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**CONTROL ID:** 1489914

**TITLE:** A decision-tree-based method for reconstructing disturbance history in the Russia boreal forests over 30 years

**ABSTRACT BODY:** The boreal forest is one of the largest biomes on Earth and carries crucial significance in numerous aspects. Located in the high latitude region of the Northern Hemisphere, it is predicted that the boreal forest is subject to the highest level of influence under the changing climate, which may impose profound impacts on the global carbon and energy budget. Of the entire boreal biome, approximately two thirds consists of the Russian boreal forest, which is also the largest forested zone in the world. Fire and logging have been the predominant disturbance types in the Russian boreal forest, which accelerate the speed of carbon release into the atmosphere. To better understand these processes, records of past disturbance are in great need. However, there has been no comprehensive and unbiased multi-decadal record of forest disturbance in this region. This paper illustrates a method for reconstructing disturbance history in the Russia boreal forests over 30 years. This method takes advantage of data from both Landsat, which has a long data record but limited spatial coverage, and the Moderate Resolution Spectroradiometer (MODIS), which has wall-to-wall spatial coverage but limited period of observations. We developed a standardized and semi-automated approach to extract training and validation data samples from Landsat imagery. Landsat data, dating back to 1984, were used to generate maps of forest disturbance using temporal shifts in Disturbance Index through the multi-temporal stack of imagery in selected locations. The disturbed forests are attributed to logging or burning causes by means of visual examination. The Landsat-based disturbance maps are then used as reference data to train a decision tree classifier on 2003 MODIS data. This classifier utilizes multiple direct MODIS products including the BRDF-adjusted surface reflectance, a suite of vegetation indices, and land surface temperature. The algorithm also capitalizes on seasonal variability in class characteristics by including metrics from different times of year. The resultant classification maps are validated using the remaining samples of Landsat-based disturbance map and the accuracy of classification is assessed. The result of this set of procedures is a geographical database of mature forest with identified disturbance types and ages (by decade) for the entire Russian boreal forest spanning more than three decades. The presented method has been applied experimentally in a previous study on a forest region in the Russian Far East where disturbed and mature forests in RFE were successfully differentiated with an overall accuracy of 88% (Kappa 0.73), and the overall accuracy of identification of individual disturbances was 70% (Kappa 0.64).

**CURRENT SECTION/FOCUS GROUP:** Global Environmental Change

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**INDEX TERMS:** [1640] GLOBAL CHANGE / Remote sensing, [1632] GLOBAL CHANGE / Land cover change.

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