



Elevating accuracy – using an eBee to boost a micro-gravity survey's precision

When MWH Geo-Surveys International was employed to conduct a micro-gravity survey of an Omani mine site, the company's eBee drone was the only solution capable of producing the high-resolution elevation model the client required.

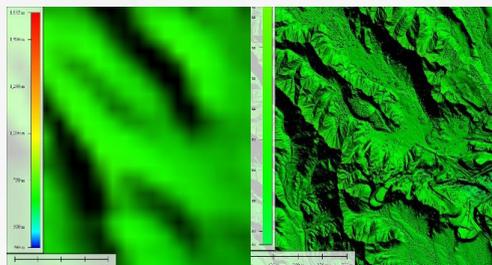
The Al Ram Chromite Mine in Oman is operated by Al Tamman Trading Establishment, which in 2015 contracted MWH Geo-Surveys International to run a micro-gravity exploration survey of its site.

The goal of the survey was to map sub-surface chromite veins. The result would allow MWH Geo-Surveys to create a targeted drill program to identify the location and depth of chromite veins for future mining operations.

A critical element in high-resolution gravity surveys is being able to accurately calculate and correct for local topography, which is particularly important in areas of difficult, complex terrain such as the Al Ram site. "Our gravity surveys require precise RTK GNSS surveying at each gravity measurement point," says Kevin MacNabb, a founding partner and owner of MWH Geo-Surveys. "In order to produce a micro-gravity survey in an area of difficult topography a high-quality, high-resolution DEM is essential."

Filling the data gap

According to MacNabb, the conventional options for obtaining a digital elevation model (DEM) of the site were limited.



A screenshot of the existing SRTM DEM of the site, with a resolution of 90 metres (left), and a screenshot of MWH Geo-Surveys' drone-produced DEM, at 1 metre resolution (right).

Additionally, MacNabb says that the site has never been surveyed using traditional instruments. Thus MacNabb turned to MWH's senseFly eBee drone, which the company purchased for exactly this type of data collection. "The drone allows us to create cost effective, high resolution DEMs and orthophotos, solving a technical problem very effectively," he says.

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Drone methodology

When configuring the survey's flights using the eBee's supplied eMotion software, MacNabb and co. set the ground resolution to 6 cm per pixel, for a flight altitude of 195 m above the take-off point.

As for image overlaps, MacNabb used eMotion's default overlap setting, of 60% lateral and 75% forward. "However," he adds, "we overflew the core areas multiple times, in different directions, to ensure the best overlap and accuracy possible."

The team flew 11 eBee flights in total, aerially surveying a total area of 6.5 km².

The project's UAV flights took three days followed by several days of data processing in the office using Pix4D photogrammetry software to transform 2,398 images into the required DEM. This elevation model was then ortho-rectified by identifying pre-surveyed ground control targets.

Accuracy the answer

The DEM had an average absolute vertical accuracy of 10 cm. This was calculated by comparing the eBee's data to more than 10,000 surveyed RTK GNSS positions, recorded at the gravity survey's site.

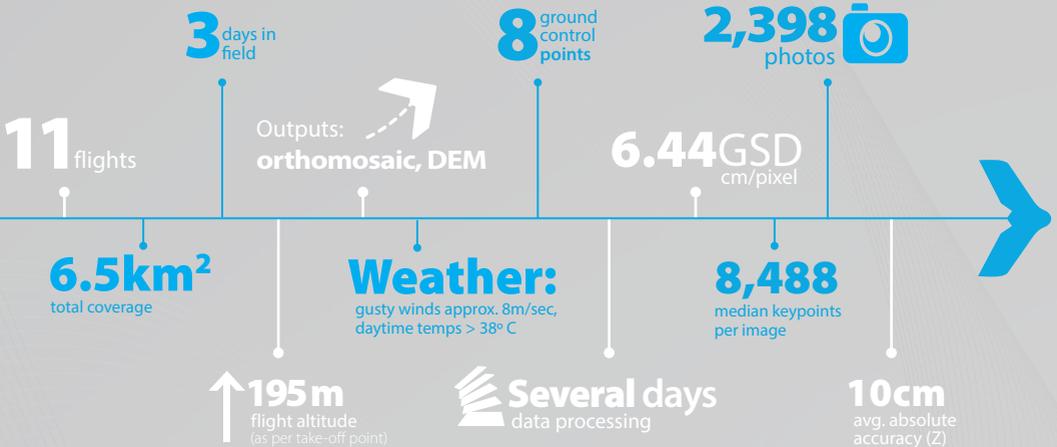


The Al Ram Chromite Mine's final 3D DEM with overlaid orthophoto.

"An effective micro-gravity survey at such a rugged and highly irregular site wouldn't have been possible without an extraordinarily accurate elevation model," MacNabb says. "With the drone's model, we were able to compute terrain corrections to the gravity field with an unprecedented level of accuracy. This in turn allowed our subsequent gravity model to map subsurface changes much more precisely, including those caused by small, thin chromite veins."

At a client service level, MacNabb points out that, "the eBee allows us to utilise our geophysical surveys to better effect, at a competitive cost, proving our exploration clients with a superior product. Customers like Al Ram also benefit by receiving a 3D orthophoto of the survey area, which they can then use for any number of GIS applications"

PROJECT STATISTICS



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