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SPATIAL AND TEMPORAL PATTERNS OF TREE COVER DYNAMICS IN THE MEKONG BASIN BETWEEN 2001 AND 2011

P. Leinenkugel [a, *], N. Oppelt [b], C. Kuenzer [a]

[a] German Aerospace Center (DLR), Earth Observation Center, German Remote Sensing Data Center, Oberpfaffenhofen, 82234 Weßling, Germany – patrick.leinenkugel@dlr.de
[b] Christian-Albrechts-Universität zu Kiel, Institute for Geography, Ludewig-Meyn-Str 14, 24098 Kiel, Germany

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ABSTRACT:

The forests in the Mekong Basin have been facing increasingly high pressure from the ongoing rapid socio-economic development evident in the Southeast Asian region over the last decades.
In this context, eleven years of MODIS data from the platforms Aqua and Terra were utilised to produce a series of regional specific maps of percent tree cover for the lower Mekong Basin. The annual maps were produced for the time span 2001-2011 and are based on MODIS 8-day surface reflectance composites at 500m spatial resolution. Prediction was based on an open-source model tree algorithm that combines regression tree functionalities with linear least squares regression models. The model tree relates surface reflectance from MODIS to sub pixel tree cover estimates that were in turn derived from high resolution Landsat TM/ETM+ data. A comparison to the global MODIS tree cover product revealed a more accurate representation of tree cover, lower influence to climatic variability, and less distortions by external interferences.
The derived data products further formed the basis for an in-depth analysis of the spatial and temporal patterns of tree cover loss in the Mekong region. The eleven-year trajectory of tree cover thereby allowed for a deeper analytical examination of land cover dynamics compared to a simple bi-temporal change detection approach. Significant tree cover changes were identified by utilizing long-term statistics on typical inter-annual prediction variability. Subsequently, areas identified as change where categorized according to their temporal patterns into temporary forest losses and permanent land cover conversions. Furthermore, the rate of change was analysed to differentiate between areas of rapid forest conversions and more gradual dynamics. It could be shown that specific anthropogenic processes result in characteristic temporal patterns of tree cover change. Information about these temporal patterns, therefore, may be a useful indicator for the direct causes of forest loss.

* Corresponding author.