# Towards an operational processing workflow of UAS imagery for environmental monitoring

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**Abstract:**
The Environmental Research Institute of the Supervising Scientist (***eriss***) undertakes monitoring and scientific research into the impact of uranium mining on the environment of the Alligator Rivers Region of Australia's Northern Territory, across a range of disciplines. To support these activities, ***eriss*** established a program in 2014 for unmanned aerial systems (UAS) to obtain very high spatial resolution, remotely-sensed data, complementary to the traditional aerial photography and satellite imagery datasets which were already being utilised. Additional platforms and sensors have since been added to the ***eriss*** fleet. The UAS program has flown numerous missions to date, capturing colour (RGB), near-infrared (NIR), and multispectral (MS) data at sub-5cm spatial resolution. This has resulted in a large amount of raw image data that requires storage and pre-processing before analysis and comparisons can commence.

The pre-processing of such data requires a robust and repeatable workflow to enable the observation and measurement of temporal changes in the landscape. In establishing our workflow, a number of steps have been refined over time, including flight planning and pre-processing to suit our specific requirements. The selection of UAS platform and sensor combinations to suit the location and study purpose, adequate flight planning, and the placement of ground control points (GCP) and radiometric calibration targets are all integral to pre-processing, as is the correct formatting of UAS flight logs and GCP data. For our purposes, we have established that while a number of Structure-from-Motion (SfM) photogrammetry packages are capable of producing orthomosaics and surface models, additional software products are often required to improve or more effectively perform some stages of the pre-processing and photogrammetry workflow. Typically, for example, corrections need to be applied to address lens distortion and sensor characteristics. Finally, in almost every instance the resultant orthomosaic requires further manual editing to improve results prior to exporting into image analysis software.

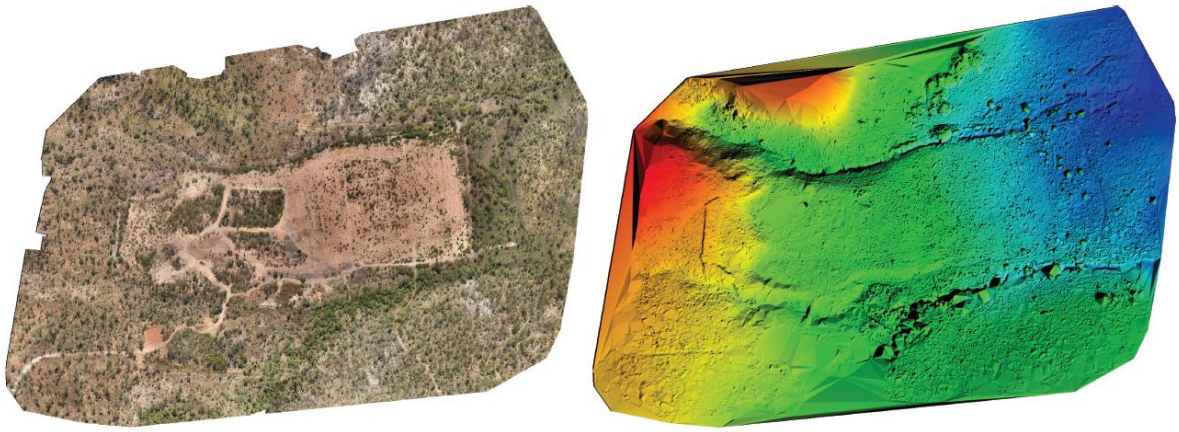

*Figure 1. Preliminary orthomosaic and Digital Surface Model (DSM) for the former Jabiluka mine site, created from 364 individual UAV images acquired on 10th July 2015.*