**Transcript of MCS v.2019 Installation YouTube Video**

**0:00**

Hi, and welcome to the first tutorial video for the Magma Chamber Simulator. In this video, I’ll show you how to install the Magma Chamber Simulator for the very first time. Previous versions of MCS did need to run using Excel 2011 – we’ve actually updated the MCS, so now we run using Excel 2016 or 2019. The MCS will work on either. So the only minimum OS requirements you’ll need to run the Magma Chamber Simulator are the minimum requirements for whatever version of Excel you’re running. Code and documentation can be downloaded from our website, at mcs.geol.ucsb.edu. In order to download the software, navigate to the Code & Documentation page, and you’ll be able to download the MCS folder structure from there.

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So we’ve got our .zip file – this is our downloaded MCS folder structure. In order to extract it, we double-click, and we have this MCS folder. Now, I wouldn’t delete the .zip file just yet – I actually like to keep it on hand as a back-up – in case I might accidentally delete a file in the future, I have a backup copy of that file and I don’t have to go back to the webpage and re-download things. Now the MCS folder needs to be put into the Documents folder on your computer. For those of you who aren’t as familiar with a Mac, you can get to your Documents folder by navigating through the Finder window – that’s this little happy face down here. You can click on that, and you’ll notice on the left-hand side there will be some places for Favorites. One of those is Documents, and this is actually your Documents folder. So we’re gonna drop the MCS folder into there, and that is Step One.

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Step two, we need to open up that folder and go into the folder called “MCS VBL CODE”. We’re gonna open that, and there are three files here. We want to open the one called “MCS\_PhaseEQ\_2019A”. Now, the end of that filename may change, depending on the version of the Magma Chamber Simulator that you’ve downloaded. We’re making this video in December 2018, so if you’re watching it in the future, the filename may very well not be this. So we can open up this Excel file now, and this is actually the Magma Chamber Simulator – we’re opening that as we speak. There’s this pop-up window that asks if we want to disable macros – WE DO NOT. We want to enable macros, and that’s because the Magma Chamber Simulator IS a macro. The worksheet in and of itself is a macro, it’s not an add-in, it’s written in Visual Basic, *and* because the worksheet itself is the macro – that means that when we’re done using it, we don’t want to save it. And that’s another reason why it’s a good idea to keep a backup copy of our folder structure on hand. So, let’s click “Enable Macros”. You’ll also note that the next pop-up window lists the version of Excel – this means that it is a 100% requirement for you to keep your Excel up-to-date. If you don’t yet have version 16.19 of 2019, or the latest version of 2016, you will need to update your version of Excel in order to work the Magma Chamber Simulator properly.

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So we can click “OK”, and there’s another pop-up window! This is actually a little navigation safety thing that has been built in – this is a security issue, and we actually want this. This helps protect your Mac from viruses, and this allows Excel to communicate with other programs. So we want to navigate until MCS is at the top. So starting at your Documents folder, we’re gonna just select the MCS folder, and click “Choose”. So we want to *choose* the MCS folder. And unfortunately, you will need to do every time we start up the Magma Chamber Simulator – it is slightly inconvenient, but it is much better than having a computer rampant with viruses. And that’s essentially it! We are finished installing the Magma Chamber Simulator. We can close it out – and again, remember, don’t save the file.

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Now there are two other files in here – we can talk about these files a little bit, and we can talk about the rest of the folder structure. We’ve seen the Magma Chamber Simulator main file. There are two other files in this “MCS VBL CODE” folder. The first is the Trace Element Engine, and this is actually a file that runs in the background while you’re using the Trace Elements part of the Magma Chamber Simulator program. You DO NOT want to touch this – don’t open it, don’t disturb it in any way. The MCS Trace Elements program will contact this worksheet and run in the background while it’s doing those calculations. The last file is the Trace Elements & Isotopes part of the Magma Chamber Simulator; it is a separate file. And what essentially happens is the major oxides will be in an output file according to the phase equilibria output of the system. That output is then taken by the Trace Elements part, and used as an input with whatever partition coefficients you desire, to do the trace element calculations in line with the phase equilibria results. And it also does the isotopes at the same time. So again, we want to enable the macros, we have our welcome pop-up window, and again, we do need to give Excel permission to access the MCS folder. And then this is the Trace Elements engine…er… part of the Magma Chamber Simulator. It looks a little bit complicated; we’re gonna get to that in another tutorial video. But for now, we’re gonna go ahead and close, and again – DON’T SAVE.

**6:34**

Navigating back to the Magma Chamber Simulator folder, the first folder we have is “Input & Output”. And what these are, are your input and output files. Your folder structure should come pre-populated with one that says “PROTOTYPE MES”; that file will not work unless you rename it. The rest of the files that you’ll see here up top are input files that I have previously made, and you’ll notice that they all begin with a capital “M”, capital “E”, capital “S”, and an underscore. Every input file must begin with these four characters, or the Magma Chamber Simulator will not be able to read it. There’s also a folder here called “PAR Files” – those are files that store partition coefficients. So, if you go to GERM, you pick out your partition coefficients, you enter them into the Magma Chamber Simulator, and it will give you the option “do you want to save these?”, and it will allow you to create a PAR file so that you don’t have to re-input your partition coefficients every single time. It’s very convenient. And then if you had any output files, they would also be located in this folder.

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The next set of folders we’ll look at are the Magma folder, the Recharge folder, and the Wallrock folder. So the Magma Chamber Simulator runs using three separate subsystems: the Magma, Recharge, and the Wallrock. Essentially, we run MELTS in each one of these subsystems, and allow the different MELTS batch terminals to communicate with each other – via the Magma Chamber Simulator. If you’re like me, and you like using the MELTS output files, you like having those mineral compositions handy, or that liquid composition handy, or you just like the way the melts.out file looks, you can still access them. They are, for each individual subsystem, in that particular folder. What I mean by that, is, that melts.out files for the Recharge subsystem will be located in that Recharge folder. So, what I typically do is at the end of every run, because these files do get written over just like in standalone MELTS, I tend to create a folder. And I might call it “1December\_Test”, and then I would take all of my MELTS output files, and I would move them into that folder. And I typically do this for every subsystem for every run, just because it’s handy to have them on hand, and if you don’t transfer them over before you do the next run, you lose the data forever.

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Now you’ll also notice that I’ve *left* a file in here – in each one of these folders, there is a file called MELTSinput.xsd. I’ll just go ahead and delete these out of here…. And you’ll see that there’s one of those files in each of these three folders. These files NEED to stay where they’re at. There’s also a MELTSinput.xsd and a MELTSoutput.xsd just located in the MCS folder – those also need to stay where they’re at. If you move any of these files, the Magma Chamber Simulator will not work. Again, this is why it’s nice to keep a folder structure on hand.

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Next, the top four batch terminal files are our actual batch terminals for MELTS. They’re labeled according to the version of MELTS that they correspond with. So, the Magma Chamber Simulator can run using p-MELTS, rhyolite-MELTS 1.0.2, 1.1.0, or 1.2.0. If you’re not quite sure which version you need to use, you can go onto the MELTS website, and that’s at melts.ofm-research.org. Navigate down to the bottom, and Mark Ghiorso has kindly provided some instruction as to how to navigate the different versions of MELTS – how to pick which one you choose, and things like that.

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So, the last part of the folder structure are these folders at the bottom, and they start with XML and an underscore. These are folders that temporary files actually pass through during the run – at the end of every run, you will have some files in your XML\_OUT folder and your XML\_PROCESSED folder. And that’s perfectly okay. There’s actually no additional information that are in these files that you need. The Magma Chamber Simulator, at the beginning of every run, empties out these folders. So if there was anything left over from the previous run, they’re automatically cleared out. I do find, however, that if I haven’t manually emptied these folders out after a while, the Magma Chamber Simulator does tend to get a little bit sluggish, so after every about 10 runs I go through and I manually empty out the XML\_PROCESSED and the XML\_OUT folders.

**12:04**

And that concludes our tutorial on how to install the Magma Chamber Simulator for the very first time. In our next video, we’ll show you how to put together an input file for a fractional crystallization run.

**END**