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SUBMIT ABSTRACT

Landsat Based Woody Vegetation Loss Detection in Queensland, Australia Using the Google Earth Engine

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Abstract Text:

Land clearing detection and woody Foliage Projective Cover (FPC) monitoring at the state and national level in Australia has mainly been undertaken by state governments and the Terrestrial Ecosystem Research Network (TERN) because of the considerable expense, expertise, sustained duration of activities and staffing levels needed. Only recently have services become available, providing low budget, generalized access to change detection tools suited to this task. The objective of this research was to examine if a globally available service, Google Earth Engine Beta, could be used to predict woody vegetation loss with accuracies approaching the methods used by TERN and the government of the state of Queensland, Australia. Two change detection approaches were investigated using Landsat Thematic Mapper time series and the Google Earth Engine Application Programming Interface: (1) CART and Random Forest classifiers; and (2) a normalized time series of Foliage Projective Cover (FPC) and NDVI combined with a spectral index. The CART and Random Forest classifiers produced high user's and producer's mapping accuracies of clearing (77-92% and 54-77%, respectively) when detecting change within epochs for which training data were available, but extrapolation to epochs without training data reduced the mapping accuracies. The use of FPC and NDVI time series provided a more robust approach for calculation of a clearing probability, as it did not rely on training data but instead on the difference of the normalized FPC / NDVI mean and standard deviation of a single year at the change point in relation to the remaining time series. However, the FPC and NDVI time series approach represented a trade-off between user's and producer's accuracies. Both change detection approaches explored in this research were sensitive to ephemeral greening and drying of the landscape. However, the developed normalized FPC and NDVI time series approach can be tuned to provide automated alerts for large woody vegetation clearing events by selecting suitable thresholds to identify very likely clearing. This research provides a comprehensive foundation to build further capacity to use globally accessible, free, online image datasets and processing tools to accurately detect woody vegetation clearing in an automated and rapid manner.

Session Selection: Remote Sensing of Forest Disturbance: Pushing the Frontier

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