



Central Siberian taiga mapping using by SPOT 4 and inventory data

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One of the main purposes of this research was evaluation of the suitability of satellite data middle resolution for Central Siberian forest mapping. The study area is located on the right bank of the Yenisei River between Podkamennaya Tunguska and Nizhnyaya Tunguska rivers (the Central Siberian Plateau) on the Central Siberian Natural Biosphere reserve. Nowadays there are several maps for this region which could be divided for two types conditionally: cartographic material obtained through field work of the 1930-1980 (for some part the last inventory was conducted in 1990) and satellite maps based on the coarse resolution images (such as AVHRR, SPOT VEGETATION and MODIS). General idea was to develop methodology main trees species precision mapping by SPOT 4 data sets. Training samples for the images classification was based on the results of the field inventory researches conducted in 2009-2011.

A technology sample plot lying was oriented on the spatial resolution of SPOT4 multispectral bands. Each point geometrically represented a square of 20 x 20 meters and describes the following each of trees species parameters: max and min diameters, numbers of stems, max/min height, density, plot's altitude. During the field works was prepared 43 sample plots spread over a total area of 70 sq km (total Reserve area is about 1 million sq ha); each point's location determined by the landscape oriented approach, geo-referencing was carried out with the GPS. Also during the project the digital elevation model of the Reserve has been adjusted using the updated field data.

Time series of satellite images was selected not only for summer periods of 2009-2011 but also a few clouds free winter images. Mapping technology involves several stages thematic processing: initially classification carried out strictly according to the results of fields' works data sets inside the local area of 70 sq km; processing was based on statistical supervised methods of classification. On the next step training samples set has been extended manually based on the expert assessment of the first stage results. Further process was in a several iteration expanding the area for classification. The final stage classification was based on two approaches: statistical and neural network. The main problem of the first classification phase was a high degree of heterogeneity of the Reserve territory due to mixed forests; currently fuzzy neural network algorithm is under development to resolve it.

The main results of the first stage of project are: percentage analysis of tree species in the Reserve (Table 1) and also geo-information analysis revealed the relationship of vegetation (tree species) distribution on the altitude.

#	Tree species	Percentage of test forestry polygon over 70 sq km
1	Pinus sibirica	24.7
2	Birch (Betula)	34.3
3	Siberian Spruce (Picea obovata)	22.1
4	Scots Pine (Pinus sylvestris)	5.3
5	Larches (Larix)	7.3
6	Aspen Populus tremula	3.6
7	Siberian Fir	2.1
8	Other formations	