

# MAPPING WITH STRINGS ATTACHED

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## Image processing

was performed with Agisoft PhotoScan, a computer vision software application that generates three-dimensional data from a set of overlapping, uncalibrated still photographs (Figure 3; Verhoeven 2011). The software uses structure from motion (SfM) and dense, multiview stereo reconstruction techniques to generate a 3-D mesh model of the imaged surfaces. The model may be georeferenced using ground control points and exported as a digital elevation model (DEM) or textured to produce an orthophoto mosaic.

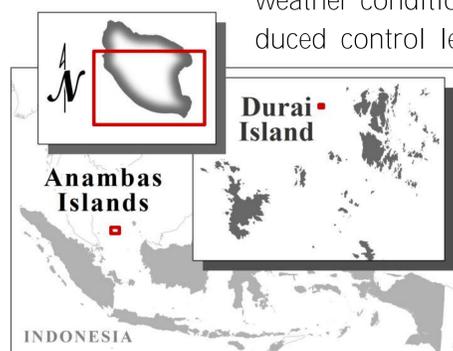
## DIGITAL MODEL STATISTICS

TOTAL NUMBER OF INPUT PHOTOS: 367  
NUMBER OF GROUND CONTROL POINTS: 38  
AVERAGE GROUND RESOLUTION: 3 CM/PIXEL  
ROOT MEAN SQUARE ERROR: 1.41 M

## Advantages of KAP

over conventional (aircraft-based) methods of collecting aerial photographs include the comparatively low cost of equipment, short assembly and disassembly time, limited level of experience necessary, and ease of portability to remote locations.

Disadvantages include dependence on local weather conditions and reduced control leading to unpredictable results.



## DURAI ISLAND

IMAGERY DATE: 4 & 7 JULY, 2011  
MAP DATE: 8 APRIL, 2013

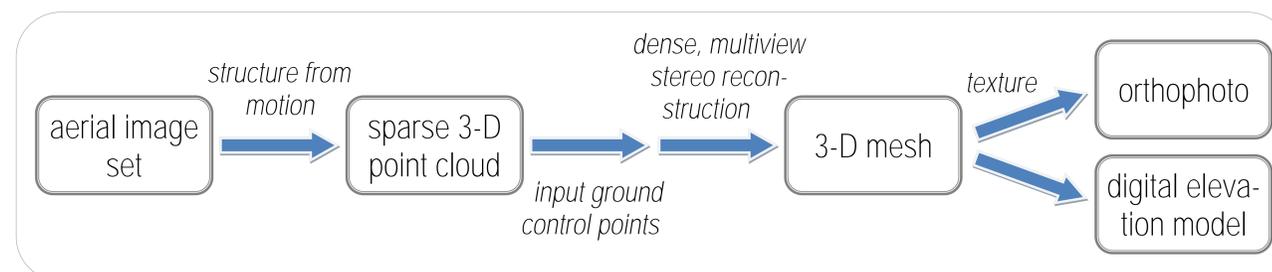


Figure 3. Workflow for creating an orthophoto and digital elevation model from a set of overlapping aerial photographs. Italics indicate software processing techniques (top) or user input steps (bottom).

Kite Aerial Photography (KAP) has been used to collect images of the earth's surface since the 1880s (Aber 2008). Today, lightweight digital cameras and a variety of image processing software make KAP an appealing technique for generating geospatial data on a budget. From digital elevation models to GIS-ready basemaps, KAP offers compelling reasons to go fly a kite.



Figure 1. Data collection in the Anambas Islands, Indonesia, July 2011.

Coral reefs in the Anambas Islands, Indonesia were the subject of a case study using KAP during the summer of 2011. Aerial images and GPS-derived ground control points were collected along the coastline of Durai Island and processed to create a georeferenced orthophoto mosaic (see "Image processing", left). In conjunction with georeferenced underwater survey data, the orthophoto mosaic will be used to study the reef's geomorphology and biotic community structure.

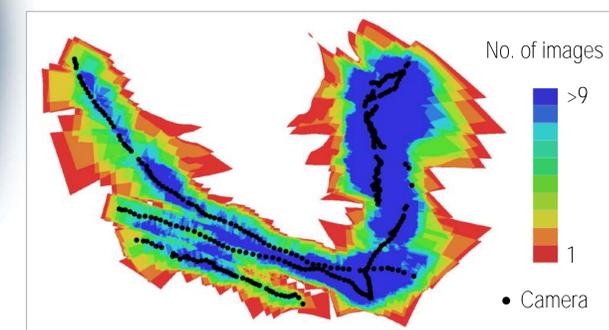


Figure 2. Image density and estimated camera positions.

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## References

- Aber, J.S. 2008. History of Kite Aerial Photography. <http://www.geospectra.net/kite/history/history.htm>. Retrieved on 4 April 2013.
- Verhoeven, G. 2011. Taking computer vision aloft—archaeological three-dimensional reconstructions from aerial photographs with PhotoScan. *Archaeological Prospection* 18 (1):67-73.

