# Supporting Information

Supporting Table 1: Compilation of different solubility models, crustal densities, and handling of bubbles in published cascade melt inclusion studies.

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| --- | --- | --- | --- |
| Reference | Model | Density | Handling of bubbles |
| Aster et al. 2016 | VolatileCalc (doesn’t say, but presume basalt) | Don’t convert to depths | Measure some at VT, |
| Walowski et al. (2016) |  |  |  |
| Walowski et al. 2019 | Isobars overlain with RhyoilteMELTS | Don’t convert to depths | Vol bubble=0.0092 ΔT from rhyolite MELTS, then mol% of CO2 from rhyolite-MELTS, then equation of state for CO2. |
| Quinn, 2014 | Papale et al. 2006 | 2650 kg/m3 | None |
| Ruscitto et al. 2010 | Papale et al. 2006 | 2800 kg/m3 | None |
| Le Voyer et al. 2010 | VolatileCalc (basalt) | Doesn’t say | None |
| Ruscitto et al. 2011 | Papale et al. 2006 | Doesn’t convert to depths | None |
| Bacon et al. 1992 | Cite Newman et al. (1988) | 2200 kg/m3 | None |
| Mandeville et al. 2009 | Moore et al. 1998 | 2300 kg/m3 | None |
| Wright et al. 2012 | VolatileCalc (doesn’t say, but assume rhyolite) | 2200 kg/m3 | None |
| Johnson and Cashman, 2020 | Papale et al. 2006 | 2800 kg/m3 | Vol bubble=0.00923 ΔT from rhyolite MELTS, calculate mol% CO2 using VolatileCalc, |
| Koleszar et al. 2012 | Papale et al. 2006,  Newman and Lowenstern, 1995 | Don’t convert to depths | None |
| Blundy et al. (2005) | Newman and Lowenstern (1995), presume rhyolite from temperature | Doesn’t say | None |
| Blundy et al. 2010 | Newman and Lowenstern (1995), presume rhyolite from temperature,  Papale et al. 2006 | Doesn’t convert to depths |  |
| Venugopal et al. (2020) | Papale et al. 2006 | Don’t convert to depths | Raman analyses, but no instrument-specific calibration. |

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Supporting Fig. 1 – Cascade amphibole data plotted alongside the calibration dataset of Ridolfi (2021). We apply filters based on the cation fraction of Al and Si, as these are the clearest places where our data lies outside the calibration range. Specifically, we exclude data with >6.8 For Si, and <1.1 for Al.

Chart, scatter chart

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Supporting Fig. 2 – Applying the additional filters for Si and Al cation fraction results in a filtered dataset (grey) within the calibration range of Ridolfi, 2021.

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Supporting Fig. 3 – Variation in Cpx-only pressures for different eruptive deposits from Mt. Rainier.

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Supporting Fig. 3 – Correlation between SiO2 and H2O for the 3 most H2O-rich melt inclusions from each volcano.