Land cover change detection using the internal covariance matrix of the extended kalman filter over multiple spectral bands

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ABSTRACT:

In this paper, the internal operations of an Extended Kalman Filter is investigated to observe if information can be derived to detect land cover change in a MODerate-resolution Imaging Spectroradiometer (MODIS) time series. The concept is based on the internal covariance matrix used by the Extended Kalman Filter, which adjusts the internal state of the filter for any changes occurring in the time series. The Extended Kalman Filter expands the internal covariance matrix if a significant change in reflectance value is observed, followed by adapting the state parameters to compensate for this change. The analysis shows that a change detection accuracy above 90% can be attained when evaluating the elements within the internal covariance matrix to detect new human sesettlements, with a corresponding false alarm rate below 6%.