

UAV Based Very-High-Resolution Imaging on Barton Peninsula Antarctica

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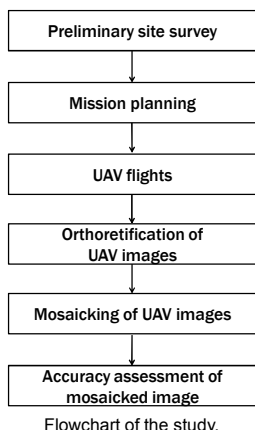
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1. Introduction

UAV capable of shooting in low-altitude with an advantage of taking a high-resolution is economical and accessible way of obtaining images compared to satellite and conventional aerial photography. In this study, UAV imaging was performed to obtain very-high-resolution images in restrictive environment of Antarctic in Jan 2014. The target area was nearby the King Sejong station located in Barton Peninsula, Antarctica.

As flight results, mosaicked orthoimages was produced with an extent of about 3.1 km² around the King Sejong station. The UAV based imaging which could take very-high-resolution images economically in restricted areas as polar regions compared to satellite and aerial photography will be used to various fields of study.



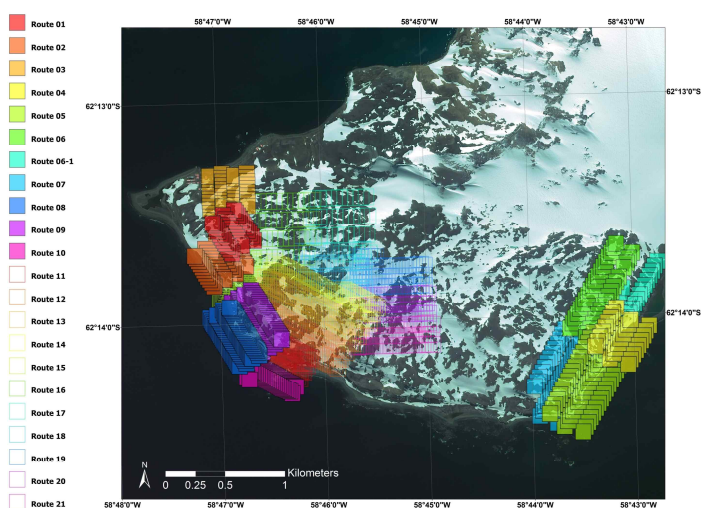
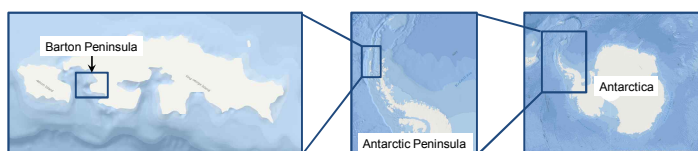
2. Methods

2.1 Specification UAV and Sensor

The UAV used in the study was an Octocopter. The UAV consists of a control system, a data modem, a camera gimbal and a monitor, and it was equipped with GPS/INS and IMU, and a Canon EOS 5D Mark III camera. True color (red, green and blue) images were obtained and the size of image was 5,760 × 3,840 pixels.

2.2 Flight Mission Planning

Flights considering unexpected weather condition of Antarctica were planned with combination of 22 courses, flights altitude of 100 m, forward overlap of 70% and lateral overlap of 30%. A flight system with the software based on Google Earth was used and automatic flight was performed.



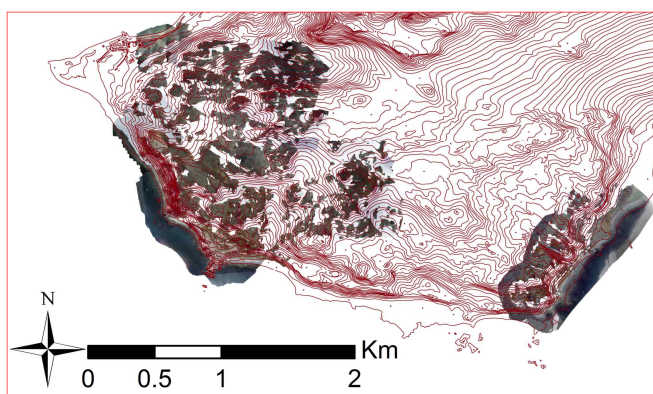
Planning of UAV flight courses in Barton peninsula, Antarctica.

References

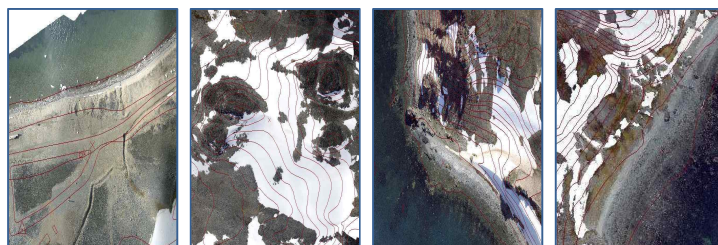
- [1] Lambers K, H Eisenbeiss, M Sauerbier, D Kupferschmidt, T Gaisecker, S Sotoodeh & T Hanusch, 2007. *Combining photogrammetry and laser scanning for the recording and modelling of the late intermediate period site of Pinchango Alto, Palpa, Peru*. Journal of Archaeological Science 34, 1702-1712.
- [2] Laliberte A S, J E Herrick, A S Rango & C Winters, 2010. *Acquisition, orthorectification, and object-based classification of Unmanned Aerial Vehicle (UAV) imagery for Rangeland monitoring*. Photogrammetric Engineering & Remote Sensing 76, 661-672.

3. Results

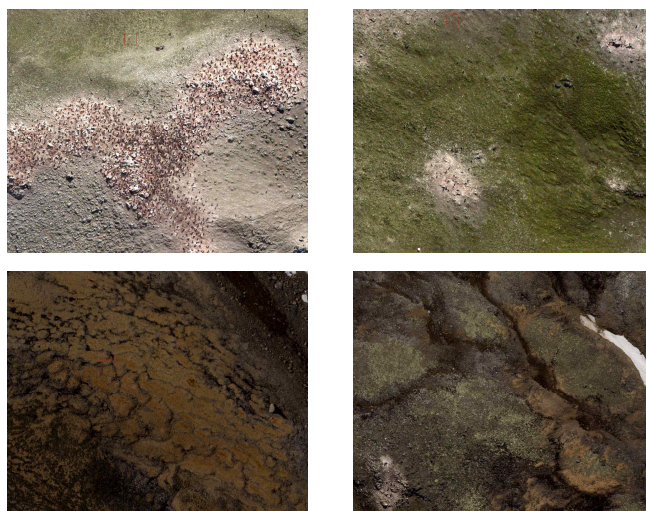
As the flight results, about 1,500 images of spatial resolution of about 2 cm was obtained with location and attitude information. In preprocessing steps, brightness adjustment and geometric correction were performed to produce orthoimages. Mosaicked orthoimages were produced with an extent of about 3.1 km² around the King Sejong station. Quality of the mosaicked image was evaluated by overlapping 1/5,000 digital topographic map and KOMPSAT-2 satellite images of 1 m spatial resolution. Coastline, building outlines, and topographic ridges were compared between datasets.



A comparison between the mosaicked UAV image and the topographic map.



Detailed comparison of coastlines and topographic ridges.



Penguin colony and vegetation in mosaicked UAV image

4. Conclusions

The results of this study indicate that UAV images for polar regions monitoring show good accuracy. The UAV based imaging which could take very-high-resolution images economically in restricted areas as polar regions compared to satellite and aerial photography will be used to various fields of study, such as studying distribution of plants and animals or producing environment maps.

Acknowledgement

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