

EVALUATION OF SKYBOX VIDEO AND STILL IMAGE PRODUCTS

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ABSTRACT:

The SkySat-1 satellite launched by Skybox Imaging on November 21 in 2013 opens a new chapter in civilian earth observation as it is the first civilian satellite to image a target in high definition panchromatic video for up to 90 seconds. The small satellite with a mass of 100 kg carries a telescope with 3 frame sensors. Two products are available: Panchromatic video with a resolution of around 1 meter and a frame size of 2560x1080 pixels at 30 frames per second. Additionally, the satellite can collect still imagery with a swath of 8 km in the panchromatic band, and multispectral images with 4 bands. Using super-resolution techniques, sub-meter accuracy is reached for the still imagery. The paper provides an overview of the satellite design and imaging products. The still imagery product consists of 3 stripes of frame images with a footprint of approximately 2.6 x 1.1 km. Using bundle block adjustment, the frames are registered, and their accuracy is evaluated. As the images are delivered with a physical sensor model as well as RPCs, the accuracy of both orientations are compared. Image quality of the panchromatic, multispectral and pansharpened products are evaluated. The video product used in this evaluation consists of a 60 second gazing acquisition of Las Vegas. A bundle block adjustment of all 1800 images is performed. Using publicly available information, georeferencing accuracy of the video product is evaluated. A DSM is generated by dense stereo matching. Multiple techniques such as pairwise matching or multi image matching are used and compared. As no ground truth height reference model is available to the authors, comparisons on flat surface and compare differently matched DSMs are performed. Additionally, visual inspection of DSM and DSM profiles show a highly detailed reconstruction of small features and large skyscrapers.

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