EASEL #44: Feasibility of Drone Use in 3D Geologic Mapping Daniel Bochicchio (Earth and Space Sciences) Faculty Mentor: LeeAnn Srogi

Collecting aerial imagery with drones/UAVs (Unmanned Aerial Vehicles) rather than manned aircraft in order to create orthomosaic images and Digital Elevation Models (DEM) is becoming a routine practice for data collection throughout the geologic industry. The primary goal of this research is to determine the feasibility of combining drone imagery and photogrammetry to create 3D models of rock features that are difficult to access on foot. This information is highly valuable to geologists that operate the diabase quarry in Elverson, PA, where the research is being conducted. The targeted feature is a mineral layer that may extend laterally for several meters but is thin, no more than 1-5 cm thick. Using a DJI Inspire 1 drone and integrated 4K resolution camera, pictures have been taken from all orientations of the target. Those pictures are assembled using photogrammetry software which creates a 3-dimensional mosaic based on the orientation of each photo. This layering is of interest to igneous petrologists seeking to understand how magma crystallizes. Current results and observations show that a specific combination of modeling software and targeted geologic features can produce models of varying degrees of accuracy. Moving forward, more modeling techniques will be implemented to determine the "best-fit" solution to this type of survey. Because of the cost and multi-use functionality of drone surveying, this will likely be the predominant practice of non-invasive and non-destructive analysis in the near future.