A RESEARCH PROPOSAL FOR THE TOMOGRAPHIC IMAGING AND INTERNAL STRUCTURE INVESTIGATION OF MOUNT EREBUS VOLCANO, ANTARCTICA

Hunter A. Yarbrough, New Mexico Institute of Mining and Technology

Seismology offers a great number of high-resolution geophysical techniques for imaging the interior of the earth. Volcanic regions comprise some of the most attractive targets for these seismic techniques, in that they are expected to contain a rich assemblage of theoretically imagable features associated with their history and ongoing magmatic, hydrothermal, and deformational processes. However, the task of the volcano seismologist is not simple because these regions also present many of the most difficult environments to apply seismic techniques. These difficulties arise due to high attenuation, complex internal structure (which leads to prolific scattering), and the presence of a large variety of potential source mechanisms associated with solid, liquid (magmatic, hydrothermal, gas), and combined processes that reflect mass transport as well as pressurization and deviatoric stresses.

During the past 10 years, a few of Earth’s persistently active volcanoes have been monitored at unprecedented levels by a new generation of broadband seismic and infrasonic instrumentation. One such volcano, Mount Erebus, constitutes an especially accessible (despite its Antarctic location) volcano laboratory for long-term monitoring and investigation of eruptive and other behavior. Although Mount Erebus has been extensively studied in terms of its geochemistry, eruptive phenomenology and physics, impacts on the atmosphere, and geochronology, tomographic imaging has not been previously conducted on a scale with suitable resolution to identify distinct conduit structure or magmatic chambers within the volcano. I propose that a more accurate velocity model and tomographic image can be created by utilizing diverse seismic signals recorded on the currently deployed extensive IRIS PASSCAL broadband temporary network, the permanent network, and supplemental temporary IRIS PASSCAL short period stations.

Biographical Sketch:

Hunter is a graduate of the Colorado School of Mines, where she obtained a B.S. in Geophysical Engineering and a minor in the McBride Honors Program for Public Affairs. Upon graduation from CSM, Hunter took a project engineer position with Olson Engineering, a nondestructive testing firm, in Wheat Ridge, CO. This position allowed her to work all over the world inspecting both old and new civil structures, including the levees that broke after Hurricane Katrina. After working for this company for 2 years, Hunter decided to leave Colorado and come back to her home state. She is presently working with Dr. Rick Aster and Dr. Phil Kyle at New Mexico Tech on imaging the internal structure of Mount Erebus.