

Monitoring of reforestation on burnt areas in Western Russia using Landsat time series

Oleg Vorobev (1,2) and Eldar Kurbanov (1,2)

(1) Volga State University of Technology, Yoshkar-Ola, Russian Federation (kurbanovea@volgatech.net), (2) SUFEX Jean Monnet Center of Excellence

Forest fires are main disturbance factor for the natural ecosystems, especially in boreal forests. Monitoring for the dynamic of forest cover regeneration in the post-fire period of ecosystem recovery is crucial to both estimation of forest stands and forest management. In this study, on the example of burnt areas of 2010 wildfires in Republic Mari El of Russian Federation we estimated post-fire dynamic of different classes of vegetation cover between 2011-2016 years with the use of time series Landsat satellite images. To validate the newly obtained thematic maps we used 80 test sites with independent field data, as well Canopus-B images of high spatial resolution. For the analysis of the satellite images we referred to Normalized Differenced Vegetation Index (NDVI) and Tasseled Cap transformation. The research revealed that at the post-fire period the area of thematic classes "Reforestation of the middle and low density" has maximum cover (44%) on the investigated burnt area. On the burnt areas of 2010 there is ongoing active process of grass overgrowing (up to 20%), also there are thematic classes of deadwood (15%) and open spaces (10%). The results indicate that there is mostly natural regeneration of tree species pattern corresponding to the pre-fire condition. Forest plantations cover only 2% of the overall burnt area. By the 2016 year the NDVI parameters of young vegetation cover were recovered to the pre-fire level as well. The overall unsupervised classification accuracy of more than 70% shows high degree of agreement between the thematic map and the ground truth data. The research results can be applied for the long term succession monitoring and management plan development for the reforestation activities on the lands disturbed by fire.