Aerial Photo Data Provision Using Small Format Aerial Photography and Ground Control Point: Case Study Parangtritis Tropical Sand Dunes, Indonesia

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Abstract: The endangered condition of sand dunes in Parangtritis, Java Island, Indonesia is getting more critical. Several pressures of land use change i.e. reforestation, building development, as well as illegal mining threatens the existence of one of scarce tropical barchan sand dunes in this world. The provision of aerial photography regularly becomes an important factor that must be held to support sand dunes reservation process and to support stakeholders' policy. This research aims to provide qualified, rapid, and affordable spatial data that can be used for high-resolution spatial analysis. Small format aerial photography (SFAP) has been used to provide high-resolution spatial data for a limited coverage area. However, the geometric accuracy of the SFAP is yet to deal with large scale mapping criterion. Thus, an integrated ground control point (GCP) process with SFAP can be used to cope with this condition. SFAP in this research is derived from aerial photography using a fixed-wing unmanned aerial vehicle (UAV) with a SONY Alpha 5000 camera as payload. The payload has 23.2 x 15.4 millimetres sensor with 20-megapixel resolution and flies in 300 metres altitude above the terrain. The GCP process is conducted by combining two processes namely premarking and postmarking. The premarking points are distributed in bare land area (sand dunes), while postmarking points is selected among existing objects that can be clearly seen from the aerial photo. The final spatial resolution that is generated after the mosaic process is 0.57 metres, while the geometric accuracy results from 12 GCP points is 0.81 of RMSE. The aerial photo is panchromatic and can be used for visual analysis and classification as well as for digital image processing.

Keywords: small format aerial photography, ground control point, UAV, sand dunes