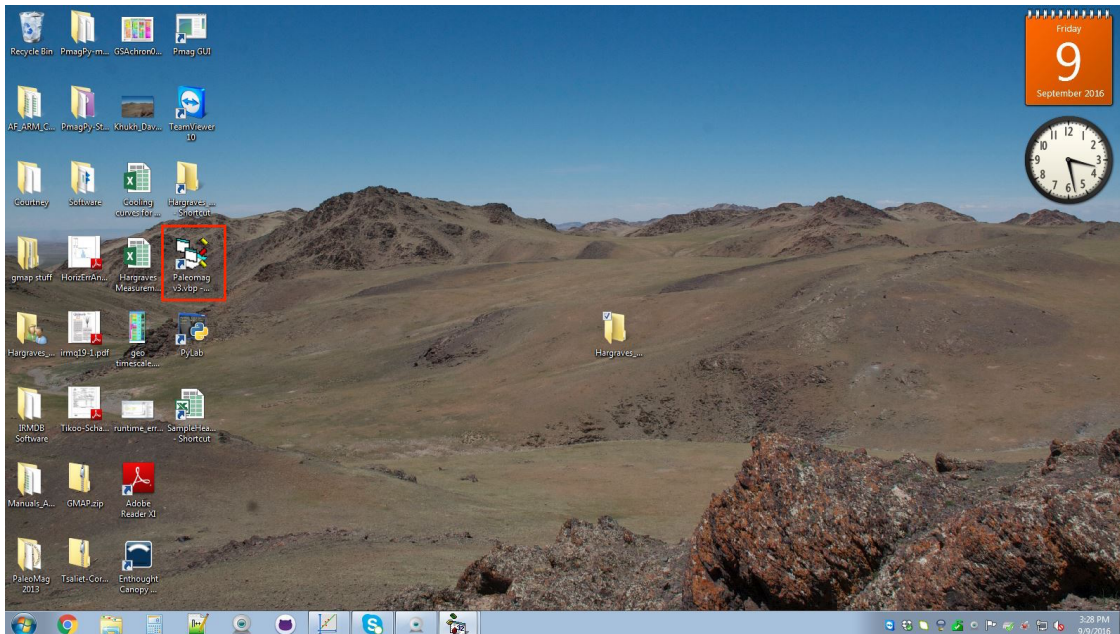
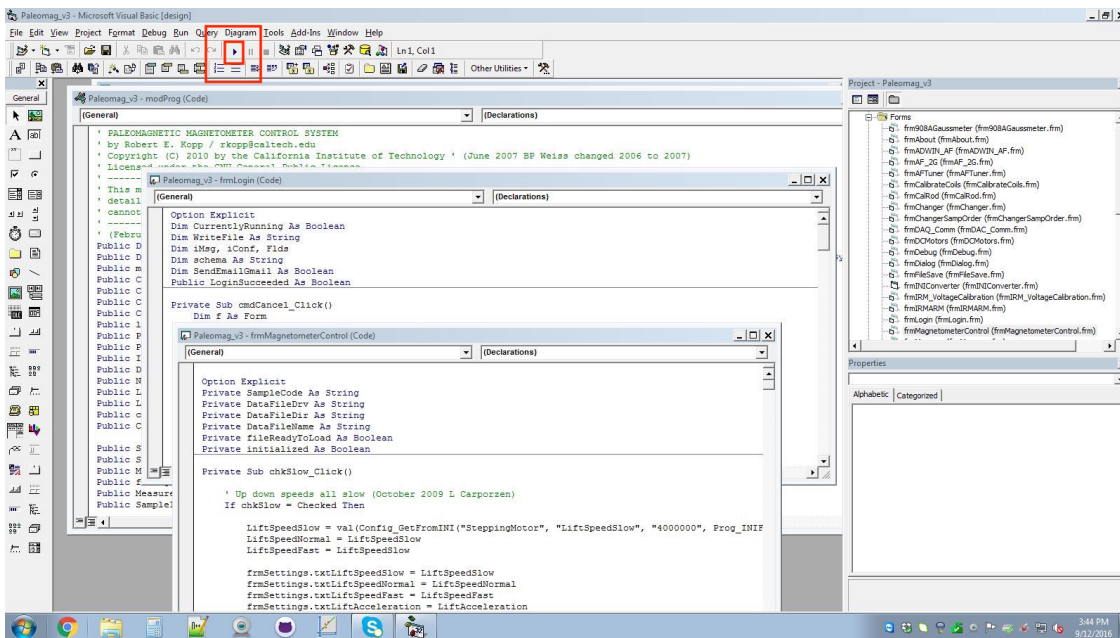


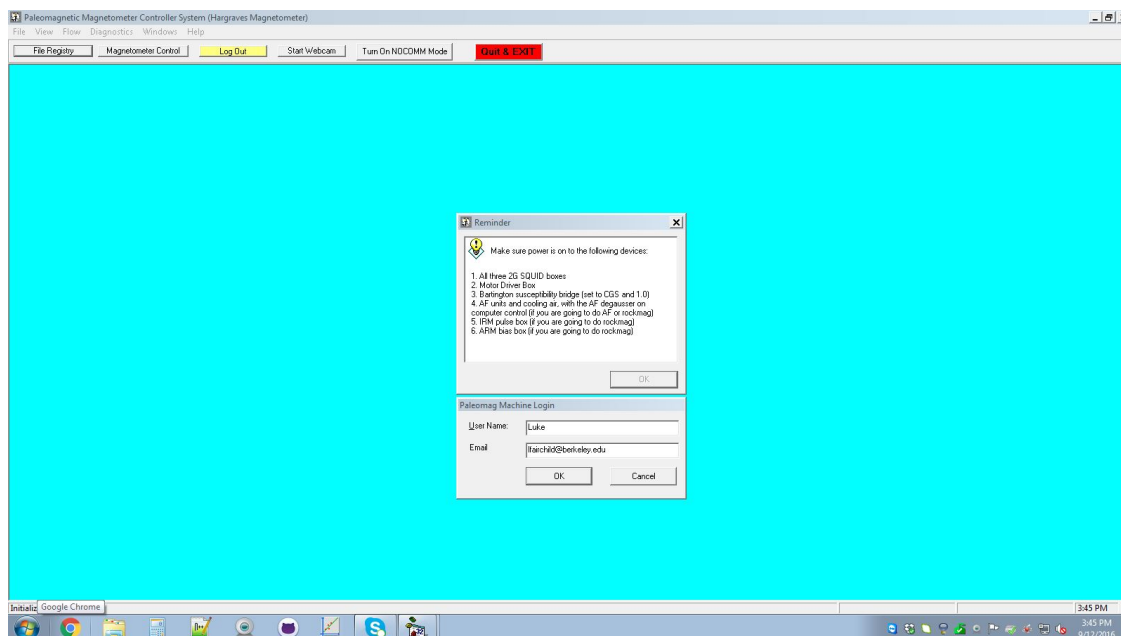
Step 1. Open the Visual Basic program (double click the circled icon on the desktop).



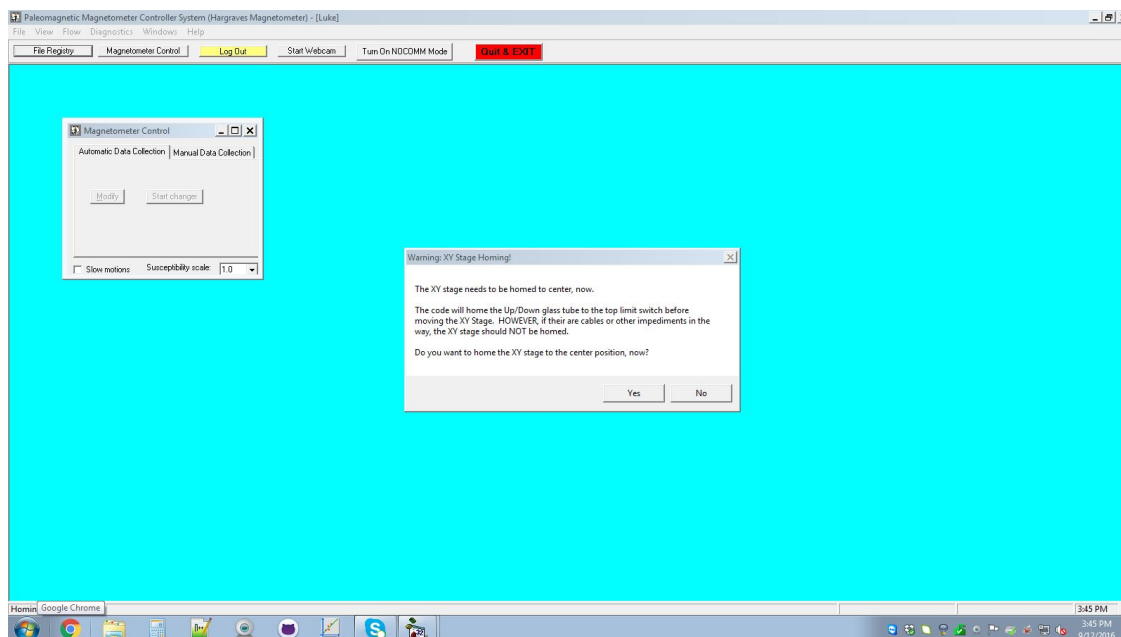
Step 2. Press the play icon to open the program interface.



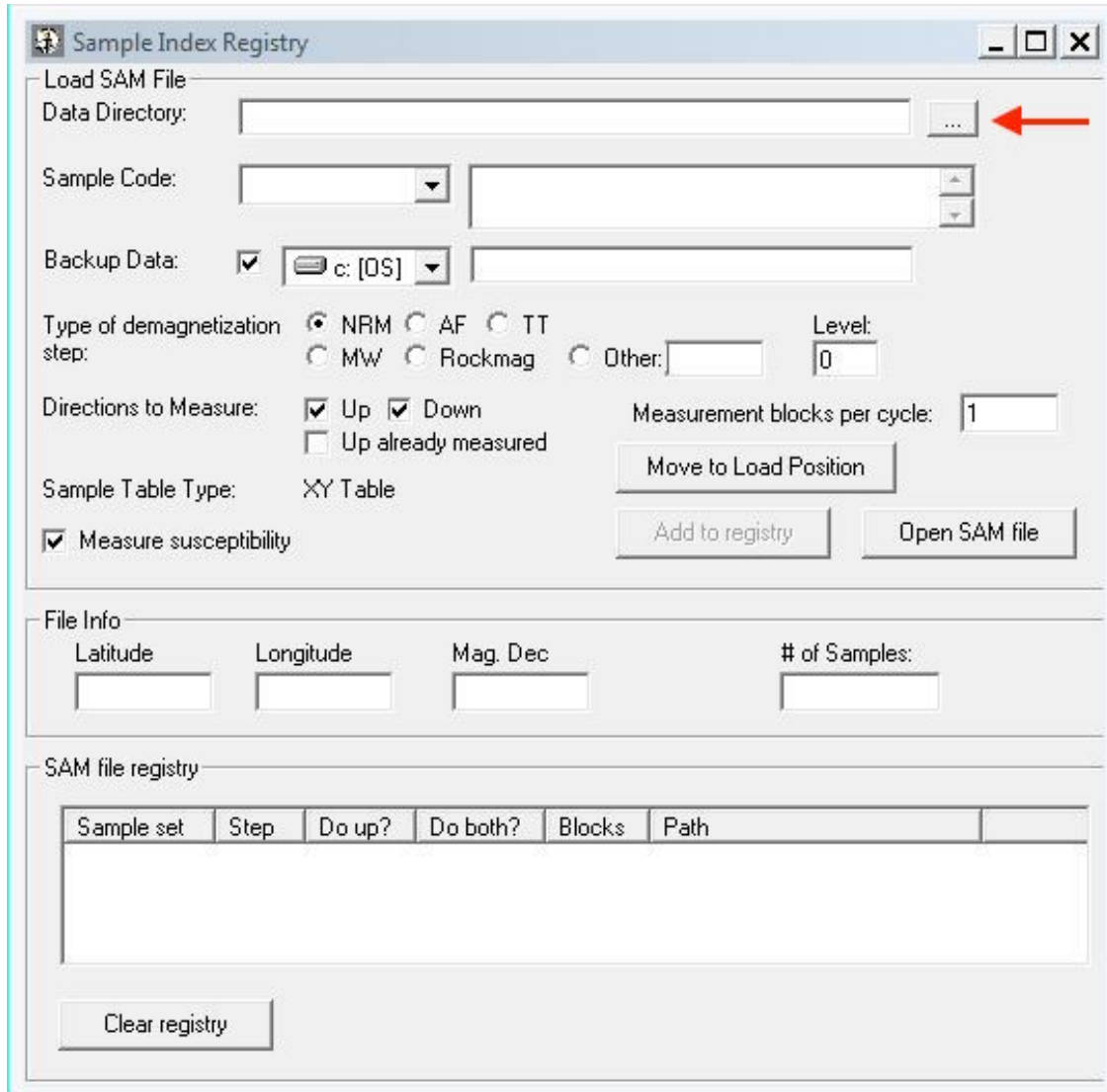
Step 3. Sign in with your name and email.



Step 4. The program will ask to home the XY stage to center—you can either choose to do this now (if your samples are already loaded on the tray) or click “No” to do it later.



Step 5. The Sample Index Registry window (see below) should open automatically. Click the button marked by the arrow to begin loading your data files into the registry.



The screenshot shows the 'Sample Index Registry' window. The 'Load SAM File' section contains the following fields and controls:

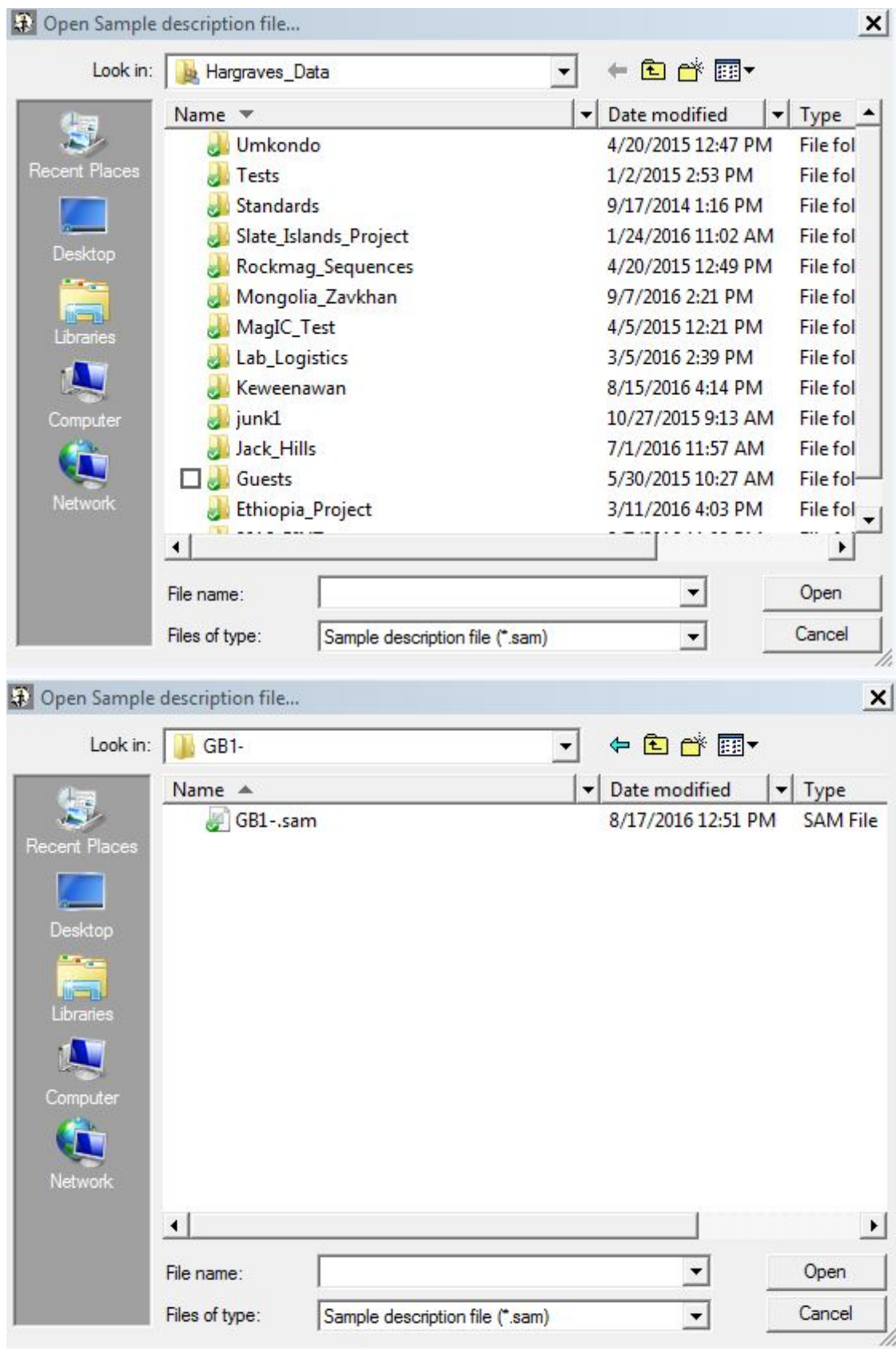
- Data Directory:** A text field with a browse button ('...') indicated by a red arrow.
- Sample Code:** A dropdown menu and a text field.
- Backup Data:** A checked checkbox, a drive dropdown (showing 'c: [OS]'), and a text field.
- Type of demagnetization step:** Radio buttons for NRM (selected), AF, TT, MW, Rockmag, and Other. A 'Level:' field with the value '0'.
- Directions to Measure:** Checkboxes for Up (checked), Down (checked), and Up already measured (unchecked).
- Measurement blocks per cycle:** A text field with the value '1'.
- Sample Table Type:** A dropdown menu showing 'XY Table'.
- Buttons:** 'Move to Load Position', 'Add to registry', and 'Open SAM file'.
- Measure susceptibility:** A checked checkbox.

The 'File Info' section contains four text fields: Latitude, Longitude, Mag. Dec, and # of Samples.

The 'SAM file registry' section contains a table with the following columns: Sample set, Step, Do up?, Do both?, Blocks, and Path. The table is currently empty.

A 'Clear registry' button is located at the bottom left of the window.

Step 6. In the Hargraves_Data Dropbox folder, find the SAM file of the first site you want to load.



Step 7.

1. Uncheck “Backup Data”.
2. Specify the treatment step of the samples you are measuring. In the example below, samples have been thermally demagnetized (“TT”) to 200 °C.
3. Specify the orientations of samples you wish to measure. Both “Up” and “Down” should be measured when possible. If “Up” directions were measured previously and you are only measuring “Down”, uncheck “Up” and check “Up already measured”.
4. Specify whether you want to measure susceptibility.
5. Add the site to the registry.

The screenshot shows the 'Sample Index Registry' dialog box. Red numbers 1 through 5 are placed next to specific fields to indicate the steps in the process:

- 1.** Next to the 'Backup Data' checkbox, which is currently unchecked.
- 2.** Next to the 'Type of demagnetization step:' section, where 'TT' (Thermal Treatment) is selected with a radio button, and the 'Level' is set to 200.
- 3.** Next to the 'Directions to Measure:' section, where both 'Up' and 'Down' are checked.
- 4.** Next to the 'Measure susceptibility' checkbox, which is checked.
- 5.** Next to the 'Add to registry' button.

The dialog box contains the following fields and controls:

- Load SAM File:** Data Directory (C:\Dropbox\Hargraves_Data\Keweenawan\Gooseberry\), Sample Code (GB1-).
- Backup Data:** ☐ (unchecked), c: [OS], c:\Dropbox\Hargraves_Data\Keweenawan\.
- Type of demagnetization step:** ☐ NRM, ☐ AF, ☒ TT, ☐ MW, ☐ Rockmag, ☐ Other: [], Level: 200.
- Directions to Measure:** ☒ Up, ☒ Down, ☐ Up already measured, Measurement blocks per cycle: 1.
- Sample Table Type:** XY Table, Move to Load Position button.
- Measure susceptibility:** ☒ (checked), Add to registry button, Open SAM file button.
- File Info:** Latitude (47.2), Longitude (-91.5), Mag. Dec (0), # of Samples (8).
- SAM file registry:** Table with columns: Sample set, Step, Do up?, Do both?, Blocks, Path.
- Clear registry** button.

Step 8. Repeat step 7 for all sites and fill the registry.

Sample Index Registry

Load SAM File

Data Directory: C:\Dropbox\Hargraves_Data\Keweenaw\Gooseberry\

Sample Code: GB4-

Backup Data: ☐ c: [OS] c:\Dropbox\Hargraves_Data\Keweenaw\

Type of demagnetization step: ☐ NRM ☐ AF ☒ TT ☐ MW ☐ Rockmag ☐ Other: Level: 200

Directions to Measure: ☒ Up ☒ Down ☐ Up already measured Measurement blocks per cycle: 1

Sample Table Type: XY Table

☒ Measure susceptibility

Move to Load Position

Add to registry Open SAM file

File Info

Latitude	Longitude	Mag. Dec	# of Samples:
47.2	-91.5	0	8

SAM file registry

Sample set	Step	Do up?	Do both?	Blocks	Path
GB1-	TT 2...	Y	Y	1	C:\Dropbox\Hargraves_Data...
GB2-	TT 2...	Y	Y	1	C:\Dropbox\Hargraves_Data...
GB3-	TT 2...	Y	Y	1	C:\Dropbox\Hargraves_Data...
GB4-	TT 2...	Y	Y	1	C:\Dropbox\Hargraves_Data...

Clear registry

Step 9. In the Magnetometer Control window, click “Modify”.

Magnetometer Control

Automatic Data Collection | Manual Data Collection

Modify Start changer

☐ Slow motions Susceptibility scale: 1.0

Step 10. Specify the position (hole number) of the first sample. Click “Add to list”. This will assign positions on the tray for all the samples in the registry in the order that they were loaded (starting from the initial position). Click “View new sample list” and check that the positions of the samples on the tray are correct.

The image shows two windows from the Hargraves Magnetometer software. The top window is the 'Sample Settings' dialog, and the bottom window is the 'Hole Sample List - New Sample Set'.

Sample Settings Dialog:

- Position of first sample: 1
- From file: [All]
- Load Order: ☒ Ascending ☐ Descending
- Reload position: ☒ Return to start ☐ Leave at end
- Final position: ☒ Return to start ☐ Leave at end
- Multiple holder measurements: ☒ Repeat (weak samples) ☐ Skip (strong samples)
- AF Holder: ☐ AF Holder before measuring
- Measure Holder: ☒ Measure holder every 10 samples
- Buttons: Add to list, View new sample list, Send list to command queue, Cancel

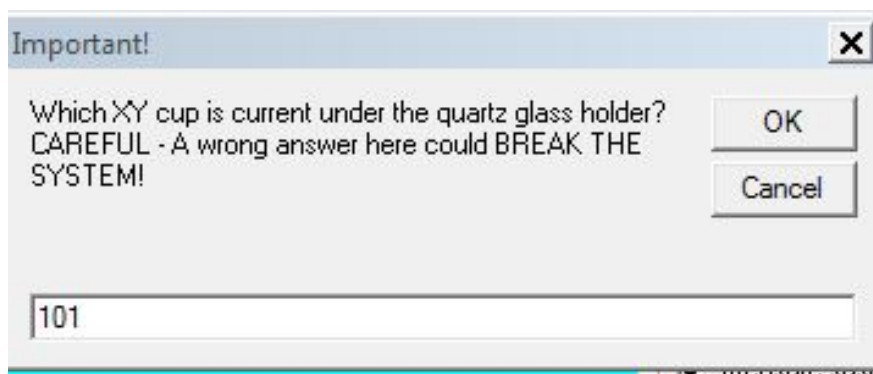
Hole Sample List - New Sample Set:

Hole	Sample	Hole	Sample	Hole	Sample
1	GB1-1a	47		93	
2	GB1-2a	48		94	
3	GB1-3a	49		95	
4	GB1-4a	50		96	
5	GB1-5a	51		97	
6	GB1-6a	52		98	
7	GB1-7a	53		99	
8	GB1-8a	54		100	
9	GB2-1a	55			
10	GB2-2a	56			
11	GB2-3a	57			
12	GB2-4a	58			
13	GB2-5a	59			
14	GB2-6a	60			
15	GB2-7a	61			
16	GB2-8a	62			
17	GB3-1a	63			
18	GB3-2a	64			
19	GB3-3a	65			
20	GB3-4a	66			
21	GB3-5a	67			
22	GB3-6a	68			
23	GB3-7a	69			
24	GB3-8a	70			
25	GB4-1a	71			
26	GB4-2a	72			
27	GB4-3a	73			
28	GB4-4a	74			
29	GB4-5a	75			
30	GB4-6a	76			
31	GB4-7a	77			
32	GB4-8a	78			
33		79			

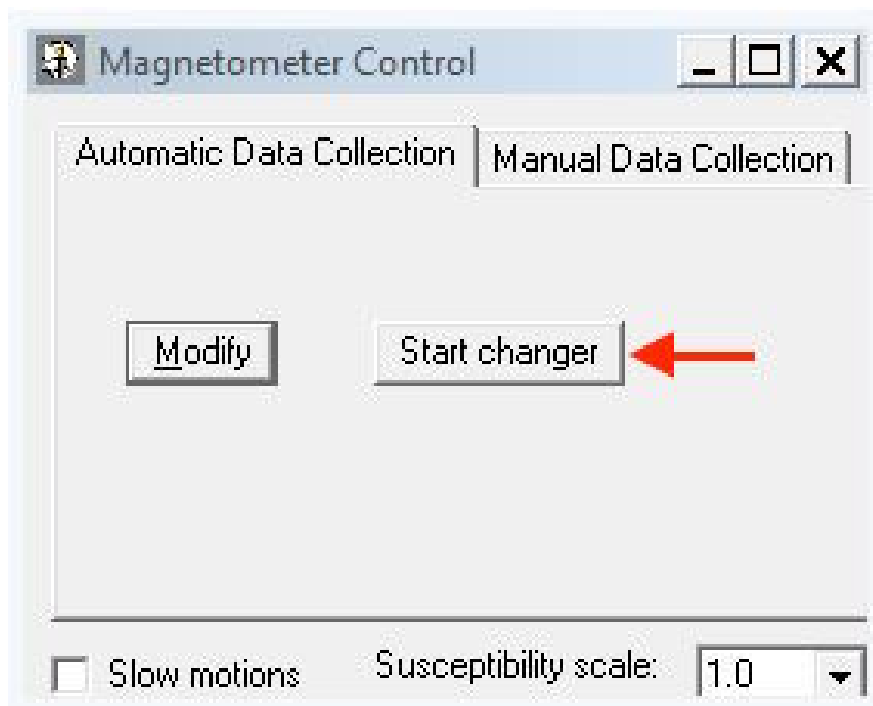
Buttons: OK, Clear, Print

Sample order: ☒ Ascending ☐ Descending

Step 11. If you chose not to home the XY stage in Step 4, the system will ask you to do this now. If you have started the program from scratch (i.e. you did not simply log off a different user and log back in), the system will confirm the position of the glass holder once the XY stage homes to center. Check to make sure the glass holder is positioned over the hole in the tray (cup number 46). If it is, enter 46 and click Okay. If it isn't, something is wrong.



Step 11. Click "Start changer" to begin your measurements!



Manual Measurements

There may be times when you wish to measure samples manually (i.e. one-by-one). (Say you have three samples out of a batch of sixty that you need to rerun before the next heating step, and you weren't able to do the automated reruns at the end of the last measurements. Instead of relying on the automated system and registering a spot on the tray for each sample, measurements would go faster if samples could be loaded manually.)

1. Repeat steps 1 through 8 from above.
2. When you get to step 9, open the “Manual Data Collection” tab.
3. Choose a sample from the sample dropdown. **NB: sample heights do not auto-fill correctly, so you will have to manually enter the sample height. Instead of measuring the sample, I usually click on View sample data (in the same window) to get the sample height recorded in the data file.**
4. Click “Measure holder”. Typically, you should only need to do this once.
5. Click “Measure sample”. The system will prompt you to load the sample onto the glass holder. Be sure that the arrow is positioned correctly before clicking OK. The system will prompt you to flip the sample if measuring both up and down.

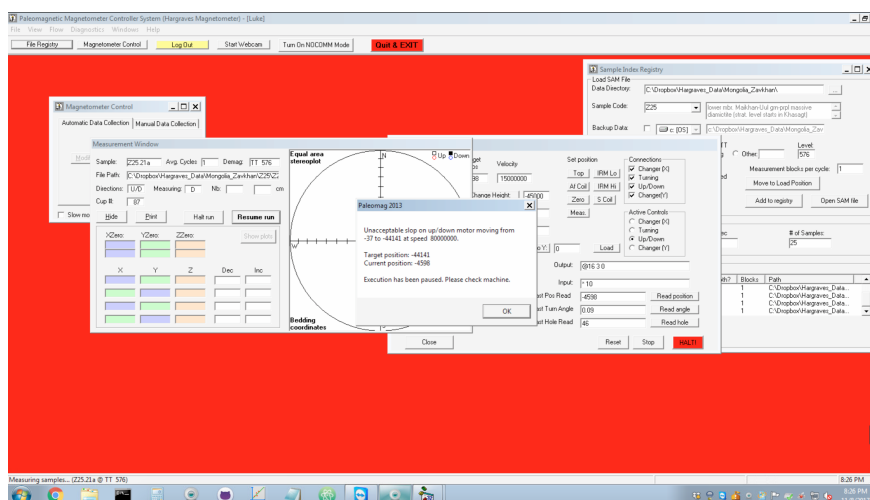
Miscellaneous Tips

SQuID jumps

The occasional SQuID jump is not a cause for concern—the magnetometer will remeasure samples up to three times before giving up (you will receive an email notification for this). For some samples, however, frequent SQuID jumps might be more of a nuisance, especially if multiple automatic remeasurements by the magnetometer don't seem to be resolving the issue. SQuID jumps may be improved or eliminated by slowing down the up/down and turning motors. This slows down the measurement process and decreases the chance of a flux jump for strongly magnetic samples.

In the program window, go to **View→Settings**. Under the DC Motors (1) tab, lower the Lift speed slow and Turning speed values. To maintain reasonable operating speeds, do not decrease the values to a lower magnitude. For example, start by lowering Lift speed slow from 3×10^7 to 2×10^7 and see if the SQuID jumps improve.

Sample gets stuck on descent (Unacceptable slop)



If you receive an “unacceptable slop” notification, it is most likely due to a sample that has been caught on the edge of the tray as it is being lowered into the magnetometer. Go to **Diagnostics→DC Motors** and click **Home to Top**. Unless it has dropped through the magnetometer, quickly adjust the sample on the holder before it descends again. Be sure to “Resume” the run.