



Assessment of productivity of terrestrial vegetation in Western Siberia: an attempt at system aggregation of remote sensing and ground data

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The overall objective of this study is to provide a verified terrestrial biota full greenhouse account for Western Siberia – a vast region of Russia totaling some 3 million km² east of the Ural Mountains and containing: (1) practically all vegetation zones of the northern hemisphere; (2) a large diversity of land forms (lowlands, plains and mountains); (3) areas of expected dramatic climatic change; (4) the largest wetlands over the globe, with substantial fluxes of methane and CO₂; (5) high levels of anthropogenic pressure due to oil and gas extraction/exploration; and (6) substantial permafrost areas. This paper presents results of the first stage of the study – development of a land cover classification and an assessment of the major indicators of ecosystems' production (live biomass and Net Primary Production, NPP). The following steps outline the methodology: (1) the GLC2000 land cover product was used as the base layer; (2) data of the State Forest Account - 2003 were linked by forest enterprise (~300 in the region) and land class; (3) forest areas were adjusted (expanded or decreased) with the help of the Vegetation Continuous Field (VCF) product; pixels of forest area were selected for a certain class starting with the highest value from the VCF and working in descending order, until the area selected matched that in the statistics; (4) agricultural land was adjusted to the land account statistics of administrative regions; and (5) wetlands were delineated based on recent maps and other sources. The general agreement was high across the study area between the two major datasets (remote sensing

and land/ forest account).

The above hybrid land cover data set at a 1-km resolution was used for assessment of live biomass and NPP (both by components, e.g., 7 components for forests). Forest biomass and NPP were estimated based on a new method that was developed for Northern Eurasian forests and which provides unbiased estimates (Shvidenko et al., *Ecological Modelling*, 2007). For other land cover classes, live biomass and NPP were defined by landscape specific botanical classes based on measurements which were provided in the study's region and neighboring areas. The paper describes the geographical and altitudinal distribution of the above indicators. With respect to NPP, the result received represents a long period average applied to land cover by a definite date. In order to provide an adjustment of NPP to actual climatic and environmental indicators of individual growth seasons, a system of regional empirical regressions is suggested. It is shown that the live biomass of the region is estimated with uncertainties in limits of 7-10% and NPP – 12-15% (confidence interval 0.9) although some unrecognized biases (e.g., for wetlands) are possible.