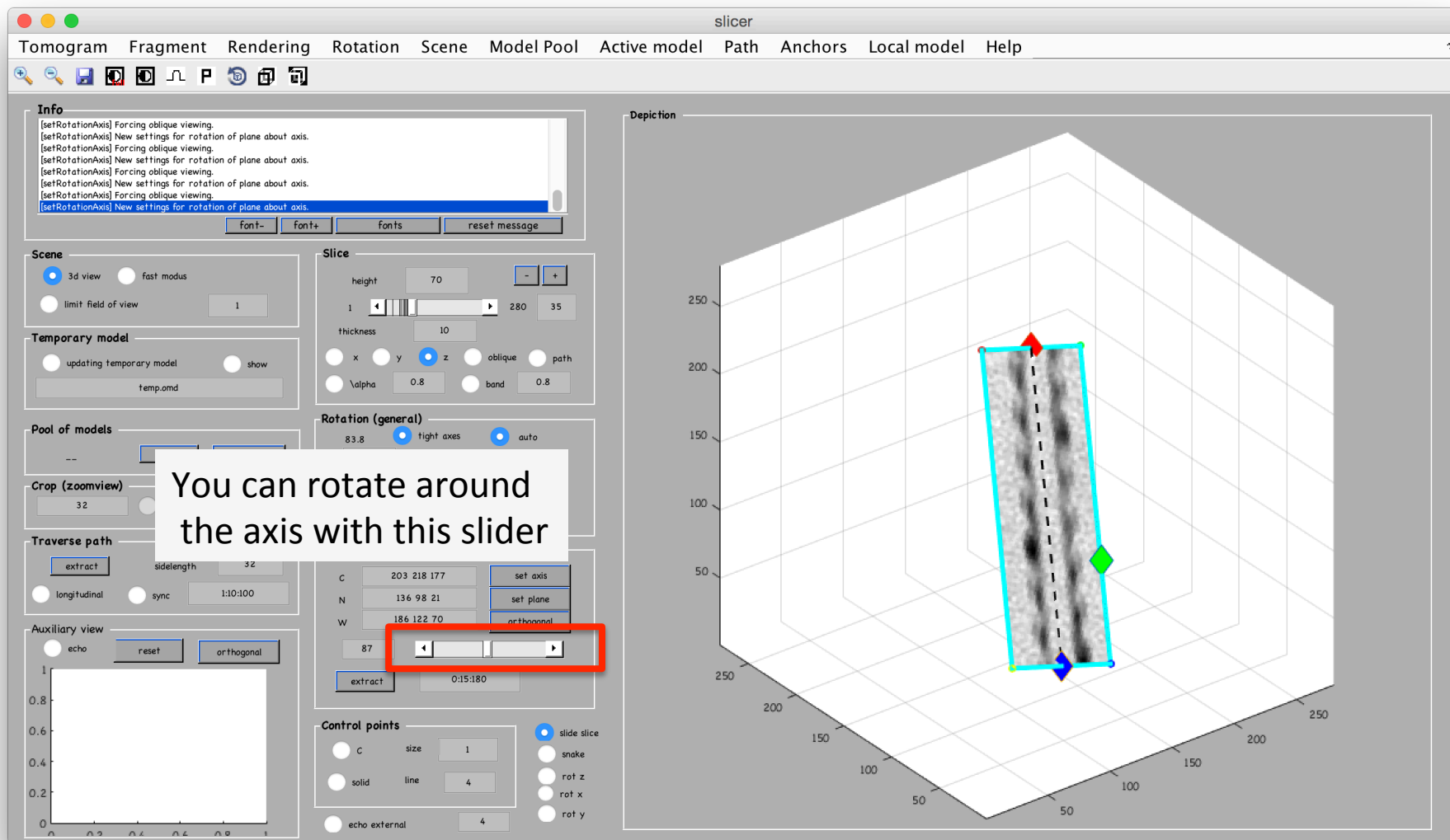
with [2] we mark a second point (called the 'South' point in the [Anchors] panel)

We can even mark a third one to select the width of a plane....

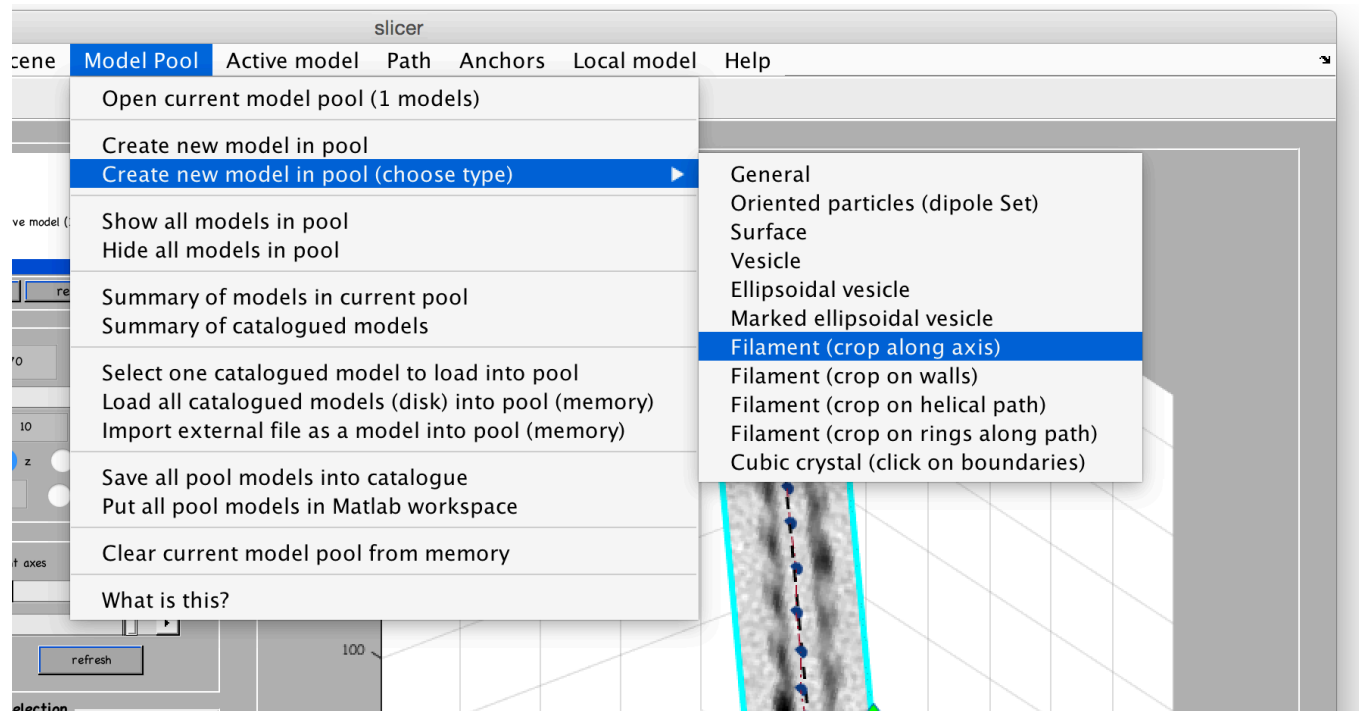... [set a plane] for the three points we just clicked.

Here, we would have several options to click points that will define a *backbone*.

A backbone represents a "smooth" version   of the path of the filament, foreseen to encompass the case of bent filaments.

But we have to the define first a **model**, otherwise Dynamo will not know what to do with the points that we define.

We choose a model type called *filamentWithTorsion* , which operates creating crop points along the filament path.

We will see how to convert the *clicked points* into *crop points* for this particular geometry later.

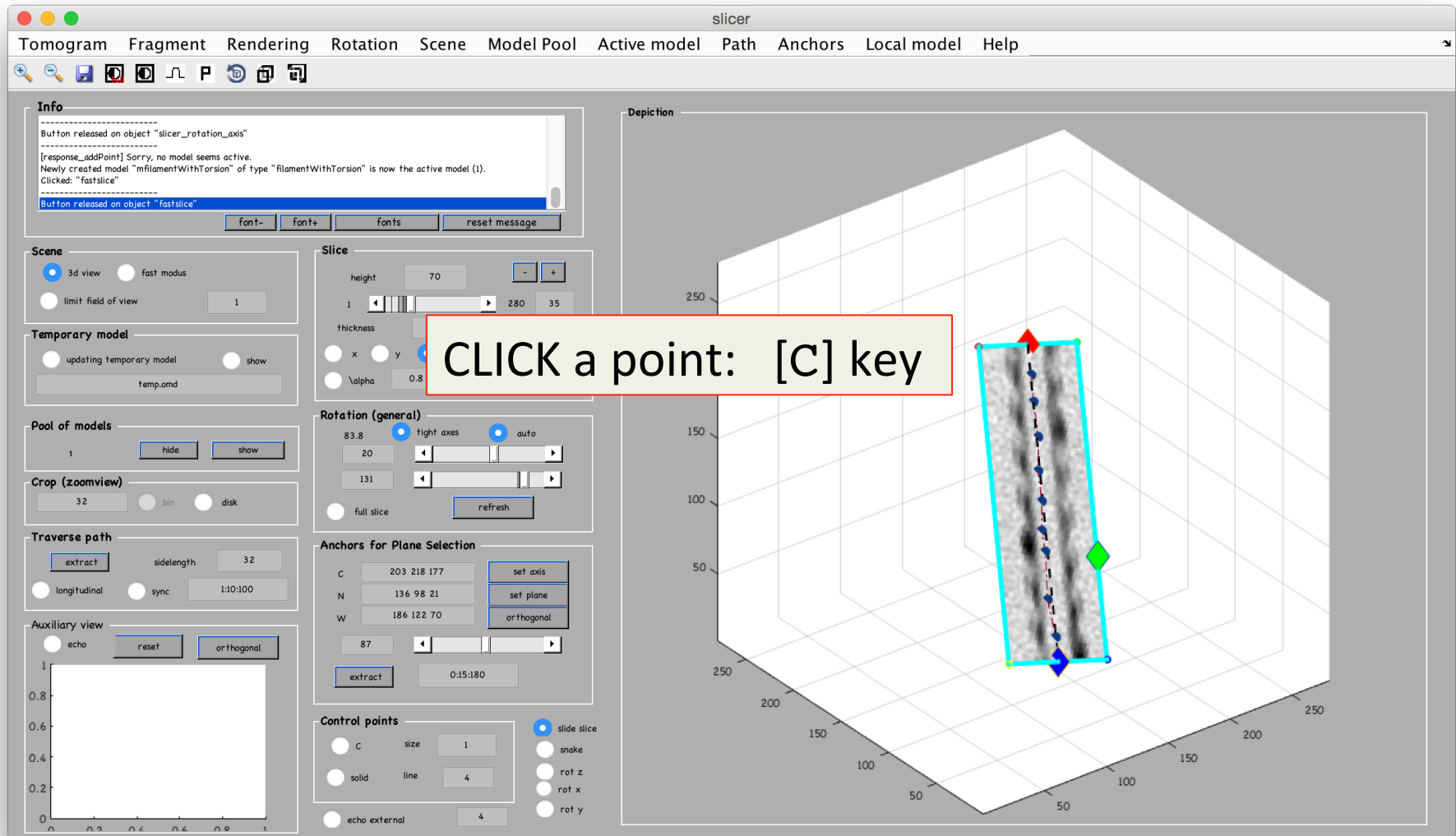By now, we have first to just create those points, so remember the basic controls

CLICK a point: [C] key

Delete last clicked point: [DELETE] key

Delete a point: secondary click , then select option

We have actually seeral options to create the points
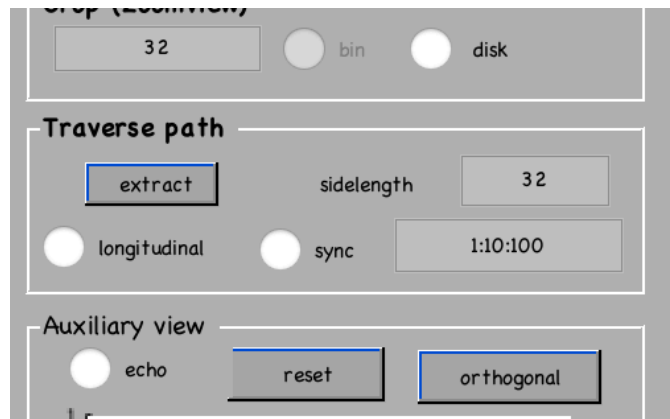
OPTION A: click in in the plane that traverses the filament

OPTION B: click in transversal slice
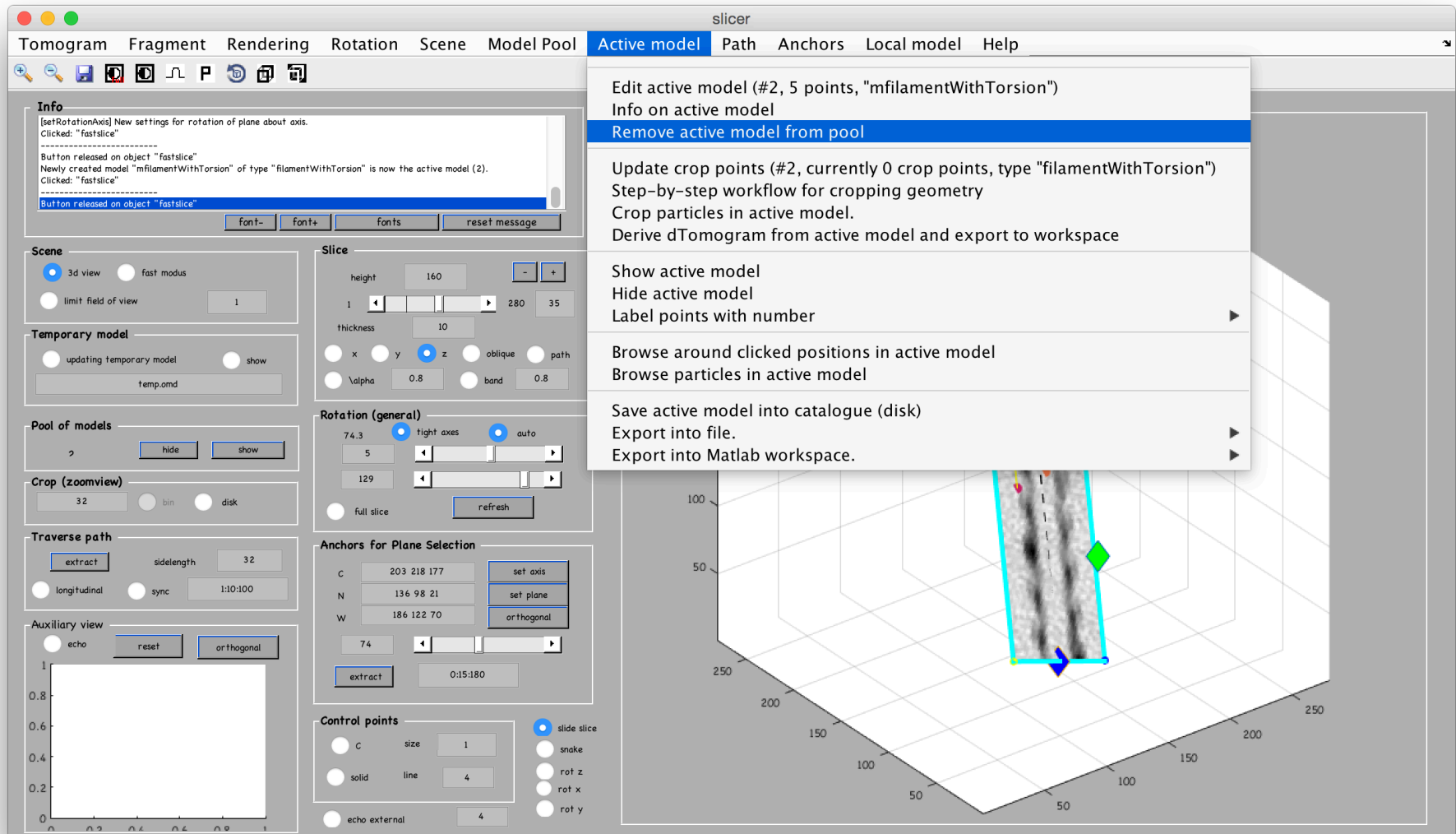
While this will probably work for reasonably straight filaments, sometimes the filaments are bent or appear together with many other objects and are difficult to show a plane where you can pick all points at once.

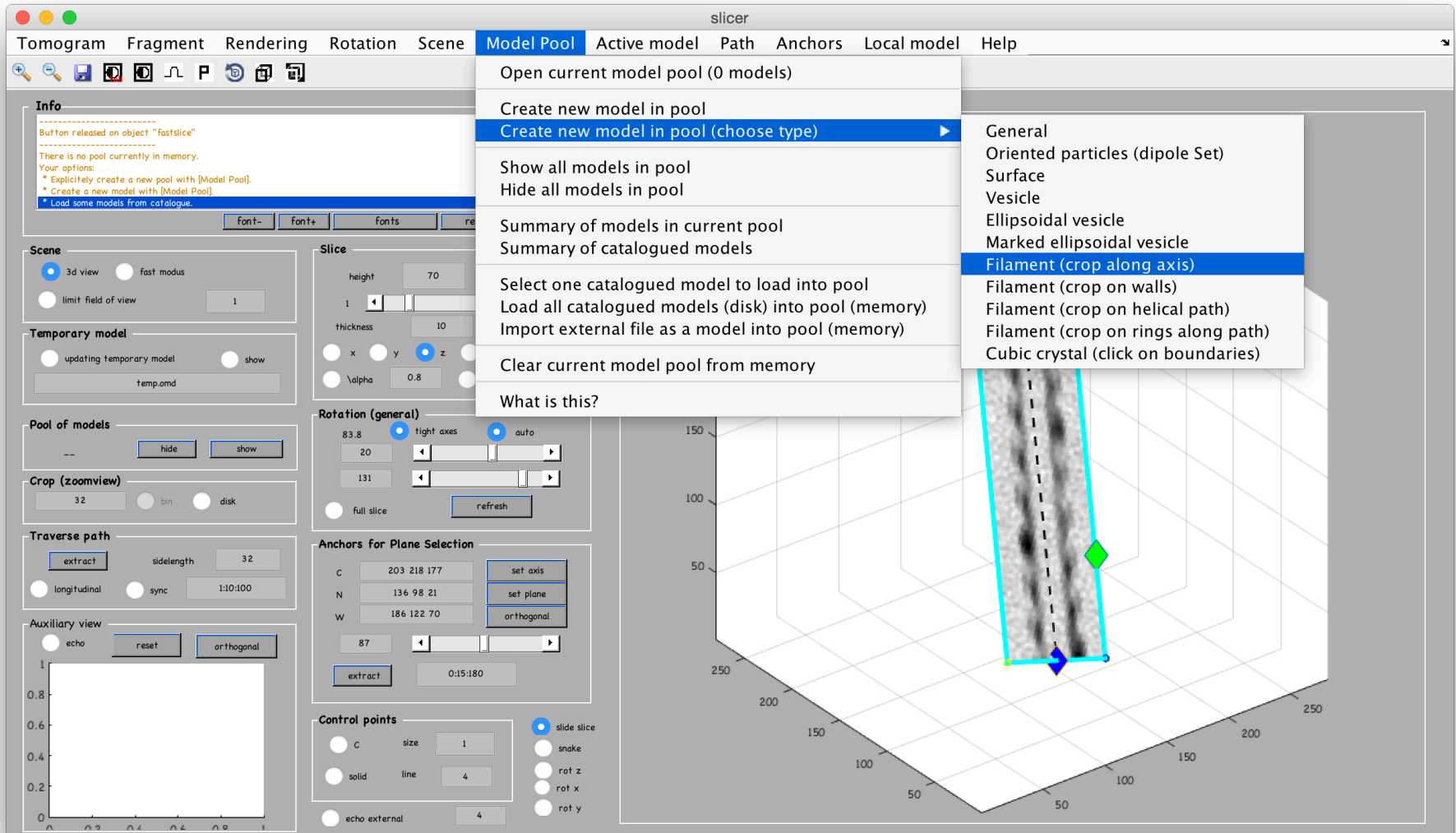In those cases we should generate orthogonal sections along the path.
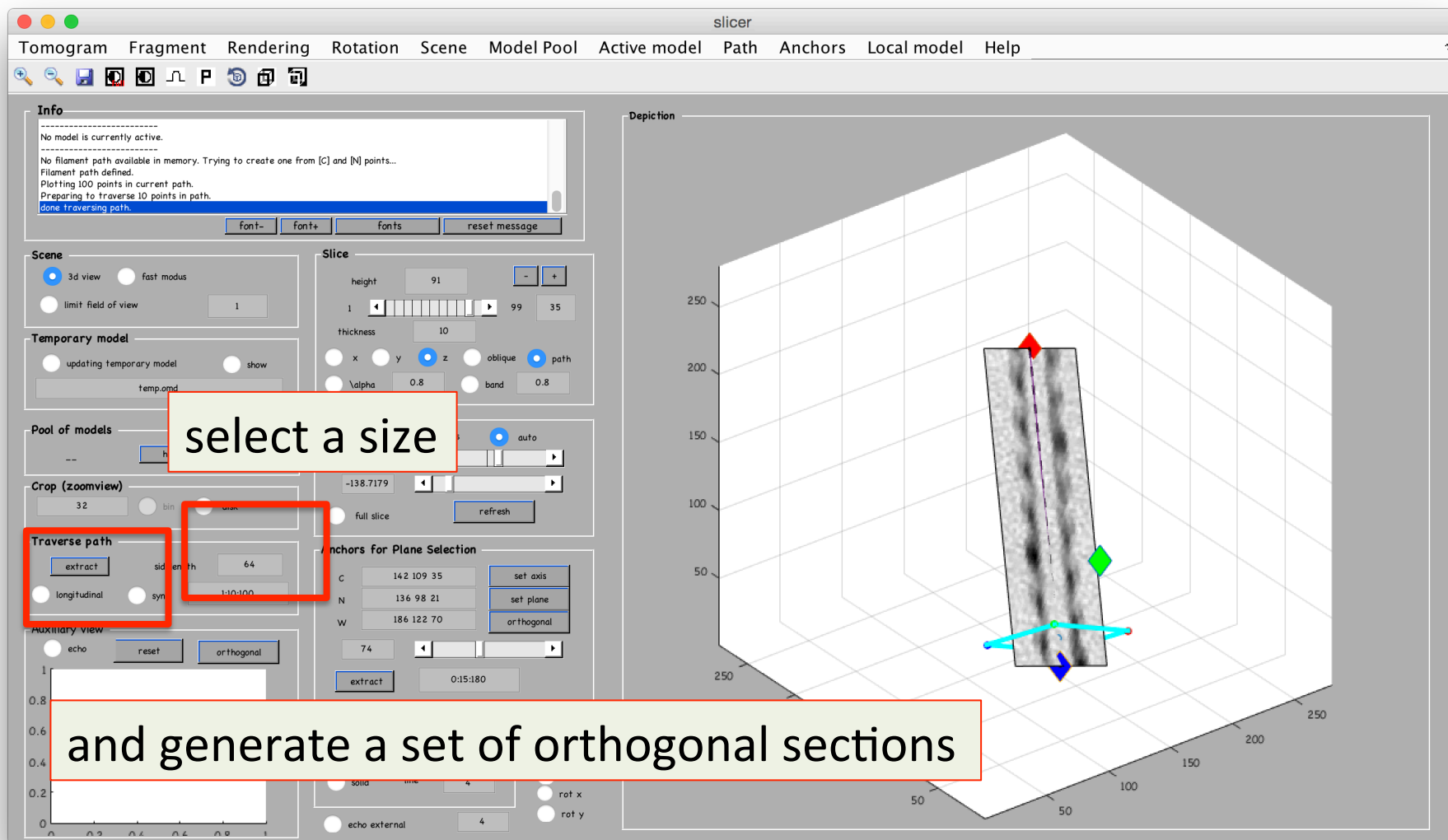
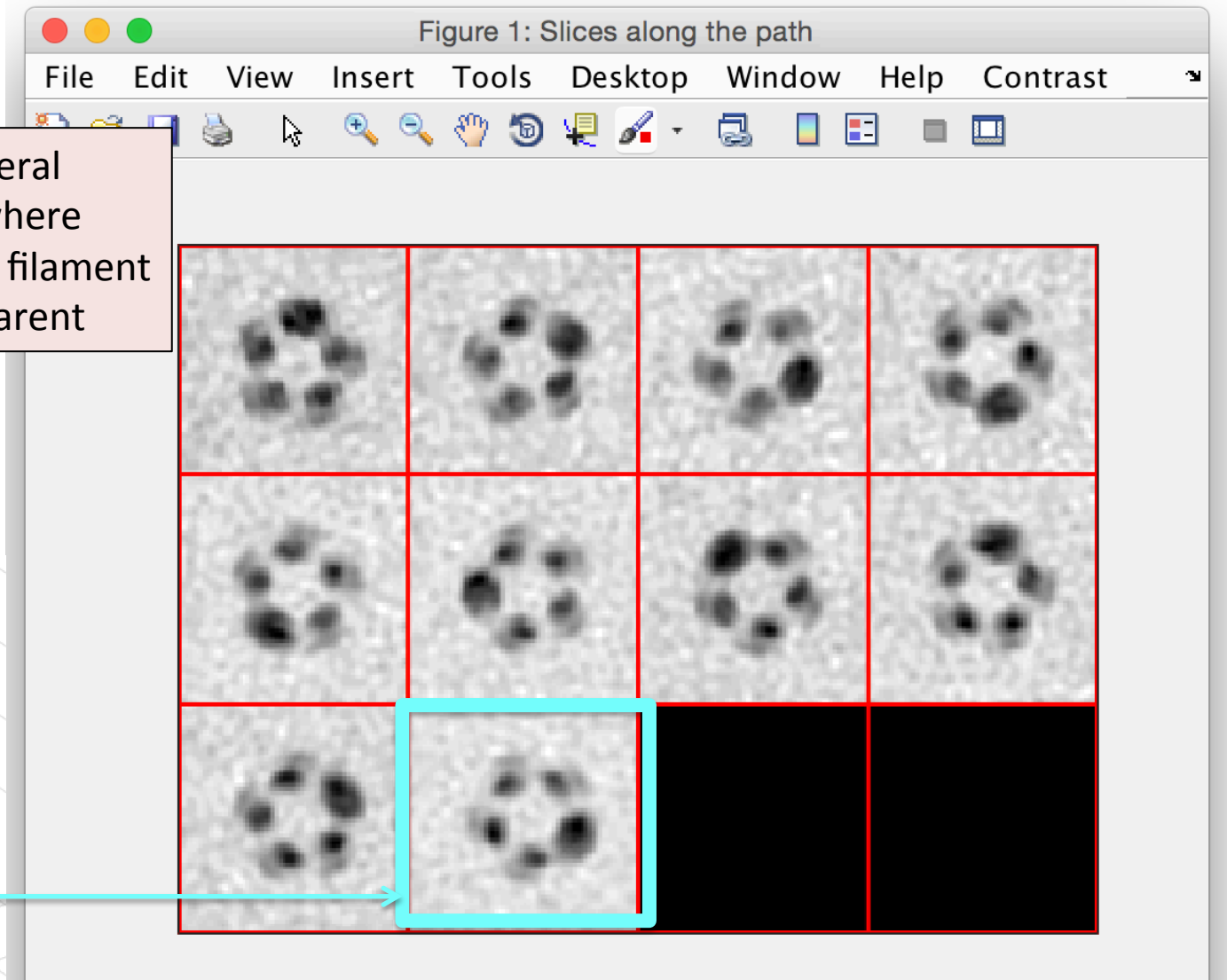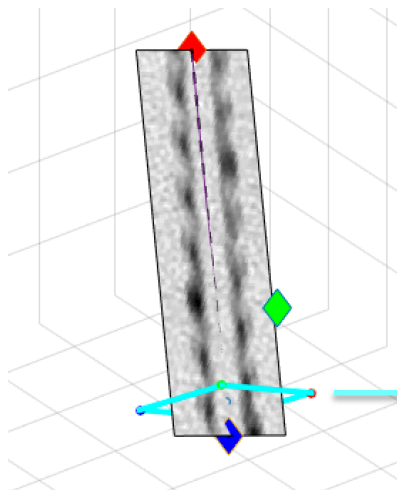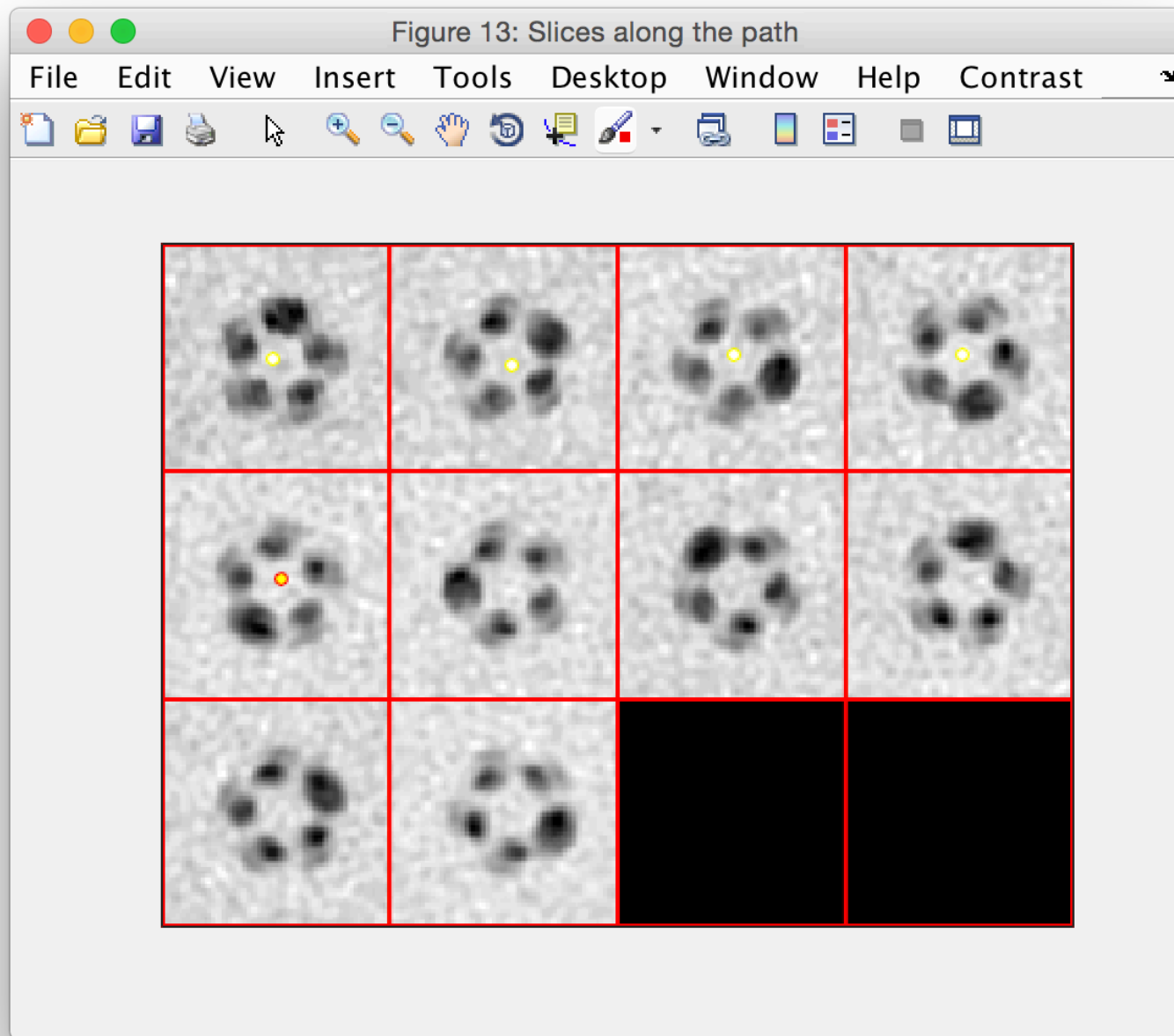If you want to try this B) option, just delete the model that we just generated:
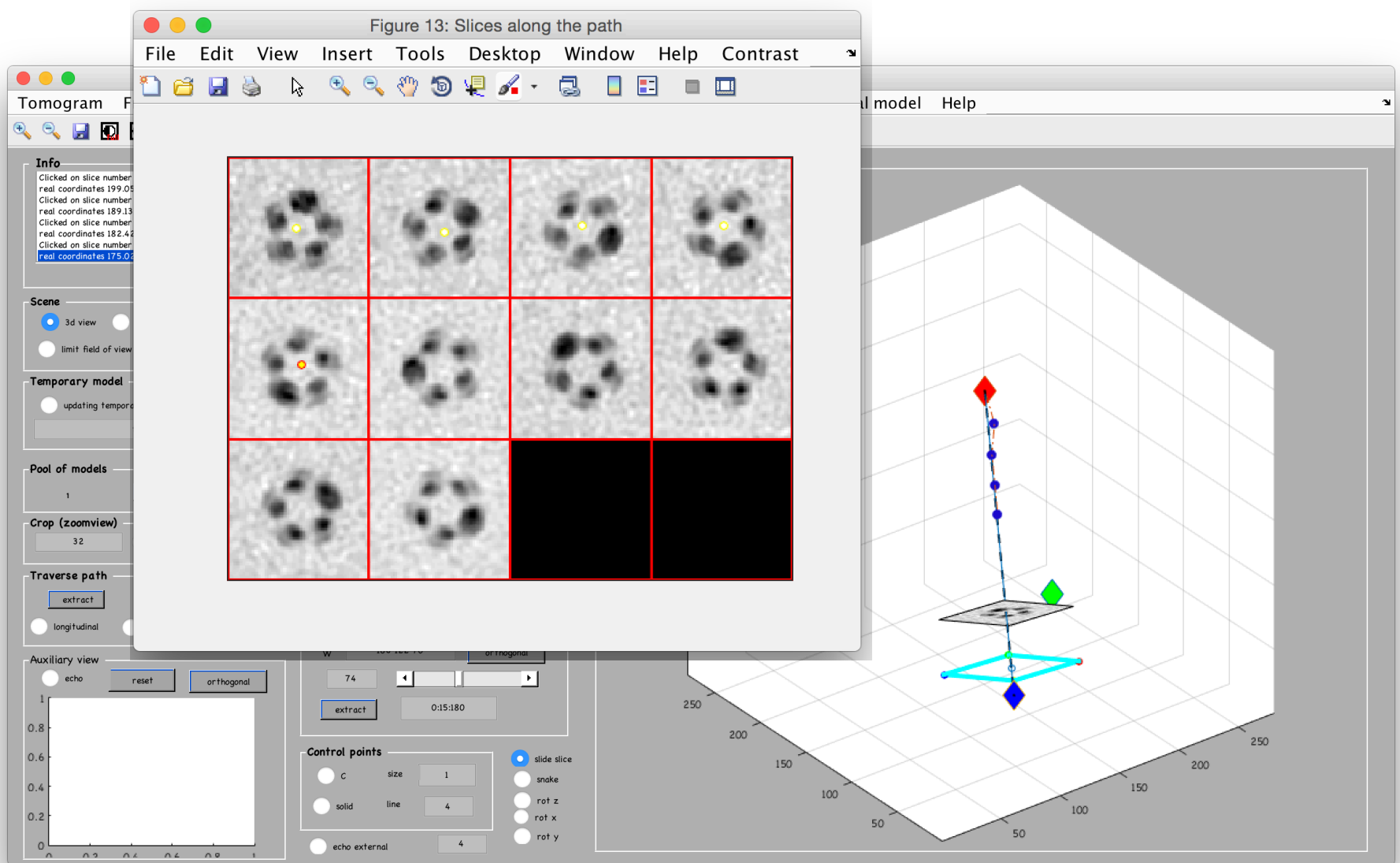
... and just recreate it...

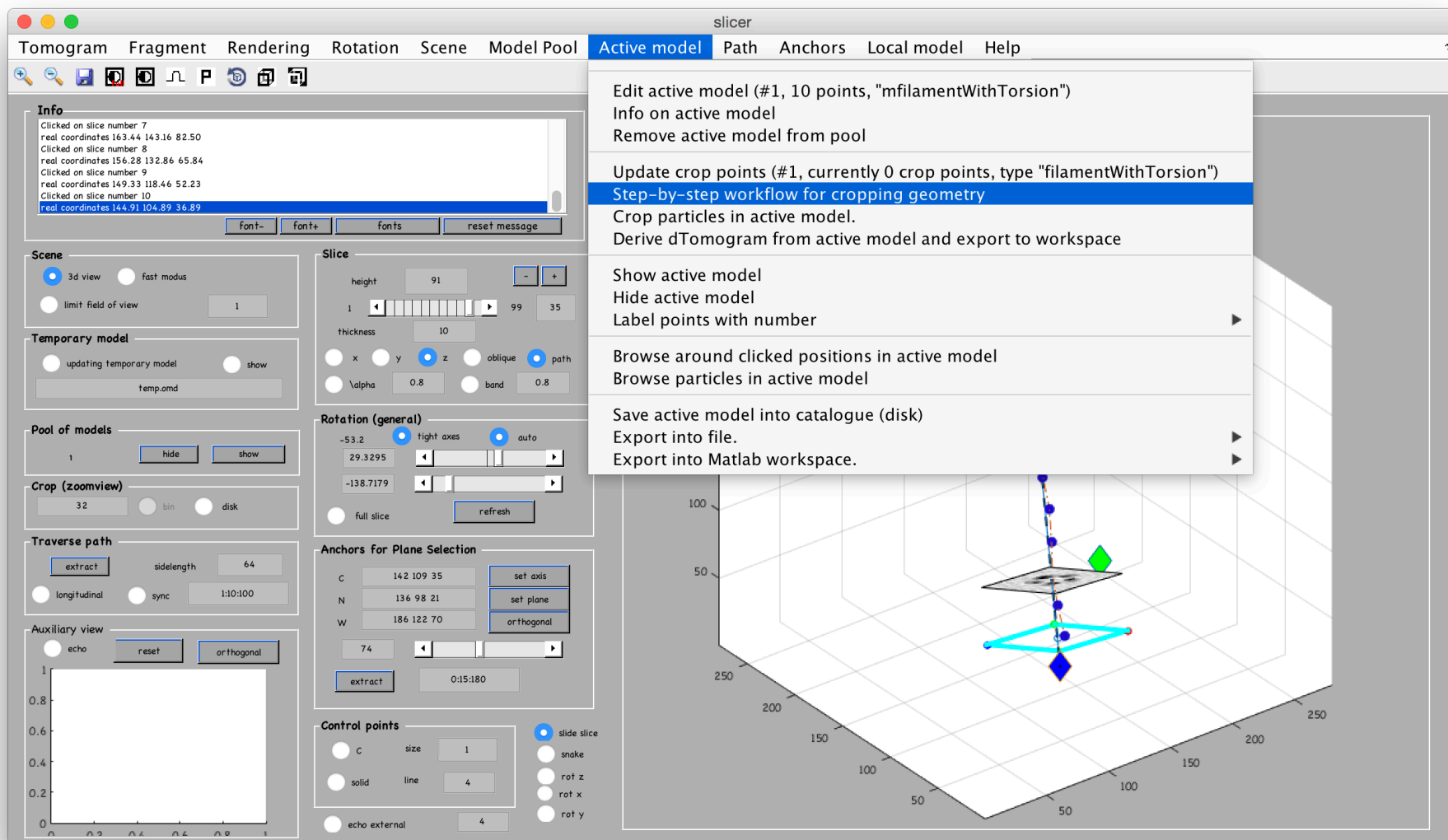You get several orthoslices where the center of the filament is totally apparent

and you click directly on the centers [in lexicographical order]

The main window gets updated as you click on the 'slices along the path' window

slicer

Tomogram   Fragment   Rendering   Rotation   Scene   Model Pool   **Active model**   Path   Anchors   Local model   Help

Active model menu:
Edit active model (#1, 10 points, "mfilamentWithTorsion")
Info on active model
Remove active model from pool

Update crop points (#1, currently 0 crop points, type "filamentWithTorsion")
Step-by-step workflow for cropping geometry
Crop particles in active model.
Derive dTomogram from active model and export to workspace

Show active model
Hide active model
Label points with number

Browse around clicked positions in active model
Browse particles in active model

Save active model into catalogue (disk)
Export into file.
Export into Matlab workspace.

Info
Clicked on slice number 7
real coordinates 163.44 143.16 82.50
Clicked on slice number 8
real coordinates 156.28 132.86 65.84
Clicked on slice number 9
real coordinates 149.33 118.46 52.23
Clicked on slice number 10
real coordinates 144.91 104.89 36.89

font-   font+   fonts   reset message

Scene
3d view   fast modus
limit field of view   1

Temporary model
updating temporary model   show
temp.omd

Pool of models
1   hide   show

Crop (zoomview)
32   bin   disk

Traverse path
extract   sidelength   64
longitudinal   sync   1:10:100

Auxiliary view
echo   reset   orthogonal

1
0.8
0.6
0.4
0.2
0

Slice
height   91   -   +
1   99   35
thickness   10
x   y   z   oblique   path
\alpha   0.8   band   0.8

Rotation (general)
-53.2   tight axes   auto
29.3295
-138.7179
full slice   refresh

Anchors for Plane Selection
C   142 109 35   set axis
N   136 98 21   set plane
W   186 122 70   orthogonal
74
extract   0:15:180

Control points
C   size   1   slide slice
solid   line   4   snake
rot z
echo external   4   rot x
rot y

Save

○ create a smooth backbone | View

radius	5
interval in backbone	2
# backbone points: 102	

○ create final positions and angles for particle cropping | View

subunits dz	2
subunits dphi	60
# crop points: 0	

○ save resulting model into catalogue | View

Controls

execute selection	execute all

Workflow to define crop positions on model "mfilamentWithTorsion"

Save

○ create a smooth backbone | View

radius	5
interval in backbone	2
# backbone points: 102	

plot points entered by the user
plot computed backbone

○ create final positions and angles for particle cropping | View

subunits dz	2
subunits dphi	60
# crop points: 0	

○ save resulting model into catalogue

Controls

execute selection | exec

Figure 13

File Edit View Insert Tools Desktop Window Help

Model: mfilamentWithTorsion

Workflow to define crop positions on model "mfilamentWithTorsion"

Save

○ create a smooth backbone

View

plot points entered by the user
plot computed backbone

radius	5
interval in backbone	2
# backbone points: 102	

○ create final positions and angles for particle cropping

subunits dz	2
subunits dphi	60
# crop points: 0	

○ save resulting model into catalogue

Controls

execute selection

Figure 13

File   Edit   View   Insert   Tools   Desktop   Window   Help

Model: mfilamentWithTorsion

Workflow to define crop positions on model "mfilamentWithTorsion"

Save

○ create a smooth backbone   View

radius	5
interval in backbone	2
# backbone points: 102	

○ create final positions and angles for particle cropping   View

subunits dz	2
subunits dphi	60
# crop points: 0	

○ save resulting model into catalogue   View

Controls

execute selection	execute all

Workflow to define crop positions on model "mfilamentWithTorsion"

Save

○ create a smooth backbone   View

radius	5
interval in backbone	2
# backbone points: 102	

○ create final positions and angles for particle cropping   View

plot table points (crop positions)
plot table points and orientations

subunits dz	2
subunits dphi	60
# crop points: 93	

○ save resulting model into catalogue

Controls

execute selection   execute

We get too many points

Figure 13

File   Edit   View   Insert   Tools   Desktop   Window   Help

Model: mfilamentWithTorsion

Workflow to define crop positions on model "mfilamentWithTorsion"

Save

create a smooth backbone   View

..and actualize [create final positions]…

interval in backbone   2

backbone points: 102

create final positions and angles for particle cropping   View

But if we change
the parameters…

subunits dz   20

subunits dphi

crop points: 8

save resulting model into catalogu

Controls

execute selection

.the crop positions get updated …

Figure 13

File Edit View Insert Tools Desktop Window Help

Model: mfilamentWithTorsion

210

200

190

180

170

160

150

140

130

120

120   140   160   180   200   220   240

Don't forget to save your work into the catalogue (= hard disk)

and we could crop particles already

dynamo_data_browse

Data   Table   Table+Data   Projects   Selection   Help

data	temp_multitube_Particles
table	temp_multitube_Particles/crop.tbl
restriction	cc=<1
actions	

slice range   *   view   x

range of tags   *   label size   0

bin   0   <-   30   ->   sidelength   48

show   in new figure

mbslider
ddslider   font-   font+   reset

data browser

Creating depiction for 8 tags
No selected tags in temporary file temp_ddbrowse_selection.tags
No selected tags in figure. Use [s] [u] to select / unselect
Depiction done.

Creating depiction for 8 tags
No selected tags in temporary file temp_ddbrowse_selection.tags
No selected tags in figure. Use [s] [u] to select / unselect
Depiction done.

z view

x view