Zygo ZeScope instruction V. 2.0
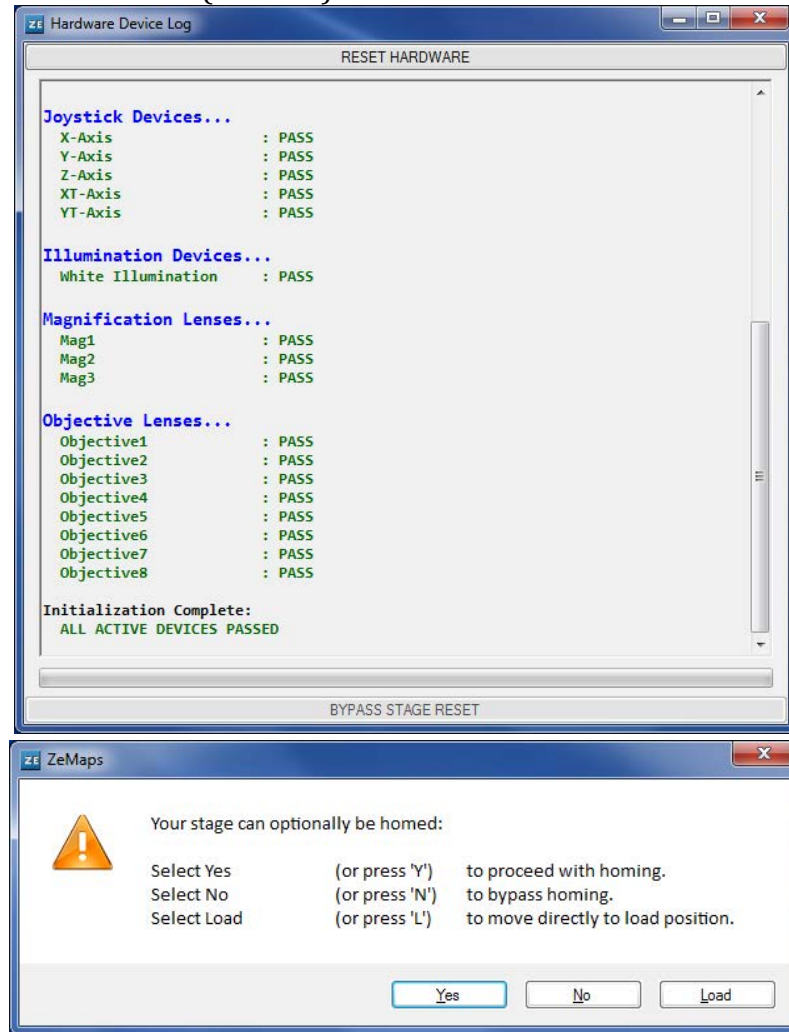
I. Starting the instrument:

1) Open ZeMap by clicking the ZE icon on the desktop.

2) Wait for the hardware to initialize (~ 1 min).

3) **Check that the sample stage is clear** (no sample or anything else), then select yes to proceed with homing the instrument. —> Wait for the instrument to home all the motors

4) When warned about the Z axis moving down, Check that the sample stage is clear and click proceed.
    a.   The tower is now moving down

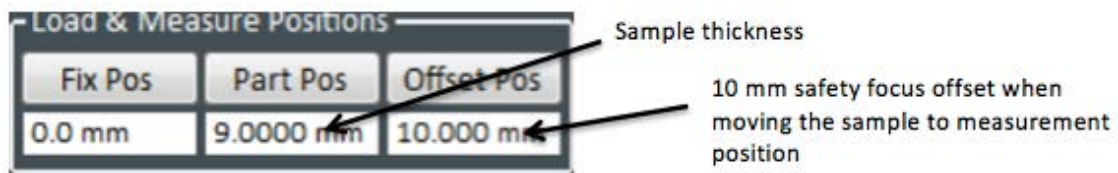5) When asked " do you want to open the last recipe you used?" select "No".
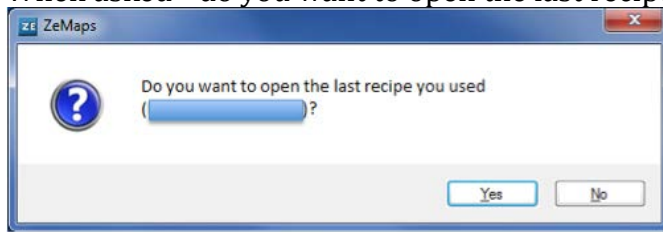
6) Windows layout in 4 individual quadrants with 4 menus
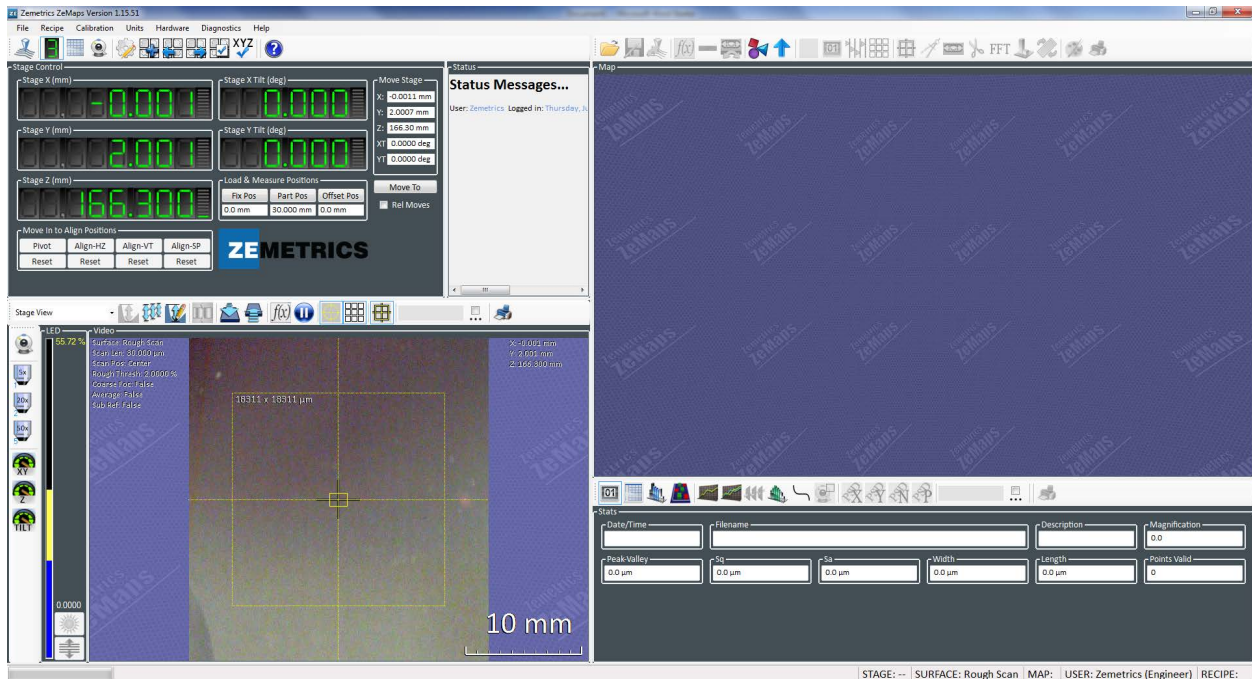
7) In the top left corner of the screen click on the green [3] icon.

   a. You now see numbers for the stage control / position
   b. In the box "load & Measure Positions"

      i. Place your sample next to the vertical scale on the left side of the sample stage to measure it's height. If less than 1 mm assume it is 1 mm thick.
      ii. Type the thickness of you sample in "part Pos" then **click enter**
      iii. Type 10 mm in "offset Pos" then **click enter**

II. <u>**Sample loading and focussing**</u>:

1) In the stage view window (bottom left quadrant)
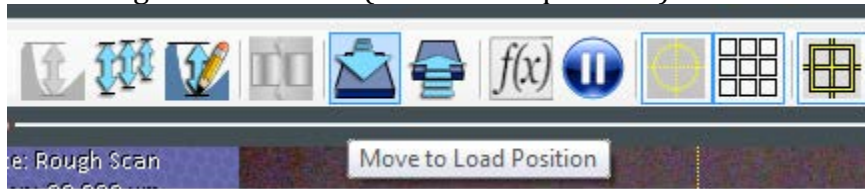
a. click the "Move to Loading Position" icon
   (it could be that nothing happens at this time)

b. **You can now place your sample on the stage**

c. click the "Move to Measure Position" icon
   i. when the Z move warning pops up check that the sample is not too tall

   ii. click proceed; the tower will then lower by 10 mm

2) You now can see the surface of your sample and a laser spot on the bottom left quadrant
   a. on the remote use the remote change Z (left most lever) in order to have the laser spot match with the crosshair.
   b. You can also move the sample in X and Y (second joystick) to place the area of interest at the crosshair.

3) Select the objective you want to use to image the sample

| Objective	Mag changer	Magnification	X size (μm)	Y size (μm)
5X	—	3.15x	1500	1225
		5x	935	700
	+	10x	470	350
20X	—	12.6x	380	285
		20x	240	180
	+	40x	120	90
50X	—	31.5x	150	123
		50x	95	70
	+	100x	47	35

a. Typically start with 5x objective
   i. Click on the 5X icon
      1. 3 objective options appear
         a. select the appropriate one (typically the 5x or 5x-)
   b. Note that higher magnifications are recommended for rougher samples.

4) You now want to focus on the sample
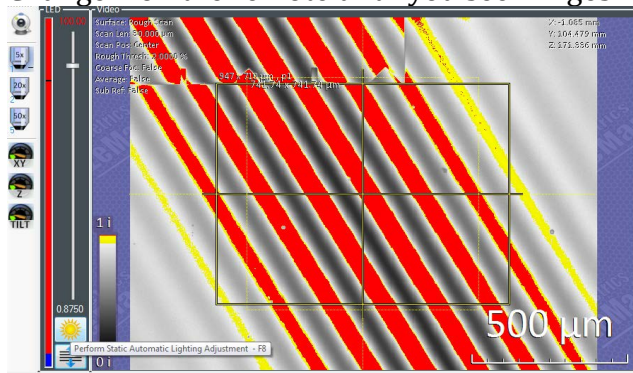   a. click on the icon at the lower part of the window "turn on field stop" Mode

   Turn on Field Stop Mode

   b. you now see a purple ring

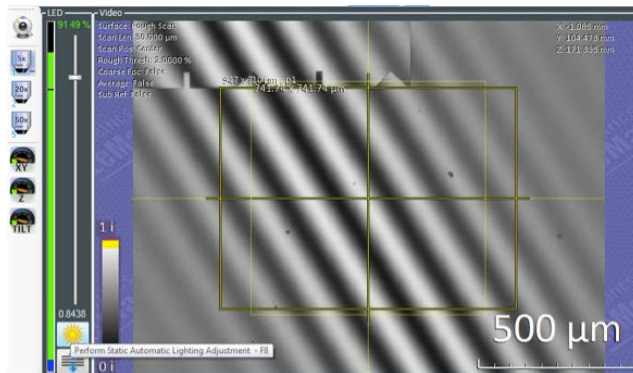   500 μm   Mode: Field Stop   500 μm   Mode: Field Stop
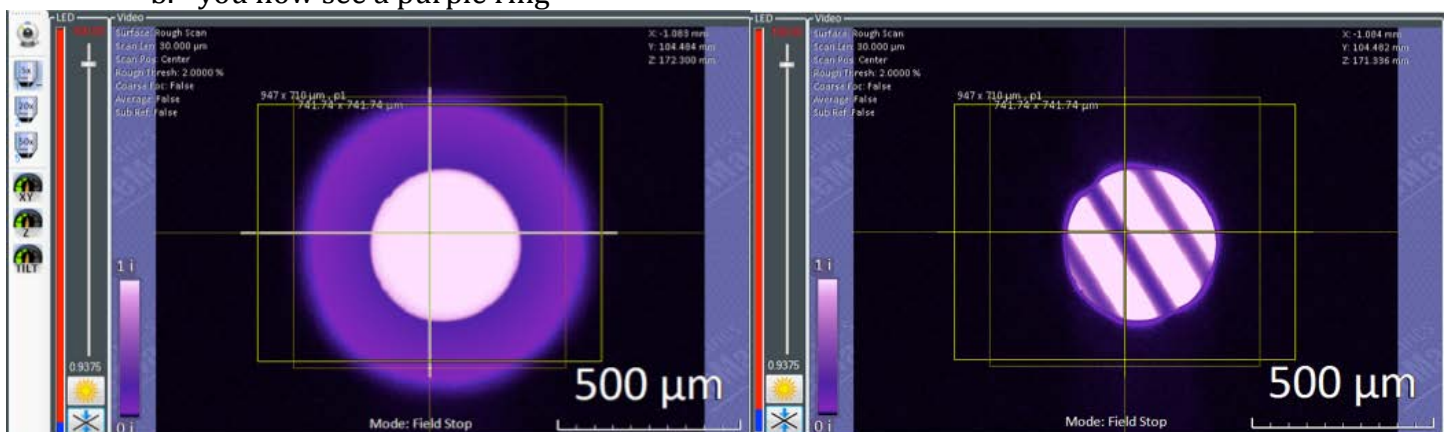
   c. adjust Z until the ring is as sharp as possible

d. click the "turn off field stop" icon (same location as the previous icon)

e. Change Z on the remote until you see fringes

f. If needed click on the sun icon or F8 "Perform Static automatic lighting adjustment"

g. If you have clean fringes (very flat sample)
    i. Use the tilt (right most lever on the remote) and focus joysticks until the fringes are as wide as possible and the fringes are as bright as possible
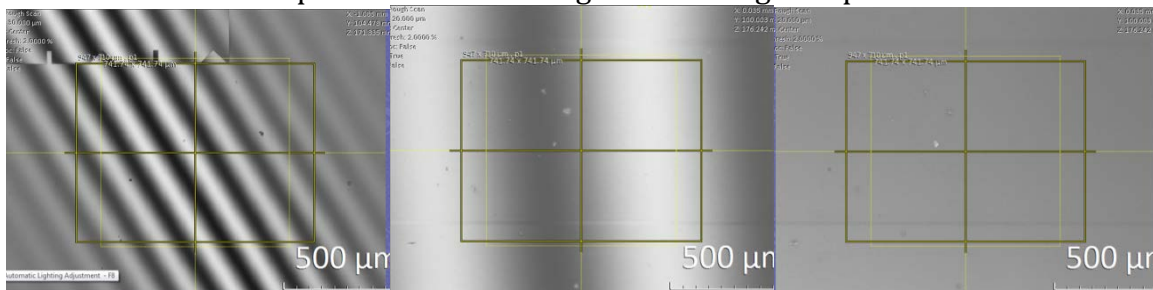
    ii. Click the sun icon (F8) if you see some red saturation

III. Measurement setup parameters
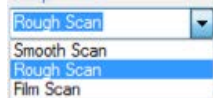## A. Single measurements:
1) You are now ready to set up your measurement parameters

    a. Click the "Acquire Recipe Option" icon
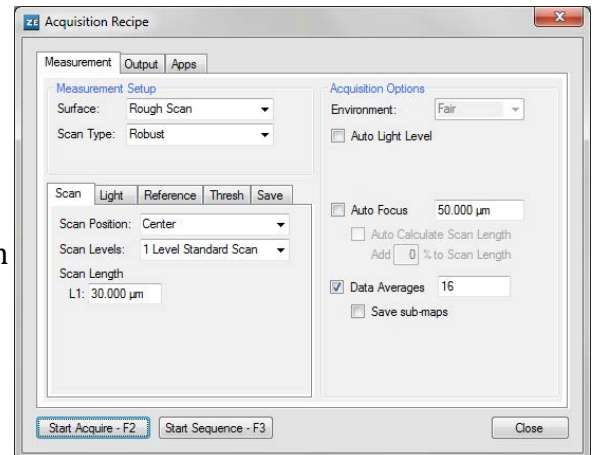
    b. A window pops up

    c. Select the surface type and the Scan length
        i. Surface type: smooth / rough (typical) / film scan (1-50 μm thick transparent film)
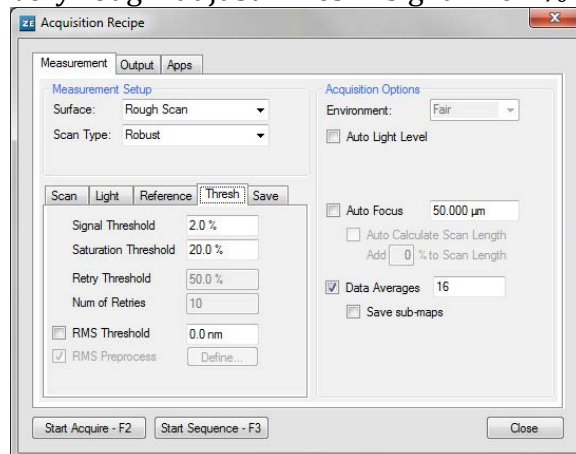
        ii. Scan length: typically 2x the maximum topography of your surface
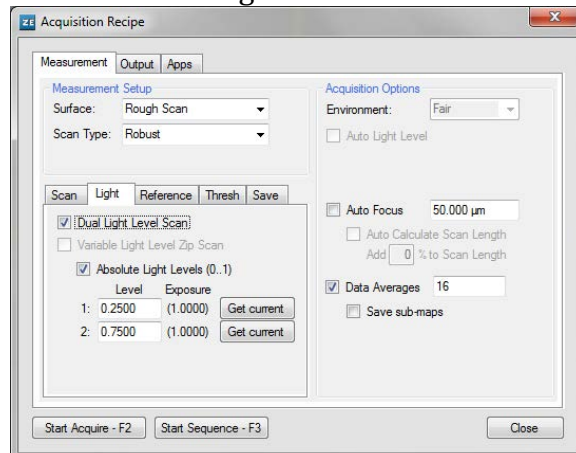
    d. Special cases:
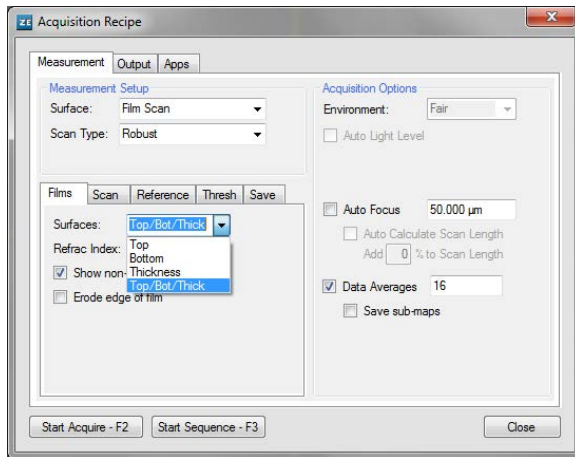   i. Very rough: adjust Thresh : signal > 0.7% and saturation > 7%

        ii. Surfaces with large difference in reflectivity: Dual light

a) Focus on one surface and click the sun then click the first "get current"

b) Focus on the other surface click the sun then click the second "get current"
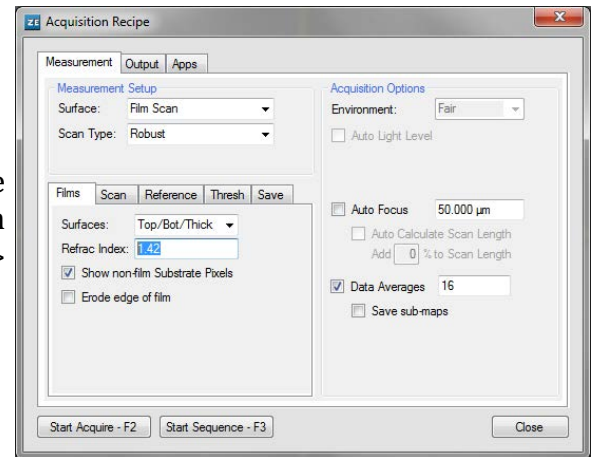
iii. Film scan:

Set the surface as "top/Bot/thick"
<—

Type the refractive index of your film
—>

2) Initiate measurement by clicking Start Acquire (F2) or

B. Stitch measurement (larger area)

1) Prepare your measurement the same was you would for the single measurement to ensure you have a good signal

2) Once you have a good single image, in the top left quadrant click on the stage view icon

3) click on the stage sequence options icon next to it
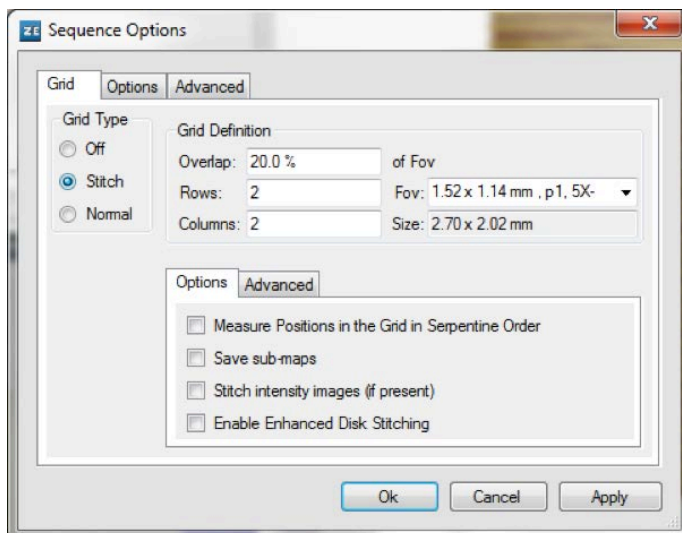
4) select the stitch radio button in grid type

5) Type in the number of Rows and columns wanted and make sure the correct objective is selected in the *Fov* drop down
Note: if you change objective after doing a map, your next map will still have the old objective information.
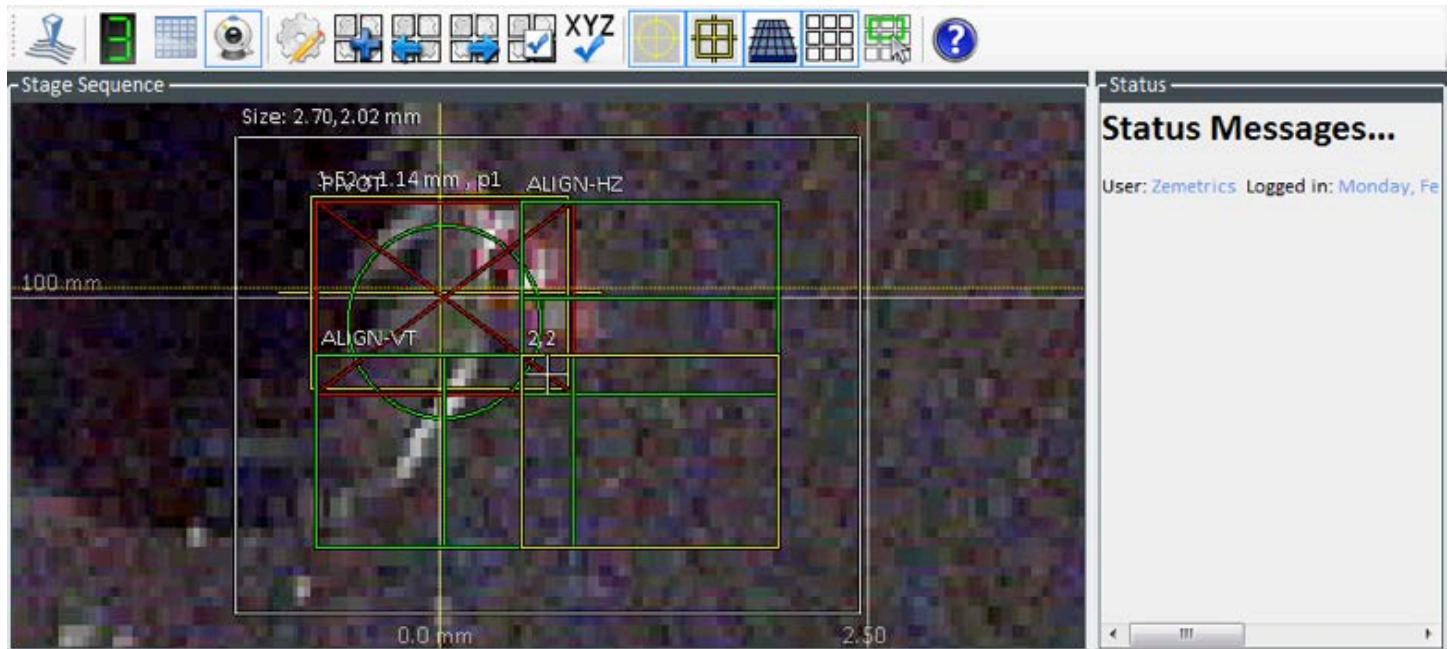
6) You now can see the area that will be measured on the stage view window on the top left quadrant.
7) You can change the size of the measured area by clicking and dragging the edges of the white rectangle.

8) You can change the location of the mapped area by moving your mouse over the white + at the center of the map until it turns red and then click and move to the desired area.

9) Before measuring a large map make sure your scan range (in the recipe options) is large enough by clicking on each corners of the map or the high and low area of the maps and checking that a single acquisition gives a good image.

10) Once all is set click F3 or start sequence Acquire
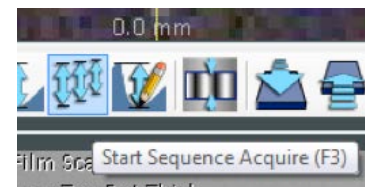
11) The data are now collecting and each individual image is appearing on the top right quadrant as it is being collected. You can also see the progression of the measured images as the current position is displayed in red on the top let quadrant stage view.

12) Once each image is collected it can take some time for the computer to stitch the images together into one image the progression is shown on the bottom left of the software window.

Note: you can click cancel at any time but if you do you may need to way between a few seconds and a few minutes for the software to cancel the measurement.

IV. <u>Working with the measured data:</u>

1) You data is now displayed on the top right quadrant of the screen.

2) Click the [icon] icon to save you data (note if you measure again without saving your data the data will be overwritten.)

3) The most useful icons are labeled on the righthand side image:

4) In order to display the data profile click the 6th icon on the lower right quadrant a line will then appear on the image. Move the line to the desired position.
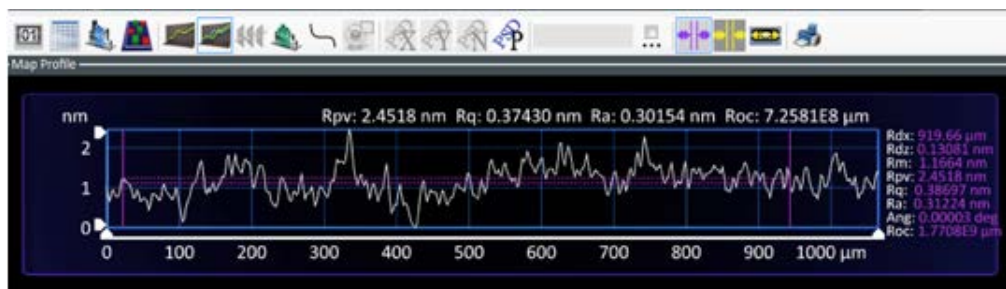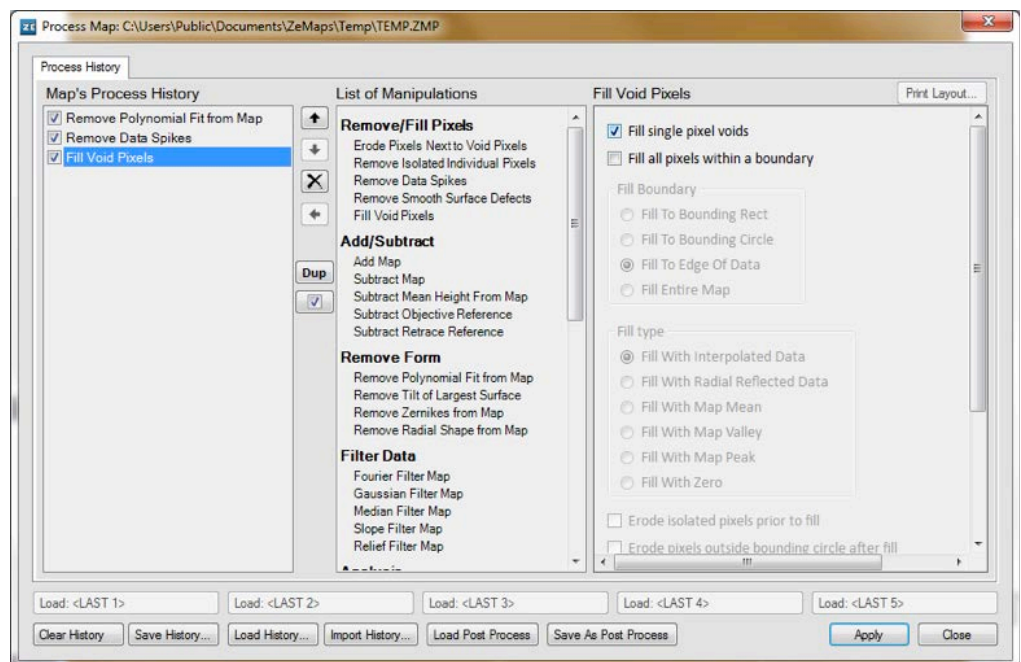

5) It is recommended to level the image using the spirit level icon located between the compass and the scissors icons. Make sure the selected leveling area is appropriate.

6) Other common data corrections are found under the data processing window (4th icon from the left)

Note: by default the software apply a full map tilt correction to the image you can remove that correction in the process map window.
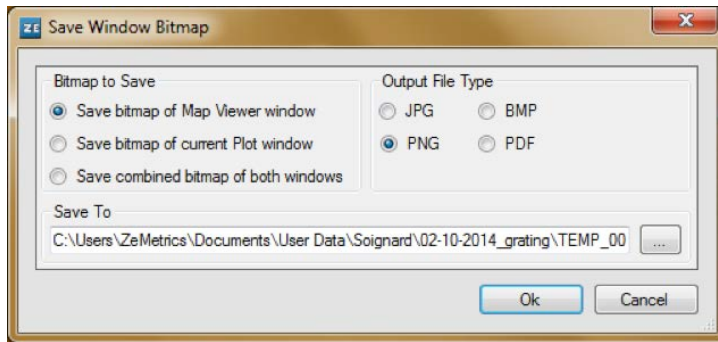
Processes:
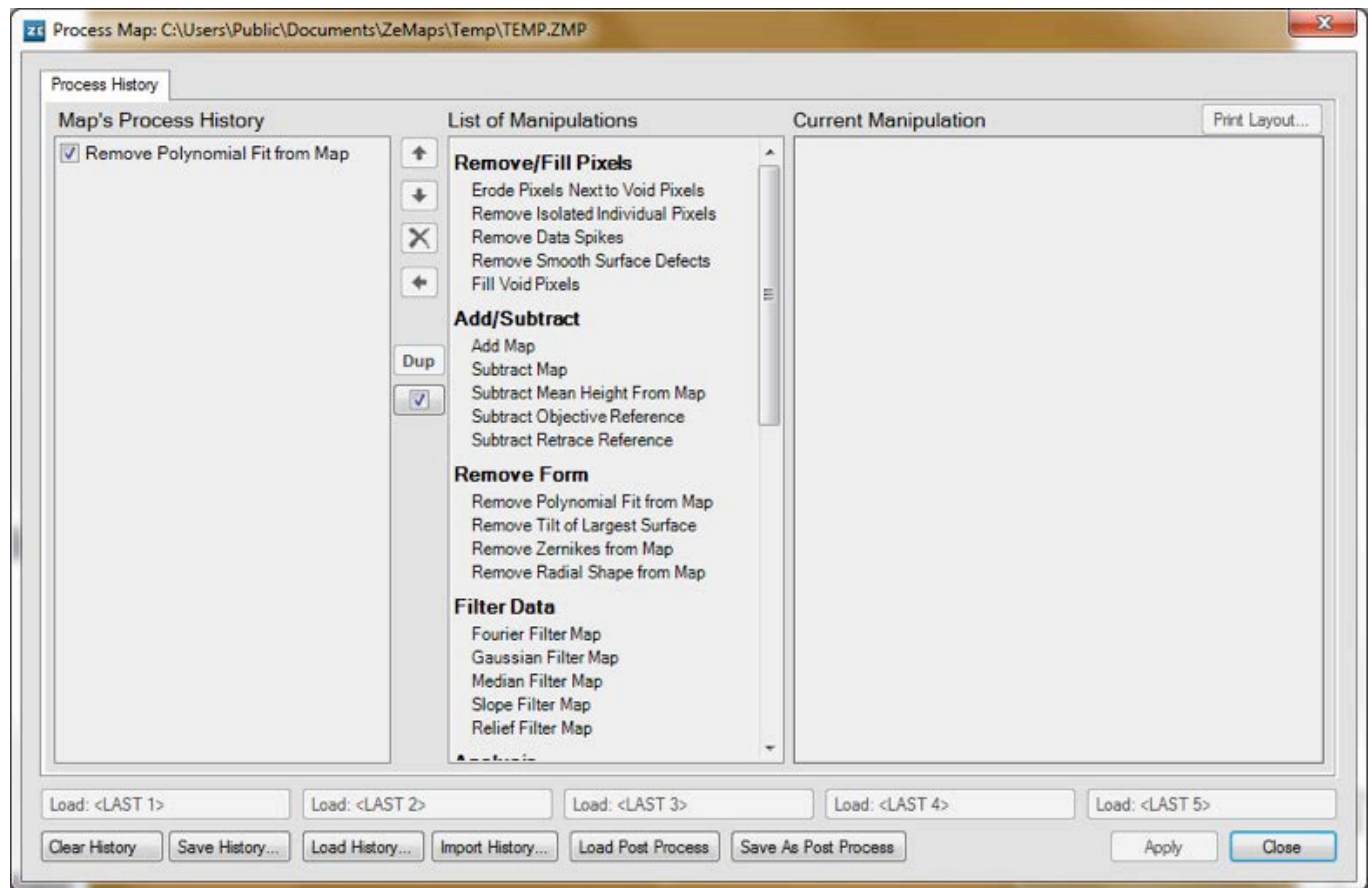
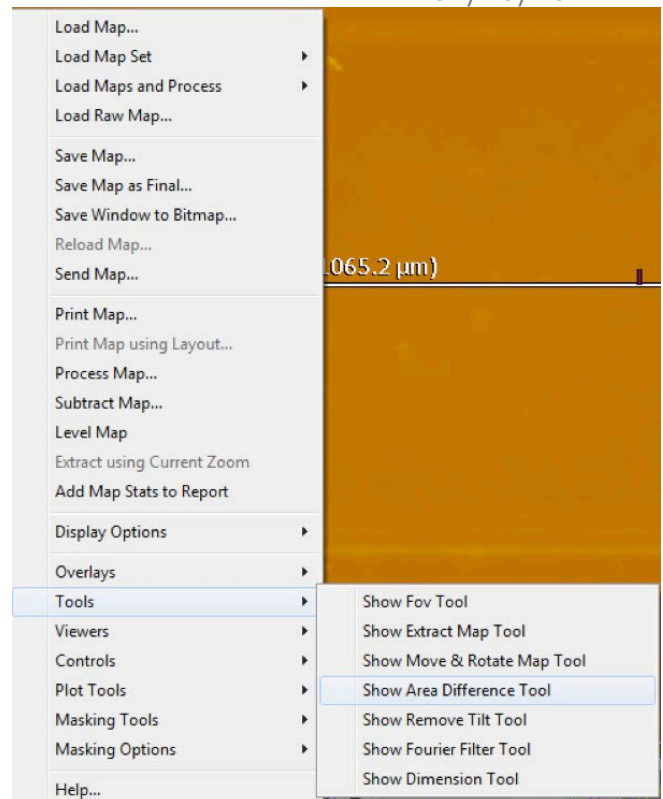Other common processes are
Remove Data Spikes
Fill Void pixels
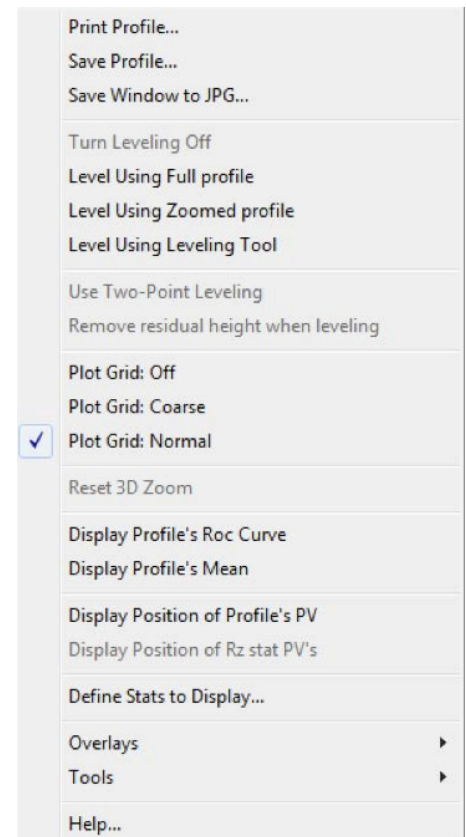
V. <u>Finished with your sample / done with the instrument:</u>

1) When done click "move to load position"

2) Remove your sample

3) Close the program
    a. when asked "Are you sure you want to exit?" click yes
    b. when asked " would you like to move the stage 55 mm away from the surface before exiting ZeMaps" click yes