

## **3D Geological Mapping Using Unmanned Aerial Vehicle (UAV) (Wadi Bani Awf and Qarn Alam Salt Dome)**

**Mohammed S. Al Sulaimani<sup>1</sup>, Rachid Rahmoune<sup>1</sup>, Suleman Al Harthy<sup>1</sup>, Afifa Al Mawali<sup>1</sup>, and Khadija Aisari<sup>1</sup>**

<sup>1</sup>Geomatics, Petroleum development Oman, Muscat, Oman.

### **ABSTRACT**

The study of surface manifestation of subsurface geology is a technique in modeling exploration and development of hydrocarbon reservoirs. As surface geology and structures such as faults, folds, source and reservoir rock units can be mapped successfully, and correlated with subsurface information derived from seismic and well data. This understanding of the subsurface from the surface geological mapping is a key to successful development of hydrocarbon reserves in the EP business. In PDO, surface geological mapping primarily involves hiking and rock climbing in order to take measurements and record observations. In a bid to drive continuous improvement through technology, a Geomatics solution which involved the use of Unmanned Aerial Systems was employed as the principal mapping solution. Geomatics team took up the challenge to provide a low cost, HSE-friendly, reliable and high quality 3D mapping solution using AscTec Falcon 8 (Quad copter of Unmanned Aerial Vehicle (UAV)). A trial in March 2016 over Wadi Bani Awf (North of Oman) was conducted to evaluate the effectiveness of this technology solution. The purpose of this is to reduce time spent in field mapping, access larger and challenging areas, reduce cost and HSE exposure of personnel and equipment involved in mapping. After proving this technology another project was carried over Qarn Alam Salt Dome in April 2017. The Survey involved taking high resolution aerial photos over rock outcrops, generation of 3D models of the full section of rock formations. This is done in order to visualize and measure the rock geometries, debris flow, understand the flow behavior, identify the sedimentary features and identify clearly the faults and folds. In collaboration with colleagues from Geological team a total of thousands of photos were obtained, analyzed and measurements taken to extract structure information from Wadi Bani Awf and Qarn Alam Salt Dome. A typical mapping expedition of these areas would have taken a couple few weeks and hiking in challenging mountains to complete. However, mapping with the Falcon 8 was completed with very minimal climbing and hiking. The quality and quantity of imagery data, value added products, and clarity of geological interpretation revealed that higher quality deliverables at lower cost is achievable using existing resources, stronger collaboration between teams and the enterprise to push the limits of technology.