

Dr. Lowell R. Moore, PhD

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EDUCATION: what I was doing while I learned to use R

Doctor of Philosophy: Virginia Tech, Blacksburg, VA (Geosciences) **2019**

- Title: “*The volatile contents of melt inclusions and implications for mantle degassing, and ocean island evolution*,” Committee Chair: Robert J. Bodnar

Master of Science: Virginia Tech, Blacksburg, VA (Geosciences) **2014**

Bachelor of Science: James Madison University, Harrisonburg, VA (Geology, Math Minor) **2012**

EXPERIENCE: what I was ostensibly doing while writing R code

Lab Manager: Electron Microprobe Laboratory, Virginia Tech **2019 – present**

- Responsible for scheduling, operation, accounting, maintenance, and repair of electron microprobe, scanning electron microscope, and X-ray fluorescence spectrometer.

Research Assistant: NSF-funded volcanology research, Virginia Tech **2016 – 2019**

- Wrote proposals for individual student and collaborative NSF grants to fund research projects
- Prepared and analyzed geologic samples using a variety of microanalytical methods
- Published results in peer-reviewed research in academic journals and at scientific conferences

Invited Lecturer: Carbon forms, paths, and processes, Como Italy **Fall 2017**

- Designed and presented lecture material for an international student audience
- Led students and professors in discussion about the geologic role of CO₂ in the deep earth

Teaching Assistant: Physical Geology, Field Observations, Virginia Tech **2012 – 2015**

- Taught geologic lab and field methods to civil and environmental engineers
- Lecture design, grading lab assessments and writing assignments, lab setup

TECHNICAL SKILLS: tasks requiring the use of R

- **Materials Characterization** (*Electron Probe Microanalysis, Secondary Ion Mass Spectrometry*)
 - **Design & Prototyping** (*Peltier microscope stage, 3D-printed microscope camera*)
 - **Signal Processing** (*Raman spectroscopy, Laser Ablation ICP-MS*)
 - **Statistical Computing** (R: *neuralnet, ggplot2, geoR, raster, regular expressions*)
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SELECTED PUBLICATIONS: delivered using R

Moore, L.R., Bodnar, R.J. (2019) *A Pedagogical Approach to Estimating the CO₂ Budget of Magmas*, Journal of the Geological Society of London. Published online 21 December 2018.

Moore, L.R., Mironov, N., Portnyagin, M., Gazel, E., Bodnar, R.J. (2018) *A comparative study of volatile contents of melt inclusions determined by mass-balance versus experimental homogenization methods*, Journal of Volcanology and Geothermal Research, 358, 124-131.

Moore, L.R., Gazel, E., Tuohy, R., Lloyd, A.S., Esposito, R., Steele-Macinnis, M., Hauri, E.R., Wallace, P.J., Plank, T., Bodnar, R.J. (2015) *Bubbles matter: An assessment of the contribution of vapor bubbles to melt inclusion budgets*, American Mineralogist, 100, 806-823.

Addendum: specific tasks performed using R

- Data filtering: mostly from the GeoRoc database of 100,000s of rock chemical compositions.
- Statistics: characterizing data distributions, measures of normality, hypothesis testing, analysis of variance (ANOVA), bootstrapping.
- Scripting tasks for model optimization and uncertainty calculation (e.g. Monte Carlo simulation)
- Many 2D data visualizations using base R which I prefer, but also a few 2D visualizations with salmon-colored data points on a gray background using **ggplot2** just so I can say I've used it.
- 3D data visualizations using the **rgl** package with **knitr** for HTML embedding
- Nonlinear models (**glm**) for peak fitting and background correction in spectral data.
- Artificial neural networks (neuralnet, from the **neuralnet** package) to predict hard-to-collect chemical data from easy-to-collect chemical data.
- Tree regression (**rpart** package) also to predict hard-to-collect chemical data from easy-to-collect chemical data
- Hierarchical and k-means clustering for pattern matching and image segmentation
- Geostatistics with the **geoR** and **maptools** packages for spatial data (kriging, spatial correlation models)
- Raw file decoding with **hexView**
- Raster image processing with **raster** and **rgdal** packages
- Audio processing with **tuneR**
- Scraping and text processing with regular expressions