A method for the assessment of forest regrowth site index based on Earth observations and modelling

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Presented is a method for the estimation of a productivity class/site index of the forest regrowth after stand replacement natural and human induced disturbances. The method uses Global Forest Change project data on spatial distribution of forest loss sites (including the information about the date of the disturbance) with a 30 m resolution based on Landsat data. Joint analysis of this data resampled to 100 m spatial resolution together with a Russian Land Cover map for 2016 developed based on 100 m PROBA-V data is used to identify reforestation sites and to determine the forest type. Based on this information an appropriate forest growth model is chosen to simulate forest characteristics' dynamics for different site indexes. Finally information on forest characteristics from satellite data-based products is compared to the modeling results for the forest age, computed as a difference between the date of the disturbance and the date of the satellite data product. Reforestation site is assigned a productivity class that yields the best consistency between modeling results and existing satellite data products information.

Application of the presented method was tested over the European part of Russia using a 100 m global growing stock volume (GSV) map developed within Globbiomass project and lidar vegetation canopy height measurements from ICESat-2/ATLAS system (ATL08 data product). It was found that ICESat-2/ATLAS data is better suited for the proposed approach.

Presented method is aimed at the development of a reference dataset on forest parameters since obtained information on forest type, age and site index together can be used to estimate other crucial characteristics, including GSV, mean height, mean stem diameter, basal area, productivity, growth and mortality parameters, using the appropriate model. It is also worth mentioning that proposed approach allows estimation of characteristics of young forests which are rarely represented in the field survey-based reference datasets.

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