Mapping primary forest loss using dense time series and resilience metrics

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Primary forests play a crucial role in providing essential ecosystem services and supporting biodiversity compared to secondary forests. With increasing threats from extreme climate events and human activities, monitoring primary forest loss is critical for understanding the impact of these threats on ecosystems and biodiversity. Dense time series data from remotely sensed satellite imagery allow us to track historical disturbances, making it an effective source for mapping primary forests over time. However, distinguishing between primary and secondary forests based on spectral-temporal information remains challenging as primary forests can show high resilience to certain natural disturbances (e.g., drought), and secondary forests may not have experienced any disturbance during the satellite observation period. In this context, this study aims to map primary forests on the Caribbean island of Hispaniola using the time series approach and resilience metrics given that primary forests tend to be more resilient than secondary forests. To achieve this, we used spectral-temporal features from COntinuous monitoring of Land Disturbance (COLD) algorithm based on all available Landsat data between 1984 and 2023. Additionally, a resilience map is generated from deseasonalized and detrended spectral observations using the lag-1 autocorrelation method. Then, a Random Forest model was employed to generate an annual primary forest map.

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