

Nation-to-global scale forest cover change monitoring using the Landsat data archive

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ABSTRACT:

An accurate, consistent, and timely information on forest cover extent and change is required for many applications, from local resource management and conservation strategy implementation, to national carbon accounting and global climate modelling. Satellite remote sensing provides the only suitable data for forest cover and change quantification at the national-to-global scales. The challenge is to prototype a mapping algorithm that would minimize data cost and data processing effort while providing results with sufficient accuracy in timely manner. Our research team at the University of Maryland developed a cost-effective approach to map forest cover change at the global level using automatically processed Landsat data archive. Our method integrates wall-to-wall mapping using Landsat data time-series with sample-based forest cover and change area estimation using single-date Landsat imagery and commercial high resolution satellite data (e.g. RapidEye). The 2000-2012 global forest cover product was provided for public use and is going to be updated annually. We are presenting the global forest cover loss updates for years 2013 and 2014, and first results of change factors attribution. The global algorithm can be implemented at the national and regional scale, providing higher precision for area estimates. National-scale Landsat processing algorithm allows change detection at sub-annual time steps, and precise quantification of forest dynamic factors. Our algorithm is provided in a form of a national forest mapping and change detection toolbox for national monitoring agencies. In particular, we are presenting the forest monitoring protocol adopted by Peruvian Ministry of environment for annual humid tropical forest assessment. The key principle of this national-scale assessment is consistent change detection validation using medium and high spatial resolution imagery. Analysing forest dynamics over long time intervals is also possible for regions with sufficient Landsat data archive. We prototyped an algorithm for mapping three-decadal forest cover dynamic in Eastern Europe.