

Step 1: Data Pre-Processing

In the first dialogue box, the user can load the raw dataset, determine if they would like the z-plane slope corrected, and the Zbin size (in nm).

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Step 1: Data Pre-Processing

Cleaned Dataset Name
cleantest → Insert name for processed .h5 file

Correct Slope Switch
On
Off ← Due to the stage of the AFM not always lying flat, it is sometimes necessary to removed the slope in order to get an accurate visualization of the data.*

Tip Deflection Switch
On
Off → Please enter "on" if tip deflection data was collected during the AFM run.

Zbin Size
(Suggested to be 0.02)
0.02 → Zbin size is used to reduce the z-vector into a smaller dataset. The value (in nm) will be the length of the z-vector in which all values will be averaged to yield a new, single, point.

Load File → Click here to select target raw file from the user's computer.

Process Data & Export HDF5 File → Click here to start the data cleaning. This step will take between 1-4 minutes.**

Plot Data → Navigate to visualizations.

Tutorial

Acknowledgements

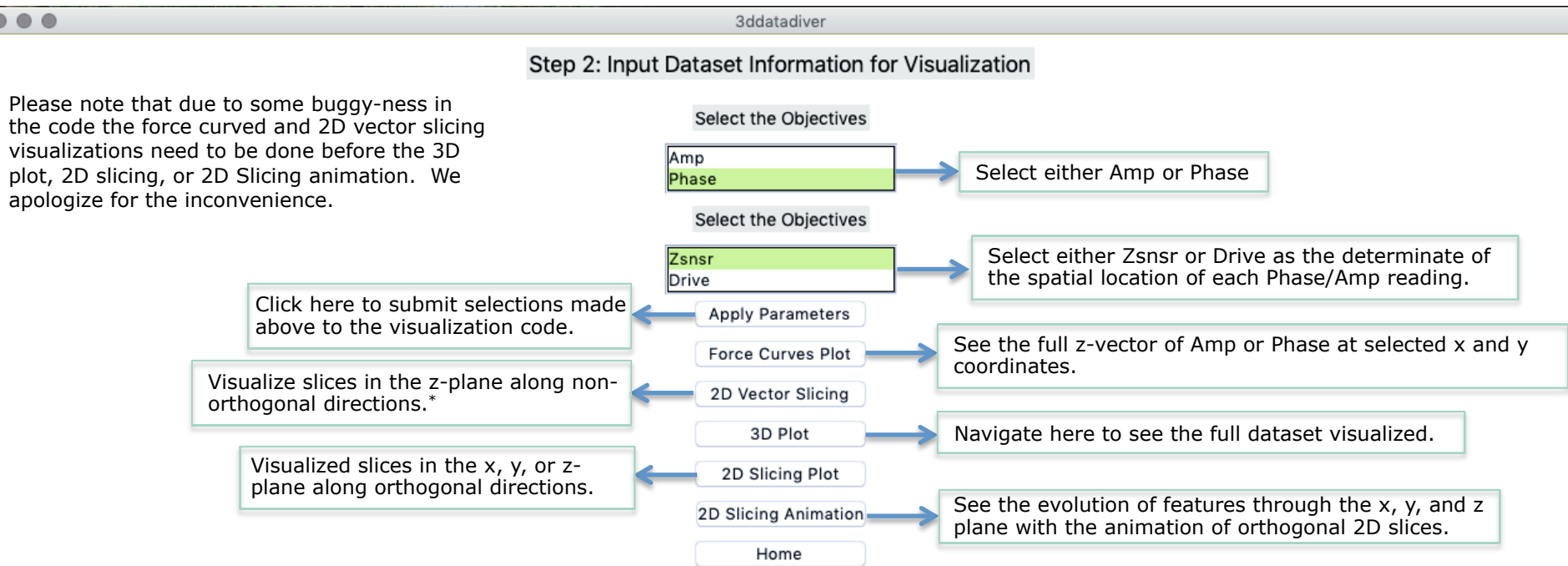
Quit

*The correct slope function finds the mean of first layer of values in the Zsnsr/Drive array in each of the x rows and y columns. Next, the function subtracts those values from the entire z-vector at each x and y coordinate.

**Once this step is completed a .h5 file as name in the first box will be generated in the folder the user is currently "in". This .h5 file will have Zsnsr, Drive, Phase, and Amp data processed to the user's specifications.

Step 2: Input Dataset Information for Visualization

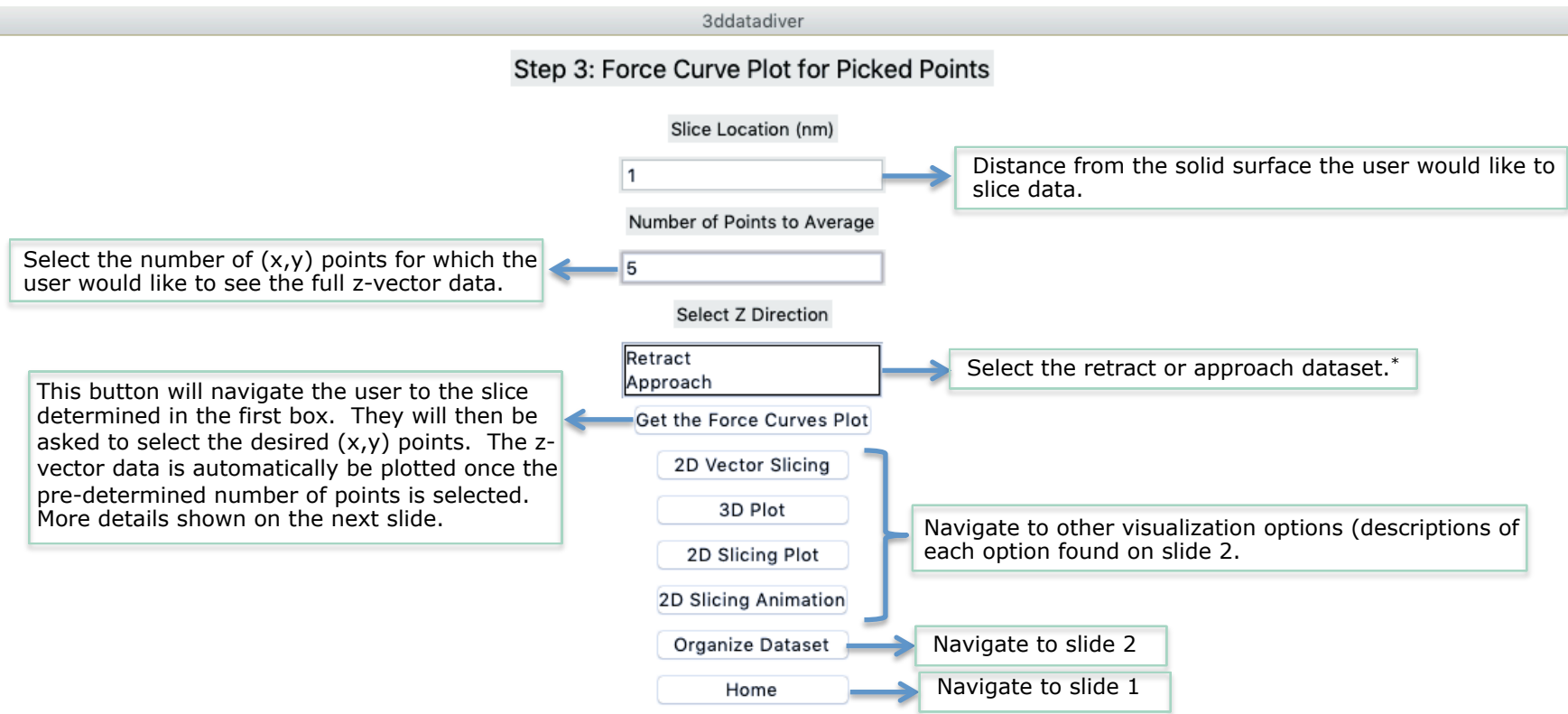
Here the user can select whether they would like to visualize the Amp or Phase data in relation to Zsnsr or Drive. There are a total of 4 combinations available.



*This feature was added to allow the user to slice along interesting directions depending on unit cell geometry.

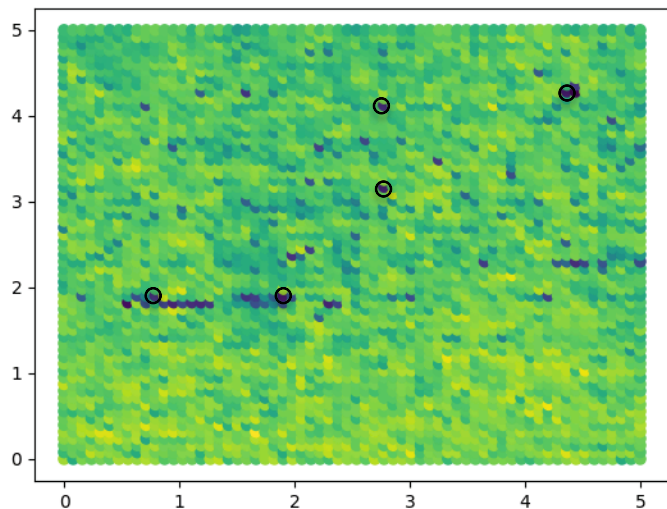
Step 3: Force Curve Plot for Picked Points

In this step the user can choose a slice location in the z-plane, input how many points they would like to average, and see the full z-vector Amp/Phase (depending on what was selected in step 2) values plotted concurrently. This feature also includes an average of all the selected curves (shown as a black solid line).



*The full dataset collected Amp/Phase data as the tip approaches the solid surface and as the tip is retracted from the solid surface.

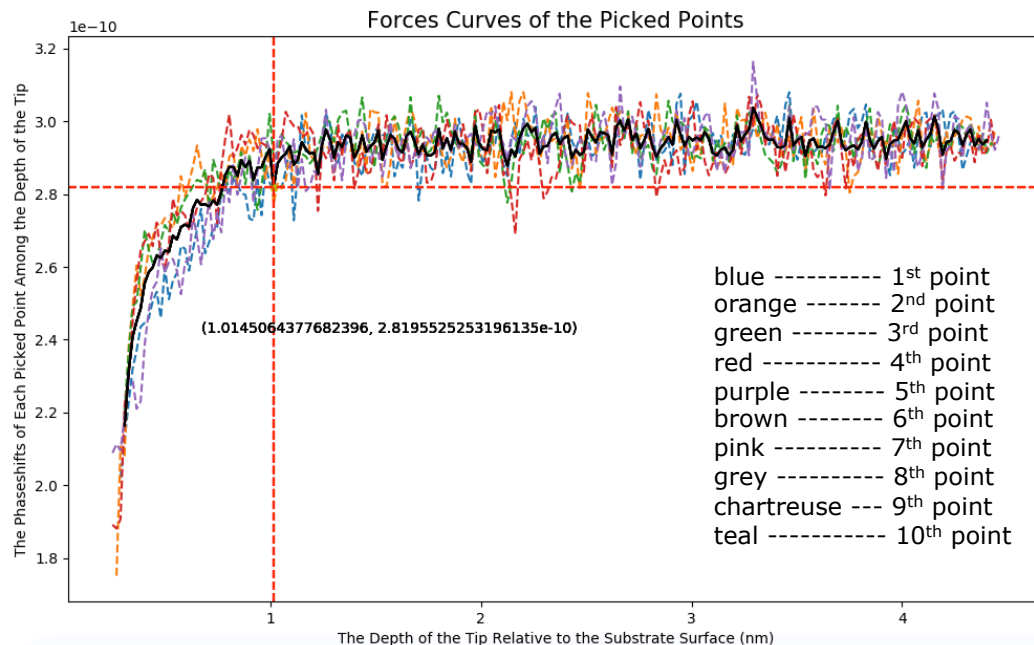
Figure 3



First, the user will be shown the z-plane slice at the location selected. Using their mouse, they can select the number of pre-determined points. After selected all of the points (in this example, 5) the full z-vector data for each point will be visualized in a separate plot.

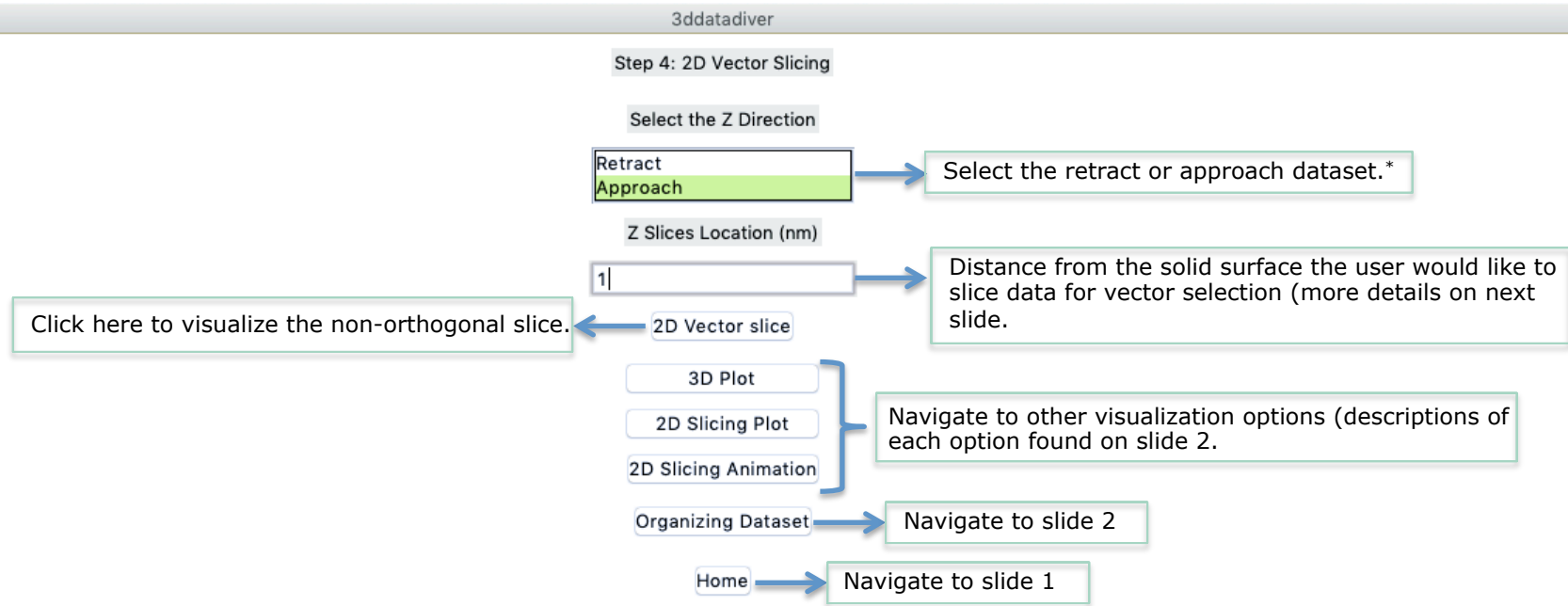
This is an example of the type of plot the user will see once all the points are selected. A few things to note. The surface is at the origin, the black line is the average of all the points, and the crosshairs mark where the z-plane slice was taken from on the average curve. Please take a moment to look at the legend as the (x, y) point z-vector data is color coded depending on the order in which the point was picked.

Figure 2



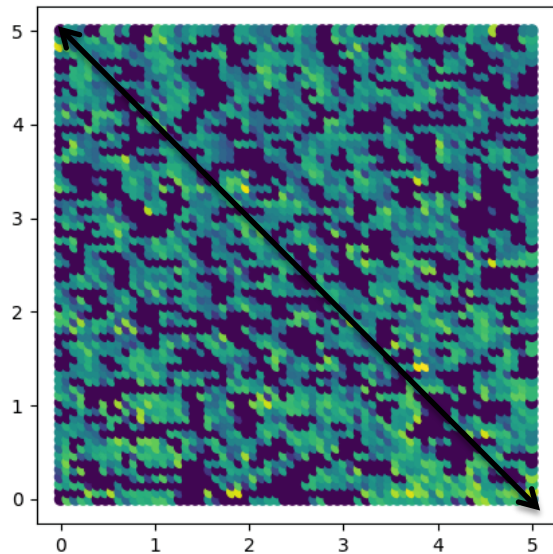
Step 4: 2D Vector Slicing

Here the user can choose a non-orthogonal slicing direction and visualize the data in the x/y plane.



*The full dataset collected Amp/Phase data as the tip approaches the solid surface and as the tip is retracted from the solid surface.

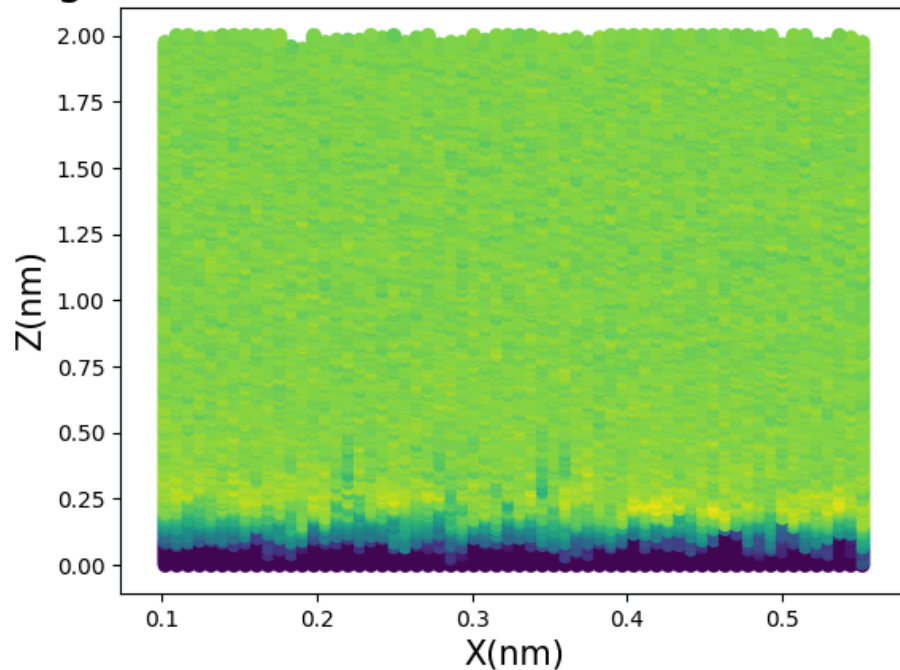
Figure 1



First, the user will be shown the z-plane slice at the location selected. Using their mouse, they can select two points through which a slice in the x/y plane will be pulled. The visualization to the right is automatically generated after the second click.

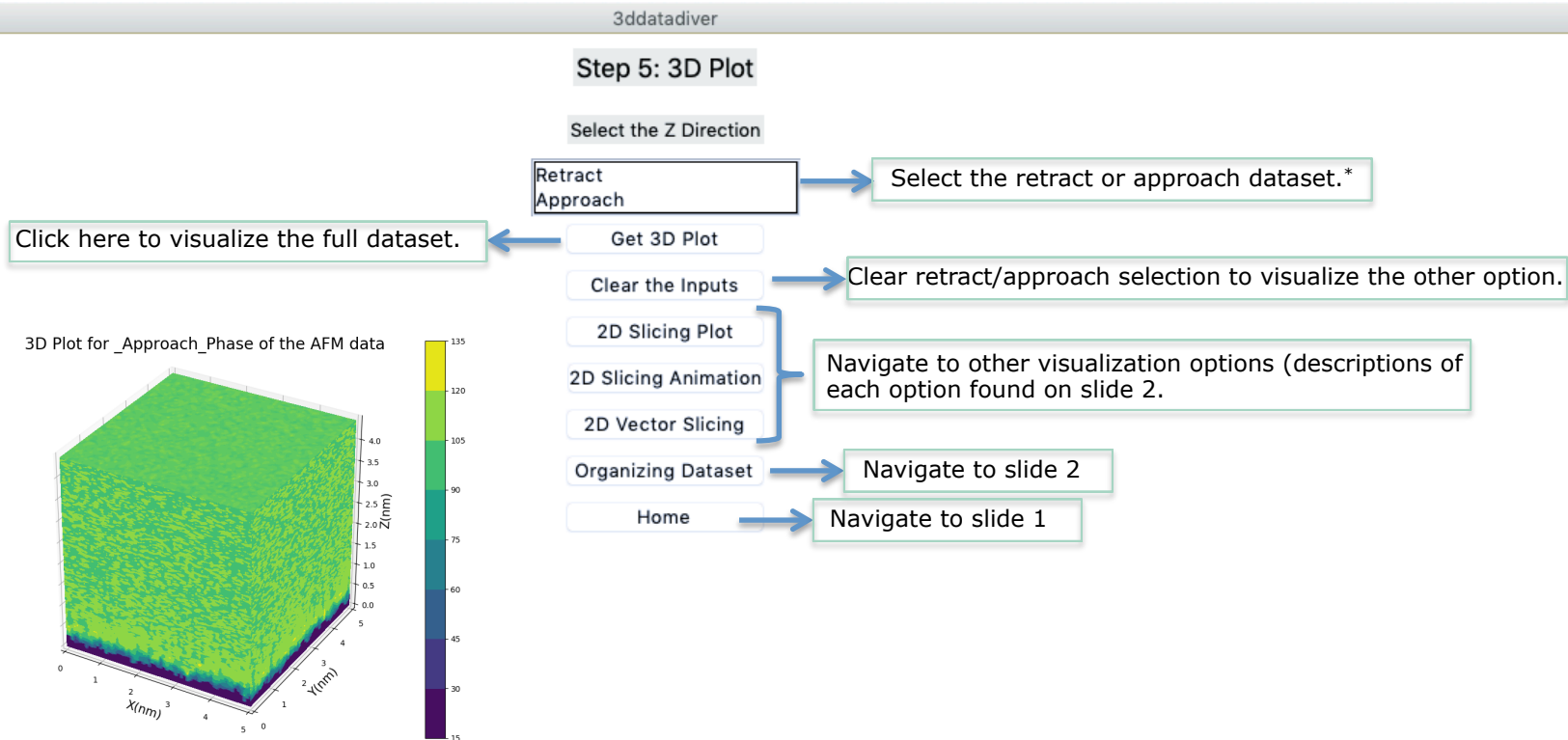
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Step 5: 3D Plot

Plot the full dataset.

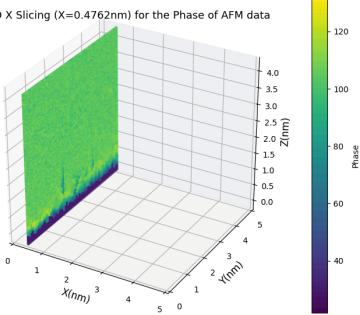


*The full dataset collected Amp/Phase data as the tip approaches the solid surface and as the tip is retracted from the solid surface.

Step 6: 2D Orthogonal Slicing

In this window the user can pull slices at different locations from the x, y, or z plane. There is also an option here to generate .h5 files containing just the data visualized in the slice.

3D X Slicing (X=0.4762nm) for the Phase of AFM data



Click these buttons to visualize data in x, y, or z planes.

Step 6: 2D Slicing Plot

Slices Location (nm)

Distance from the origin the user would like to make the data slice.

Select the Z Direction

Retract
Approach

Select the retract or approach dataset.*

Export Filename

Enter desired filename for generated .h5 file. This is only required if the user selects the .h5 button below and thus generating the file.

Get 2D X Slicing Plot

Get 2D Y Slicing Plot

Get 2D Z Slicing Plot

☐ .h5

Click here to generate an .h5 file of data displayed in chosen slice.

3D Plot

2D Slicing Animation

Organizing Dataset

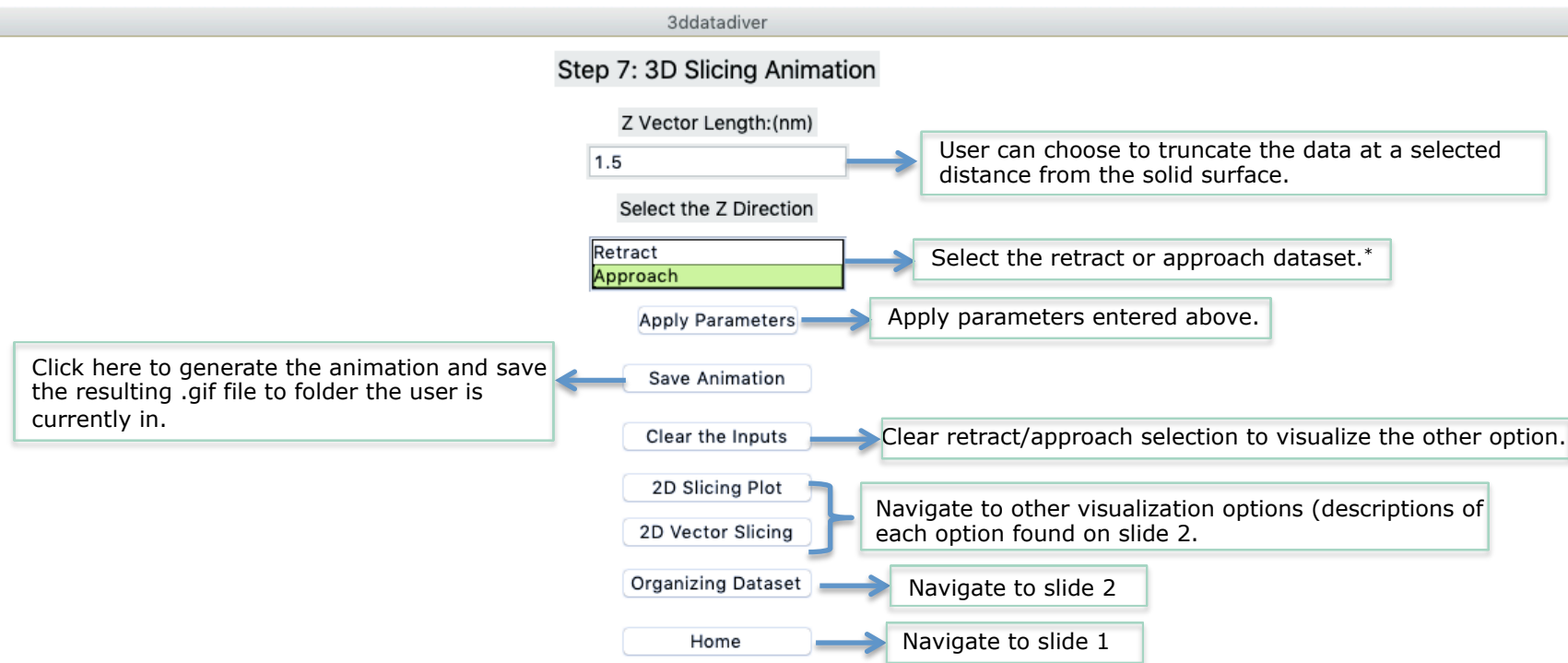
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The reference level for the plots is set as zero at the substrate surface.

*The full dataset collected Amp/Phase data as the tip approaches the solid surface and as the tip is retracted from the solid surface.

Step 7: Slicing Animation

For the final function available in 3dDataDiver, the user can see the evolution of features through the animation of 2D orthogonal slices through the x, y, and lastly, z-plane.



This concludes the manual, please enjoy
using 3dDataDiver!