Estimation of land cover condition on the basis of remote sensing data and digital elevation model.

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Development of methods of land cover properties identification is a priority direction in earth researches, resource management and planning activities. The remote sensing data and topographical maps are universal sources of the information on spatial structure and land cover properties. Traditionally the land forms is considered as a primary factor of spatial differentiation of landscapes at the expense of redistribution of solar energy, an atmospheric moisture and elements of mineral nutrition. This fact is a basis for construction of ecotope maps on the basis of analysis of digital elevation model. The different hierarchical levels of land forms organization are necessary for consideration (for example micro-, meso- and macrorelief). The remote sensing data (Landsat, SPOT, Modis, etc.) registers the current state of a land cover. Generally, the state of any landscape property can be reflected in spectral remote data, vegetation indexes based on raw spectral data (NDVI, LMI, MSAVI, etc.) and in topographical variables of micro-, meso- and macro relief. This approach was used for evaluation of properties of southern taiga on territory of an the Valdai Hill (Central - Forest biosphere reserve, 33°E, 56°N). The amount of vegetation and soil descriptions has exceeded 1000. Satellite data included spectral data from the Landsat 7 (ETM+) for September, 2000. The digital elevation model was constructed on the basis of topographical maps of scale 1:10 000. Topographical variables such as altitude slope and curvature was calculated for three hierarchical scales (210, 330 and 900 m). The quality of reproduction of modeled vegetation variables varies in significant limens. The R2 of regression model for average height of forest is equal 0.2 (a standard error - 6.2 m), the total basal area of trees - 0.33 (8.3 m2/ha), the spruce basal area (Picea abies) - 0.7 (1.67 m2 / ha), the basal area of other tree species less than 0.2. The quality of discriminantal models for basal area was equal: for a pine - 95 %, for a spruce- 57 %, for a birch - 53 %, for a aspen – 43 %, for an alder grey - 78 %, lindens - 80 %. The types of herb and moss layers were decoded reliably.The thickness of humus horizon is predicted in discriminantal model with accuracy about 60 %. Peatlands type was predicted statistically significantly. The received maps can be used for calculation of carbon cycle models. Use of land forms variables allows constructing forecast maps of bogging at various variant of climate changes.