

# Mapping natural forest and tree plantation dynamics in Misiones, Argentina (1984-2017) using Landsat time series

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## Abstract

Extensive industrialized tree plantations are expanding rapidly in the tropics and subtropics. Often they directly replaced natural forest structures and thus have a great negative impact on the conservation of important ecosystems. Because of their spectral similarities to natural forest canopies, automatic distinction between both tree cover types is challenging. In this study, we propose and test the usage of the BFAST Monitor break detection method (Verbesselt et al., 2012) to automatically detect and map clear-cut deforestation in dense satellite image time series, enabling the classification of a forested area into natural forest and tree plantation cover. As study area, a region in Misiones, Argentina was chosen where short-rotation plantations of *Pinus taeda* stand next to protected native forests. Using the complete Landsat archive, we mapped deforestation between 1989 and 2015 and compared the outcome with data of deforested areas both observed visually and detected by Global Forest Watch (Hansen et al., 2013). Then the area was classified into natural forest and tree plantation cover. Results are promising, with an overall accuracy of 85.76% and a user's accuracy of 98.32% to detect tree plantations. The methods proposed can be applied to map the entire extent of tree plantations in Misiones and thus to study their ecological implications on natural ecosystems.

## References:

Jan Verbesselt, Achim Zeileis, and Martin Herold (2012): Near real-time disturbance detection using satellite image time series. In: *Remote Sensing of Environment* (Vol. 123), pp. 98–108

Matthew C Hansen et al. (2013): High-resolution global maps of 21st-century forest cover change. In: *Science* (Vol. 342), pp. 850–853

