

Land cover classification of West Siberian middle taiga and its application for estimating methane emission Land cover classification of West Siberian middle taiga and its application for estimating methane emission

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Middle taiga zone occupies one fifth of the West Siberia plain and has the largest paludification area reaching about 35% of the territory. Raised oligotrophic bogs dominating there are the typical landscapes widely spread all over the northern hemisphere. As it was recently revealed, these bogs are not at present only the considerable sources of greenhouse gases into the atmosphere but also have a great potential in matter of global warming. In this study, the land cover classification for the middle taiga zone based on satellite images was conducted and used for the quantification of methane emissions from this area.

LandSat 5 and LandSat 7 images were used in the classification approach. Forests, wetlands and some other ecosystems were partly masked by normalized difference and green-red vegetation indexes. Mask and classified image noises were further rejected using original algorithms. A supervised classification of masked image was carried out using spectral bands 4, 5 and 3. Seventeen land cover classes of aquatic and terrestrial environments were assigned during the classification. Total methane emission was estimated basing on the data from 10 key sites including 681 methane emission measurements. Wetland classification of the whole area based on original Landsat data was achieved for the first time.

As it was considered earlier oligotrophic systems are dominating in West Siberian middle taiga. These wetland systems are firstly presented by forested raised bogs with dwarf pine-shrub-sphagnum communities (24.9% of the total wetland area) and by patterned bogs. The last ones are composed of ridge-hollow complexes (35.8%) combined with aquatic ecosystems (14.9%) and surrounding quacking mats (4.8%). Poor fens and fens are also found to be widely spread covering 17.2% of the total area. The rest of territory are occupied by drained and burned wetlands (2.2%).

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