

Enhancing Forest Change Detection Using Self-Supervised Learning with Multi-Source EO Data

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This study presents advancements in forest change detection by leveraging self-supervised learning (SSL) methods with multi-source and multi-temporal Earth Observation (EO) data. Transitioning from traditional bi-temporal approaches, the developed methodology incorporates multi-temporal analysis and multimodal data fusion using Sentinel-1, Sentinel-2, and PALSAR-2 imagery. Key innovations include mapping the magnitude of forest changes rather than binary classifications, enabling nuanced assessment of disturbance severity.

Experiments demonstrate the effectiveness of SSL-pretrained backbones, such as ResNet architectures, in extracting features for change detection. The integration of multi-temporal Sentinel-1 time series further improved the reliability and accuracy of disturbance tracking over time. These advancements show the potential of SSL to enhance forest change monitoring, providing scalable solutions for continuous and precise assessment of forest dynamics.