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ЛЕСНЫЕ БИОГЕОЦЕНОЗЫ БОРЕАЛЬНОЙ ЗОНЫ: ГЕОГРАФИЯ, СТРУКТУРА, ФУНКЦИИ, ДИНАМИКА

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However, during the last 15 years there has been a revival of forest fire research and development activities. The role and use of fire in biodiversity management has raised increased interest for fire research, but also future scenarios of global warming and land use issues suggest that forest fires can be a larger problem in the future – as they already are in many neighboring countries. It is notable however, that similar forest management actions as suggested to lower fire risk in North-America [1], such as reduction of surface fuels, increasing the height to live crown and decreasing crown coverage already have been performed in Finland as normal procedures in even-aged forest management. These changes in forest structure together with extensive forest road network, small-sized forest compartments and effective forest fire monitoring and suppression has led to rather low fire risk. Latest large fire in Finland was in 1960, when 120 000 hectares was burnt at Finnish/Russian border. However, rather large fire in Sweden this summer, 170 000 hectares, shows that preparedness for fires is still needed.

During 2002-2008 set of experimental burnings was carried out in various fuel types, and field ignition tests and fuel moisture content monitories of the main Finnish forest fuels were performed, together with many other fire related studies.

The Finnish forest fuels were classified and described according to their characteristics and average fuel loads in different site types. A hierarchical fire risk classification for different forest stands was constructed, which is based on common variables used in forest management (site type, age/development class, tree species, stand structure). We described 14 fuel types and divided them into four classes (low, moderate, high, very high) according to separately their flammability and crown fire risk [2].

In future development work these classes can be connected to modern forest management systems and thus provide e.g. thematic maps of fire risks as well as on-line maps of current fire situations.

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SIBERIAN FOREST CARBON SINK: ESTIMATES BY THE CO_2 INVERSE MODELING AND FOREST INVENTORY METHODS

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We present an overview of the recent top-down and bottom up estimates of the Siberian forest carbon sink. Monthly carbon fluxes from 2000 to 2009 by were estimated by inversion using dense CO_2 measurements from a Siberian observational network, consisting of nine towers and four aircraft sites and surface background measurements. Inversion with only background data yielded a boreal Eurasian CO2 sink of 0.56 GtC yr^{-1}, whereas inclusion of the Siberian data weakened the uptake of CO2 to 0.35 GtC yr^{-1}. For recent period of 2009-2011 we use inverse modeling estimates of the regional carbon fluxes based on Greenhouse Gas Observing Satellite (GOSAT) observations of the atmospheric column mean CO_2. Addition of the GOSAT data results in getting better correlation between climate anomalies and estimated fluxes. An inventory based approach relies upon the verified full carbon assessment of Russian forests (FCA) is based on an Integrated Land Information System (ILIS) that includes a multi-layer and multi-scale GIS with basic resolution of 1 km and corresponding attributive databases. The ILIS aggregates all available information about ecosystems and landscapes, sets of empirical and semi-empirical data and aggregations, data of different inventories and surveys, and multi-sensor remote sensing data. The ILIS serves as an information base for application of the landscape-ecosystem approach (LEA) of the FCA and as a systems design for comparison and mutual constraints with other methods of study of carbon cycling of forest ecosystems (eddy covariance; process models; inverse modeling; and multi-sensor application of remote sensing). Use of landscape-ecosystem approach resulted in the NECB at 0.57±0.14 Tg C yr-1 in 2010. While the total carbon sink is high, large forest areas, particularly on permafrost, serve as a carbon source.