**Transcript of MCS v.2019 FC Run MCS Demonstrate YouTube Video**

**0:00**

In this video, we’re actually going to use the Magma Chamber Simulator to do the FC-only run we prepared in our previous tutorial. If you haven’t yet prepared an MES Input File, please go to our prior tutorial on how to prepare an input file for the Magma Chamber Simulator. Now, in order to run the MCS, we need to have two things open: Excel and the terminal window. I like to keep my terminal window locked in my desktop bar, so I can click on it and open it up. Now, because we’re doing an FC-only run, we are only going to be dealing with the Magma Subsystem. So we only need to have one of these windows open.

**0:37**

Next, we’re going to open the Magma Chamber Simulator. We did this before in the install video, but if you don’t remember, we need to navigate to our Documents folder using the Finder window. Once in our Documents folder, we want to open the MCS Folder, and then the folder labeled “MCS VBL Code”. The Magma Chamber Simulator is the Excel file “MCS\_PhaseEQ\_2019C” – at least in this case. If you haven’t noticed yet, the filename for the MCS has already changed since we made our first install tutorial – this is because we want you to have the best Magma Chamber Simulator possible.

**1:15**

So let’s open up the MCS, and there’s a pop-up window that asks if we want to disable macros – WE DO NOT. We want to enable macros, so click “Enable Macros”. The next pop-up window tells us which version of the Magma Chamber Simulator and which version of Excel that we are running – just click “OK”. And then the final pop-up window instructs us to navigate to the MCS folder. Again, this whole bit has to do with security permissions between the Mac OS and Excel, and although it can be a bit tedious, it’s actually a good thing. So we want to navigate until MCS is at the top, and click “Choose”. And we’re up and running (so I’ll just make this a bit bigger, so everybody can see). Now I will say that Visual Basic in Excel 2016 and 2019 likes to pitch a fit if it doesn’t get all of your attention, so I would recommend not trying to do anything else intensive on your computer while running the Magma Chamber Simulator.

**2:38**

The MCS is fairly easy to navigate, and everything is clearly labeled, with steps plainly numbered. Step 1 is to choose which version of MELTS you want to use. Again, the MELTS website is located at melts.ofm-research.org, and if you click here, on ‘which version of MELTS you should use’, it will bring up this handy flowchart that Mark Ghiorso has kindly provided that can help you to select the version of MELTS that is best for your composition.

**3:10**

So to select the version of MELTS, we want to click the button for “Step 1: Melts Terminal Commands”. We can choose which version to use in the drop-down menu, and for this composition we want to use Rhyolite-MELTS v1.2.0. Now, the batch executable labels will automatically update upon your selection. You’ll notice how there are three batch executable labels – one for each subsystem (magma, wallrock, and recharge). Because we are doing an FC-only run, we will only be dealing with the magma subsystem, so we can click on this “Put in Clipboard” button for the Magma subsystem at the top. This will automatically copy this batch terminal text to the Clipboard. Next, you’ll want to click on the terminal window you have open and paste the batch terminal text into the terminal window.

**4:03**

Again, here is a point where Excel 2016 and 2019 get hung up if things aren’t done precisely their way, so you’ll need to do the next few things exactly in the order I tell you to, in order to avoid an Excel freeze. Click on the large Excel window on the filename title, or somewhere in that general area. Now we can click the red “x” button to close out the MELTS batch terminal selection window. This will allow you to proceed without Excel freezing up. But, if that happens, don’t worry – it’s fine and there is a workaround. Since the MELTS batch terminal text has already been pasted into the terminal window, so we won’t need to access it again. And you can restart Excel, re-open the Magma Chamber Simulator, and then proceed immediately to Step #2 – uploading an input file.

**4:49**

So for Step 2, we want to click on the button to Create an MCS Archive File. This will bring up a user form where you can enter in the name of the file that you want to associate this run with. In previous versions of MCS, we ran on Excel 2011, and one of the limitations of that version was that we could only have a file name with 6 characters. So we used to have to use *boring* naming schematics, like 31JanA. But now, we are able to offer an expanded character limit, so filenames can be up to 20 characters long. So we can instead name our MCS Archive something like “Tutorial\_FCvid” – now, notice how I used an underscore instead of a space. You’ll need to maintain a constant character string, so use an underscore where you would a space, as is standard practice. The second half of Step 2 is to select our MES Input File that we have already created for this model. Now, *only* those files that begin with “MES\_” will be available for selection in this drop-down menu. So, if you don’t see your filename, check to make sure that it does begins with “MES\_”. If it doesn’t come up, it’s likely that you just need to rename it to begin with these four characters. We can select our MES Input File, “MES\_FC\_2”, and click the “Finish” button to create an MCS Archive file.

**6:25**

Now, what’s really nice here is that because this is an FC-only run, and there’s no assimilation involved, we can actually bypass the wallrock solidus step. Prior versions of MCS required us to do this every time, but now we can check this box up here. So if no assimilation is involved, and you don’t need any information about the wallrock subsystem, you can click this checkbox, and kind of just get around that step.

**6:55**

Now we can run the Magma Chamber Simulator because we’re bypassing that wallrock step, and click “Step 4”. Although we didn’t set a Hard Stop Temperature in the MES Input file, because there’s no wallrock information being considered, where the run would normally stop when the wallrock and magma subsystems are thermally equilibrated, we don’t have a wallrock system to consider - so we’re forced to give a Hard Stop Temperature. So we’re going to go ahead and we’re going to cut this run off at about 900 degrees, so we’re not really interested in things happening near the solidus in this case. Click “OK” – this should start our run, and you’ll see down here that some things are happening.

**7:52**

Now it might take a while for it to get to this step – it might take a couple of seconds before the Magma Chamber Simulator starts really thinking, but once it does, you’ll have your Harker diagrams show up. In previous versions of the Magma Chamber Simulator, you had to update these manually, but now these update automatically, and we can watch our magma composition evolve in real time.

**8:33**

Alright, our run is now complete! You’ll notice that the current temperature of the magma is 885.82, which is less than our Hard Stop Temperature, so our run is going to terminate. We can click “OK” – it is reminding us to export our data. In order to do that, we click on the button for “Step 5: Export Run Results”, and once you hit the button just kind of let things alone. And our run results have now been saved as this new output file, “Tutorial\_FCvid.xlsx”. We click “OK”, and now we can go ahead and close out the Magma Chamber Simulator. I like to quit Excel completely in between runs, and remember, don’t save – you don’t want to save over the Magma Chamber Simulator. And, Ctrl-C to go ahead and stop this batch terminal (I just like to keep things clean). So that concludes our tutorial on how to actually perform a Magma Chamber Simulator Run. In our next tutorial, we’ll look at how to do a trace elements run for a fractional crystallization-only model.

**9:53**