

Monitoring of Forest Ecosystems in Northern Eurasia with Earth Observation Data : First results of the FEMINE project

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Climate change is believed to be a function of concentrations of greenhouse gases, particularly carbon dioxide. Accurate and regularly updated information regarding boreal forest dynamic is crucial to quantify greenhouse gases fluxes. Recent Earth Observation technical possibilities and methods of data analyses make it feasible to develop a system for regular forest dynamics monitoring in Northern Eurasia to contribute with refined information to the improvement of statistics on forest disturbances in a broader context as well as specifically those caused by fire and logging. Cooperation between European Union, Russia and Ukraine is of vital importance for development of the Northern Eurasia forest monitoring from satellites in context of the GMES programme. An important support for this cooperation provided within, recently initiated by ESA and IAF, the BEAR programme. As a component of the BEAR initiative the FEMINE project, coordinated by the Friedrich Schiller University, Jena, Germany, aims to develop with the use of Earth Observation techniques and available in-situ data the methods to collect up-to-date information regarding geographical extension and characteristics of natural and human induced disturbances in boreal forests of Eurasia for carbon flux accounting. The project closely coordinated with the ESA-project "GMES Service Element Forest Monitoring" and will improve the understanding of carbon exchange in boreal ecosystems. The FEMINE project aims to develop methods for forest disturbance monitoring based on multi-sensor approaches with combined use of data from various available satellite instruments, including sensors collecting data in the optical and radar domain with wide range of spatial resolution from tens of meters until one kilometre. To carry out research and development in the framework of this project three test regions have been selected in different environments of the Northern Eurasia, namely in Central Siberia, European North of Russia and Ukraine. The data from SPOT-Vegetation instruments aimed at detection of the major forest changes with use of advanced methods for data time-series analysis. A possibility to use the time-series of SPOT-Vegetation data to characterise processes of reforestation after the fires is also one of the research topics. A combination of medium-resolution data from Envisat-MERIS and high-resolution imagery from MSU-E/Meteor-3M and MSU-E/SICH-1M satellite sensors is under investigation in order to characterise forest logging in selected regions of Russia and Ukraine. In order to estimate a contribution of long-term (10-20 years) dynamic of forest ecosystems caused by logging, fires, industrial pollutions, and other disturbances to the carbon balance the possibilities of combined use of available present-day and historical high-resolution images from different EU, Russian and Ukrainian satellites are also focus of the research interest in the FEMINE project.