



Hailey Mindell, Pennsylvania State University, for her project:
How do Fluids Leave the Slab? An Investigation of the Scales of Reactive Fluid Flow on the Subduction Interface

Hailey is a second year Master's student at Penn State University. Her current work is done with Dr. Andy Smye. She is studying the relationship between fluid-rock interaction, deformation, and metamorphism in an eclogite-facies vein system from the Eclogite Zone, Eastern Alps. During prograde burial and heating, the breakdown of hydrous minerals releases fluid into the subducting slab, and fluids are preserved as vein systems upon exhumation. Veins are mantled by an omphacite-rich selvage, grading to pristine eclogite further from the vein margin. Hailey's study focuses on the textural and compositional changes across the reaction selvage, and she uses a combination of phase equilibria modelling, microtextural analysis, and mineral chemistry to evaluate metamorphic conditions, compositional variation preserved in the selvage, and the temporal relationship between deformation, metamorphism, and fluid flow. Direct constraints on the mechanics of fluid transport within the slab are of high value; models for arc magma genesis require fluid transport from the down-going slab and into the mantle wedge, and the release and movement of such fluids are thought to play a pivotal role in generating and modulating subduction zone seismicity.

Hailey received a BS in Geology from Clemson University in May 2019. She worked with Dr. Lindsay Shuller-Nickles for her undergraduate research, which was a quantum-mechanical study in computational mineralogy. Hailey used the Linux program VASP to perform density functional theory (DFT) calculations on varied atomic and spin configurations along the Ba,Cs Fe-doped hollandite solid solution. The goal of the work was to evaluate the characteristics of hollandite for use as part of a polycrystalline ceramic waste form, with the purpose of storing radioactive Cs from nuclear waste streams.

Hailey's research interest is piqued by a fascination with mineral chemistry and a desire to help improve human safety, whether that be by evaluating storage solutions for high level nuclear waste or improving the scientific understanding of subduction zone seismicity. When Hailey isn't working on her research project, she loves to hike, write novels, and create digital art in Adobe Illustrator.