

VIRTUAL FIELD TRIP TO THE VACA MUERTA FORMATION, ARGENTINA

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PROJECT OBJECTIVES

- Provide the opportunity to visit the outcrops of the Vaca Muerta Formation in the Puerta Curaco area in the form of an “Interactive Multiuser Virtual Reality” field trip.
- Explore georeferenced content such as measured lithologic sections, short cores, detailed photographs in the context of their realistic location within a textured high-resolution 3D digital elevation model (DEM).

PROJECT RATIONALE

Communicating geologic findings or teaching basic geologic concepts requires integrative communication in the field in addition to merely reporting results in a paper. COVID-19 restrictions on travel have made it difficult to impossible to perform field geology and/or provide opportunities to visit outcrops during geologic field trips. Virtual reality (VR) fieldtrips can partly replace the outcrop-based knowledge transfer. To provide the 3D information available at outcrop, a virtual environment needs to be in 3D and integrated with supplemental data.

APPROACH

We will use drone images collected from the Puerta Curaco outcrops using a small, unmanned aircraft system (sUAS, or drone) to construct a high-resolution 3D digital elevation model (DEM). The models will be populated with georeferenced supplemental information, including measured lithologic sections, measured

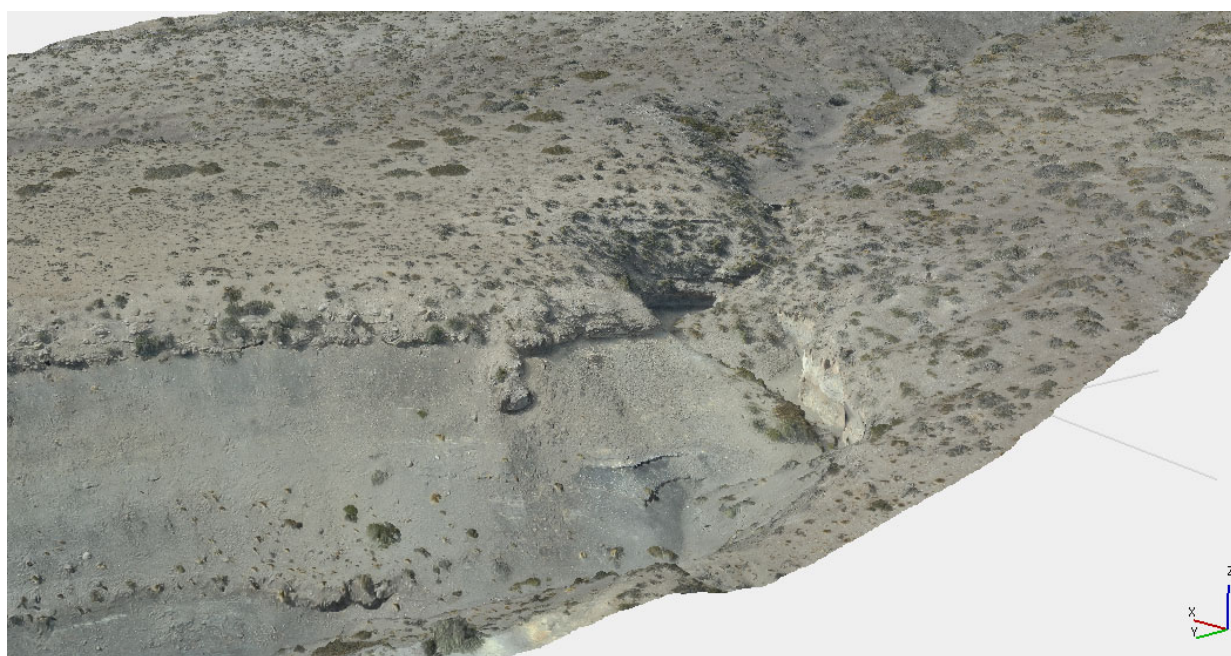


Figure 1: Drone image-based 3D Model of outcrop at Puerta Curaco.

geochemical data, detailed photographs, core descriptions, core photographs, and photomicrographs. We explore the software package of 3D Gaya (imagedreality.com) as the virtual environment that enables the integration of outcrops and supplemental data into a photorealistic environment. This platform provides virtual 3D views that can illustrate dimensions, textures, and lateral connectivity not possible in regular 2D presentations.

GOAL AND SIGNIFICANCE

This approach will facilitate knowledge transfer and enable participants to perform their own analysis and extract information from the models within the VR environment. They will be able to measure and trace features and share their interpretations in real time with others in the virtual environment.

Although virtual reality field trips will never be an alternative to real field work, they provide an integrated learning environment that can serve as an alternative to real field trips while travel is difficult or impossible. In addition, this technique can be incorporated in short courses to provide a 3D illustration of learning points in the classroom environment.