# Cross-Border Comparison of Forest Area Changes Caused by Clear-Cutting and Afforestation of Abandoned Agricultural Land Using Snow Covered Satellite Imagery in northeastern Europe

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Boreal and northern temperate forests cover substantial parts of European land area. These forests are subjected to several kinds of tree removal disturbances, dominated by clear-cut logging. There is a need for quick and cost-efficient remote sensing methods to provide an independent means of detecting disturbances and recording the history of disturbances both at regional, national as well as at European level.

The forests at northern latitudes are characterized by winters in which snow cover remains for some months of the year. Winter images are particularly suitable for change detection, while snow provides a uniformly bright background that accentuates tree crowns and their shadows and provides remarkable conditions for separating forested from non-forested areas. Winter images are particularly appropriate for monitoring gradual changes on lands that were formerly in agricultural use, that have been abandoned and are in places growing into forests.

We highlight a methodological approach of remote sensing based mapping of forest patches, forest disturbances and regrowth of forests on formerly non-forested land in the Baltic and Russian regions. Satellite imagery used are multi-temporal winter imagery, obtained from medium spatial resolution satellite scanners onboard Landsat and SPOT and from scanner Aster together with more high resolution Quickbird images. The mapping examples cover the areas in Eastern Europe in Estonia, Latvia and western parts of Russia. The time period covered is from 1987 to 2011.

Results show that a very simple approach using winter images is useful in mapping forest patches, canopy removal disturbances in forests and appearance of new forest patches within the context of agricultural lands in the situation of abandonment of agricultural land. We conclude that the use of snow-covered satellite images for forest change detection can be very efficient alternative to the use of summer images.