Review for “Depths in a Day”

20-21: depth of magma storage … high-priority information for volcanic observatories that is not currently obtainable on timescales relevant to eruption response: I wonder if this is a stretch. There are several cases with geophysical monitoring and seismic data are fully capable of detecting the depth of magma storage and movement prior to eruption onset. Grindavik for example. What I think would be better is instead highlighting the petrological monitoring aspect.

90: I would have liked to see this method applied to a volcano with much less precise information than Kilauea. Is it possible to either do this, or add on a section where you go through the hypothetical process of navigating a case study with little to no prior information?

108: What about samples without CO2 fluids? As in, samples that are pure melt inclusions? Is the presence of fluids a pre-requisite for this approach?

241-244: I think this goes against your initial paragraph – indeed, this method is not applicable to regions with little to no data, its only applicable to highly active regions that inherently has a lot of available/published data.

245: I’m pretty sure the Venugopal paper was not a Cascades paper, it was a Garibaldi Arc paper – these are two different subduction zones based on the tectonics, chemistry, and age. I think this needs to be updated in your figures too

250: There is no denying that Raman analyses of vapour bubbles is essential to crack the code on CO2 – but if this is a pre-requisite for samples that qualify for your “Depth in a day” aim, then I think there is a big discrepancy here. If pre-determined Raman data is needed, how would you provide magma storage depths? Please correct me if I’m wrong but it seems like there is an inherent positive bias here –systems with lots of data are further spotlighted, and systems with little to no data are made even more inaccessible. This further highlights my point above.

256: I appreciate this point as it addresses my concerns! But what are the range of errors when needing to estimate XH2O? Is it within the capabilities of the depths in a day approach?

259: I think this line is a little too vague and almost feels like an afterthought. I think this needs to be a section on its own. How would datasets with and without prior Raman data subjected to your Depths in a day method compare to solely using mineral-melt thermobarometry?

Overall, I find this to be a great study with broad applicability. My main concerns stem from the sensationalizing of the lack of magma storage depth information from monitoring techniques and the applicability to volcanic systems with little to no prior data (when really its not entirely possible and/or incurs additional error). I also have concerns over sample type – what about systems that predominately erupt via lava flows? Would that qualify for

this approach? Systems like Stromboli – where its very hard/dangerous to access freshly erupted tephra – how would that work? I appreciate the concept, but I feel like the execution is a lot more complicated than this paper makes it seem. Can an EOS be generated for fluids hosted in minerals other than olivine? Or is it specific to olivine hosts?

I feel like in its present state – it is two separate papers that could be expanded upon. Your workflow to calculate depths in a day and the theory behind it is excellent. But I feel like that should be a paper on its own, with the addition of several sections: application to systems without prior raman data, applications to systems that emit lava flows, applications to systems to very little knowledge. Once you've established this, then I feel you could go into detail about global applicability as you have done. I fear that this journal format is not for this paper – either make it longer as a true JPet paper, or publish companion papers and the broad applicability section could qualify for a short JPet paper.