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Exploiting Satellite Focal Plane Geometry for Automatic Extraction of Traffic Flow from Single Optical Satellite Imagery

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Abstract. The focal plane assembly of most pushbroom scanner satellites is built up in a way that different multispectral or multispectral and panchromatic bands are not all acquired exactly at the same time. This effect is due to offsets of some millimeters of the CCD-lines in the focal plane. Exploiting this special configuration allows the detection of objects moving during this small time span. In this paper we present a method for automatic detection and extraction of moving objects – mainly traffic – from single very high resolution optical satellite imagery of different sensors. The sensors investigated are WorldView-2, RapidEye, Pléiades and also the new SkyBox satellites.

Different sensors require different approaches for detecting moving objects. Since the objects are mapped on different positions only in different spectral bands also the change of spectral properties have to be taken into account. In case the main distance in the focal plane is between the multispectral and the panchromatic CCD-line like for Pléiades an approach for weighted integration to receive mostly identical images is investigated. Other approaches for RapidEye and WorldView-2 are also shown. From these intermediate bands difference images are calculated and a method for detecting the moving objects from these difference images is proposed.

Based on these presented methods images from different sensors are processed and the results are assessed for detection quality – how many moving objects can be detected, how many are missed – and accuracy – how accurate is the derived speed and size of the objects. Finally the results are discussed and an outlook for possible improvements towards operational processing is presented.

Conference paper (PDF, 3281 KB)

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