Measurements of stratigraphic columns and cross-sections are commonly determined by stratigraphers. Although traditional approaches yield valuable data, they can be time-consuming and labor-intensive, especially when dealing with small or remote exposures. Digital photography and photogrammetry offer alternative methods that can be used to create 3D models of stratigraphic columns, which can then be used to measure beds and other lithological units. The study area chosen for this project was the Hagan railroad cut in southwest Virginia, USA, which contains Silurian strata that were previously studied by Ginn (2014). The objective of this study was to compare drone-based photogrammetry to traditional methods and determine the accuracy and reliability of this new approach.

**INTRODUCTION AND STUDY AREA**

The Hagan railroad cut is situated on the Blue Ridge Escarpment in southwest Virginia, USA. The outcrop is known as a key stratigraphic unit that contains a complete sequence of the Silurian Clinch Formation. The stratigraphic column was previously measured using traditional methods (Ginn, 2014), allowing us to compare drone-based methods with conventional techniques.

**DRONE-BASED MEASUREMENT OF STRATIGRAPHIC COLUMNS AND CROSS-SECTIONS**

A drone point cloud was created from the collected images using Agisoft Photoscan. The drone images were digested using the high-alignment setting to produce a sparse point cloud, which was then re-sampled to a more detailed point cloud, allowing for the creation of a robust model. The drone point cloud was then edited to remove unnecessary features, such as the drone and trees. The point cloud can then be used to produce a 3D mesh for visualization, or as input for other geoscientific applications, such as orientation and scaling.

**STEP 2: GENERATE 3D POINT CLOUD**

For stratigraphic column measurement, the 3D point cloud was exported to a Google Earth model, which was then used to orient the data. For stratigraphic section measurement, the 3D point cloud was exported to a Google Earth model, which was then used to orient the data. For stratigraphic section measurement, the 3D point cloud was exported to a Google Earth model, which was then used to orient the data. The drone point cloud was then edited using the high-alignment setting to produce a dense point cloud. The dense point cloud was then merged into a photomosaic using the high-alignment setting. The photomosaic was then exported to a high-resolution image format.

**STEP 3: IDENTIFY BED**

Digital measurement of stratigraphic columns requires that the model first be rotated such that beds are horizontal. This can be accomplished using photogrammetry software, which can rotate an image to achieve a desired orientation. Bed boundaries are then identified using a combination of visual inspection and measurement tools. The result is a 3D model that can be used to measure beds and other lithological units.

**STEP 4: CREATE AND ROTATE PLANE**

The 3D model can then be rotated to a desired orientation using a virtual reality (VR) headset. The model can then be measured using a 3D scanner, allowing for the creation of a high-resolution model that can be used for further analysis.

**STEP 5: MEASURE SECTION**

The model and the point cloud are then combined to create a 3D model of the stratigraphic column. The model can then be measured using a 3D scanner, allowing for the creation of a high-resolution model that can be used for further analysis.

**CONCLUSIONS AND ADVICE**

Drone-based photogrammetry offers a new and improved method for measuring stratigraphic columns and cross-sections. It is a powerful tool for geoscientists, allowing for the accurate measurement of stratigraphic units and the creation of 3D models that can be used for further analysis. However, there are several factors to consider when using drone-based photogrammetry. First, the drone must be flown appropriately, avoiding uneven lighting, heavy shade, or facing into bright sun. Second, the drone must be flown at a consistent altitude and speed, which can be achieved using automated flight modes. Third, the drone must be flown at a consistent altitude and speed, which can be achieved using automated flight modes. Fourth, the drone must be flown at a consistent altitude and speed, which can be achieved using automated flight modes. Finally, the drone must be flown at a consistent altitude and speed, which can be achieved using automated flight modes. Despite these challenges, drone-based photogrammetry offers a new and improved method for measuring stratigraphic columns and cross-sections. It is a powerful tool for geoscientists, allowing for the accurate measurement of stratigraphic units and the creation of 3D models that can be used for further analysis.