# Codi Wiersma

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## EDUCATIONAL EXPERIENCE

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| M.S. in Geosciences | Virginia Polytechnic Institute and State University, Blacksburg, VA | 2017–Present |
| B.S. in Geoscience | Virginia Polytechnic Institute and State University, Blacksburg, VA Geophysics Focus | 2013-2017 |
| A.S. in Engineering | Piedmont Virginia Community College, Charlottesville, VA | 2011-2013 |

## RESEARCH INTERESTS

Tsunamis, Earthquakes, Numerical Modeling
Coseismic tsunami modeling
Geophysics
Geography

## SCHOLARSHIPS

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| Science, Technology, and Engineering Scholarship, Piedmont VA Community College | 2011.07-2013.05 |

## RESEARCH EXPERIENCE

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| Graduate Researcher, The Automation of Numerical Modelling of Coseismic Tsunamis | 2017.07 – Present |
| Undergraduate Researcher, Evaluating the Evolution of the East African Rift System Through the Lava Emissions at Oldoinyo Lengai | 2017.01 –2017.05 |

## TEACHING EXPERIENCE

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| Teaching Assistant, GEOS 2104 Elements of Geology, Virginia Tech (2 Fall '17, 2 Spring '18, 2 Fall '18) | 2017.08 – Present |

## VOLUNTEERING EXPERIENCE

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| VT Graduate Student Assembly Representative | 2018.07-Present |
| Boy Scouts of America | 2011.01-Present |
| Engineering Outreach Expo, Piedmont VA Community College | 2011.07-2013.05 |
| Choose or Lose program, Piedmont VA Community College | 2011.07-2013.05 |

## Presentations

Geoscience Student Research Symposium 2018.02

Presentation on my work as a graduate student up to that point, starting with an introduction into how tsunamis are generated coseismically, followed by how Geoclaw models the propagation of a tsunami wave travelling through an ocean basin. This was followed by an explanation of how the program I have written locates and appropriate number of faults nearest an earthquake relative to the area of failure required of an earthquake of a given magnitude. The presentation then progresses into how the program will constrain the faults into specific geometries, followed by a future works section.

Geoscience Student Research Symposium Up-Goer 5 2018.02

Presentation on my work as a graduate student up to that point using only the 1000 most common words in the english language. This involved several instances of generating a phrase of more common words to approximate the usage of a more specific word or phrase. For example, fault was replaced by 'place with angry broken rocks'. This presentation was intended to allow for increased scientific communication between the scientific community with the greater population through the use of vernacular rather than jargon specific to a field.

Undergraduate Research Poster Presentation 2017.04

Poster presentation given at the National Conference of Undergraduate Research (NCUR). The conference was located in Memphis, TN, and was a non-major specific research conference for undergraduate students. I presented on my undergraduate work on Evaluating the Evolution of the East African Rift System Through the Lava Emissions at Oldoinyo Lengai. In this presentation, by analyzing the chemical composition of various rock emissions, I concluded that the volcanic emissions from Oldoinyo Lengai has been losing silica over the past 200 thousand years. I suspect that the volcano's magma chamber may be cooling below 600 degrees Celsius, indicating the possibility of fractional crystallization of quartz crystals from the melt.

## Research Abstracts

### The Automation of Numerical Modelling of Coseismic Tsunamis

Large earthquakes, typically above a magnitude of 7.0, that occur in a subduction zone located along the edges of ocean basins, generate tsunamis. The effects of such tsunamis are generally widespread, and are a significant coastal hazard. As such, a program will be created that will automate models of tsunami propagation caused by seismic sources. These models will allow a study to be conducted to determine the sensitivity in coastal areas to small changes in a given source earthquake. In the early phase of tsunami generation, as they propagate away from the source area, there is a significant amount of uncertainty regarding the earthquake parameters, such as depth and magnitude. A detailed slip distribution on the fault is also difficult to estimate with a level of confidence. Even long after the event, slip distribution on the fault can vary depending on the data that is employed for inversion. As such, different scenarios will be created, each accounting for a different slip configuration. Preliminary results include the creation of multiple slip configurations, with a single and dual faults that run parallel to the subduction zone, a single and dual series of subfaults that run perpendicular to the subduction zone, and an unconstrained geometry of the closest number of fault sources that correspond to the area required to generate an earthquake of sufficient size. Future work will include the automation of tsunami models that occur from these variations of slip distribution and configuration.

### Evaluating the Evolution of the East African Rift System Through the Lava Emissions at Oldoinyo Lengai

Ol Doinyo Lengai is the only active carbonate volcano on Earth. It is located in Northwestern Tanzania, and is part of the Natron Rift. This rift is the only young rifting system on Earth, and provides a valuable insight into how this type of event occurs, but this system has begun rifting already. Using the geochemistry of the lava produced by Ol Doinyo Lengai and how it has changed over time can provide valuable information as to how the rifting system has evolved up to this point. The volcano experienced a particularly eruptive period during 2007 and 2010 (USGS 2013). A study was conducted by the United States Geological Survey soon after this period was published in 2013, and mapped the geochemistry around the volcano, noting ages by the Ar40/Ar39 method of various outcrops as well as their general composition (USGS 2013). The ages and chemical composition of the samples collected by the USGS indicates that the magma chamber below the volcano has progressively been losing $SiO_2$ over the past 200 thousand years. This indicates that the chamber may be cooling to below 600 degrees Celsius, below the crystallization temperature of quartz minerals. This, as well as the immiscibility of silicic and carbonitic lava, leads me to believe that the magma chamber is undergoing fractional crystallization of quartz, reducing the concentration of $SiO_2$ in the erupted rock samples.

## Work Experience

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| Graduate Researcher | VT Geosciences Department | 2017.08-Present |
| Data Reductionist | VT Transportation Institute | 2016.05-2017.08 |
| Student Manager | VT Dining Services | 2015.04-2016.05 |