

- Title:** Investigating the application of pixel-level and product-level image fusion approaches for monitoring surface water changes
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- Abstract:** The aim of this paper was to investigate the suitability of the pixel-level and product-level image fusion approaches to detect surface water changes. In doing so, firstly, the principal component analysis technique was applied to Landsat TM 2010 multispectral image to generate the PC components. Several pixel-level image fusion techniques were then performed to merge the Landsat ETM+ 2000 panchromatic with the PC1PC2PC3 band combination of Landsat TM 2010 imagery to highlight the surface water changes between the two images. The suitability of the resulting fused images for surface water change detection was evaluated quantitatively and visually. Finally, the support vector machine (SVM) technique was applied to the qualified fused images to map the highlighted changes. Furthermore, a product level fusion (PLF) approach based on various satellite-derived indices was employed to detect the surface water changes between ETM+ 2000 and TM 2010 images. The accuracy of the resulting change maps was assessed based on a reference change map produced using visual interpretation. The results demonstrated the effectiveness of the proposed approaches for surface water change detection, especially using the Gram Schmidt-SVM, PLF-NDWI, and PLF-NDVI methods which improved the accuracy of change detection over 99.70 %