

Using Advanced Image Fusion Techniques To Increase The Usability Of Razaksat Data For Map Updating In The Tropics

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Abstract: Razaksat is a high resolution Malaysian remote sensing satellite launched on 14th July 2009. It is a unique satellite system since it operates in a near-equatorial orbit with a low inclination angle of 9°. This enables the satellite to cover the equatorial region 14 times a day, a pre-requisite to optimize the possibility of obtaining cloud-free data. Previous work on this data has resulted in an overall accuracy of 94% for level-3 land use maps containing six land use classes for a case study area in the region of Melaka, Malaysia. This paper reports on advanced image processing techniques used to process the medium-sized aperture camera data including one panchromatic and four multispectral bands. In order to improve the usability of Razaksat imagery for map updating new methods of image fusion (i.e. Ehlers fusion method) are applied prior to image interpretation and classification. The Ehlers technique has shown great potential in the past using Intensity Hue Saturation (IHS) and Fast Fourier Transform (FFT) to increase the spatial resolution of satellite imagery whilst maintaining the spectral resolution and quality of the data. The goal of the study described in this paper is to increase not only the accuracy of land use mapping in general but to improve the level of object identification for urban areas using Razaksat data. Different applications require different approaches to highlight features that are of most importance to this application. Therefore this study aims at providing application oriented processing flows to make the most of the images available. The performance of the image fusion techniques will be evaluated in two ways: 1. Visual interpretation in particular for urban area map updating and 2. Using the outcome of the classification for the different classes. All this is done in the prospect of making optimum use of data obtained from the planned Razaksat-2 to be launched in 2015. The advantage of Razaksat is its orbit that was especially designed to obtain a high re-visiting frequency for the areas along the equator that usually suffer from high cloud coverage. Because of the high repetition rate of image acquisition the probability to obtain images with less cloud coverage increases drastically. The research is carried out by a team of experts in the fields of remote sensing data exploitation, environmental application, tropical forest monitoring and water security.

Keywords: Razaksat, Image Fusion, Pansharpening, Classification, Quality Assessment, Tropics