



Cartographic modeling of heterogeneous landscape for footprint analysis of Eddy Covariance Measurements (Central Forest and Central Chernozem reserves, Russia)

Daniil Kozlov (1,2)

(1) Russian Timiryazev State Agricultural University, Department of Ecology & LAMP, Moscow, Russian Federation (daniilkozlov@gmail.com), (2) Lomonosov Moscow State University, Faculty of Geography, Physical Geography and Landscape science, Moscow, Russian Federation

The topographical, soil and vegetation maps of FLUXNET study areas are widely used for interpretation of eddy covariance measurements, for calibration of biogeochemical models and for making regional assessments of carbon balance. The poster presents methodological problems and results of ecosystem mapping using GIS, remote sensing, statistical and field methods on the example of two RusFluxNet sites in the Central Forest (33° E, 56°30'N) and Central Chernozem (36°10' E, 51°36'N) reserves.

In the Central Forest reserve tacheometric measurements were used for topographical and peat surveys of bogged sphagnum spruce forest of 20-hectare area. Its common borders and its areas affected by windfall were determined. The supplies and spatial distribution of organic matter were obtained. The datasets of groundwater monitoring measurements on ten wells were compared with each other and the analysis of spatial and temporal groundwater variability was performed. The map of typical ecosystems of the reserve and its surroundings was created on the basis of analysis of multi-temporal Landsat images.

In the Central Chernozem reserve the GNSS topographical survey was used for flux tower footprint mapping (22 ha). The features of microrelief predetermine development of different soils within the footprint. Close relationship between soil (73 drilling site) and terrain attributes (DEM with 2.5 m) allowed to build maps of soils and soil properties: carbon content, bulk density, upper boundary of secondary carbonates. Position for chamber-based soil respiration measurements was defined on the basis of these maps.

The detailed geodetic and soil surveys of virgin lands and plowland were performed in order to estimate the effect of agrogenic processes such as dehumification, compaction and erosion on soils during the whole period of agricultural use of Central Chernozem reserve area and around. The choice of analogous soils was based on the similarity of their position within the landscape as judged from the terrain attributes of the DEM. The dynamics of soil cover during the last 50 years was estimated on the basis of repetitive detailed surveys of the five key plots conducted in 1963, 1984 and 2013.

All results of this study and map analysis conclusions are presented in the poster.