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Geometric quality assessment of multi-rotor UAV-borne Remote Sensing product for Precision Agriculture (PA)

Sub-meter level spatial resolution remote sensing products are essential for Precision Agriculture (PA) applications. Recent development of Unmanned Aerial Vehicle (UAV) with imaging sensors provides opportunity to generate sub-meter level, timely, and cloud free remote sensing products. This study is a preliminarily assessment of a multi-rotor UAV with consumer grade optical camera and five spectral band multispectral camera for PA applications especially in geometric aspect. The UAV was flown over the agriculture area and images from both cameras were acquired and Digital Surface Models (DSM) and Ortho-Mosaics were derived from the collected image data. Geometric and visual quality of the derived products were assessed and limitations were identified regarding to PA applications. The optical camera images derived 2.1 cm spatial resolution orthomosaic while multispectral ortho-mosaic from the UAV multispectral images gave 5.6 cm spatial resolution. The horizontal geometric accuracies of the optical camera product and multispectral camera product were 2 pixels and less than one pixel respectively. Relative average elevation difference of agriculture crop area and non-crop area were 0.27 m and 0.14 m in derived DSM from optical images and multispectral images respectively. Blurriness of the UAV-borne images was identified as a limitation of the UAV remote sensing exercise and UAV motion blur, cloud shadow, and wind were noted as possible causes for the blurriness in this study.

Keywords: UAV, Precision Agriculture (PA), Geometric Accuracy, Blurriness, Ortho-Mosaic, Digital Surface Model (DSM)