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Landscape structure of mountain ecotone belt in the Mongun-Taiga massif

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A wide variety of edaphic conditions in mountain regions is determined by frequent steepness changing, slopes orientation, characteristics and depth of the bedrock, substances and energy migration regime et al. This mountain distinctive feature has its highest possible at the ecotone area, where an altitudinal geographical changes are particularly intensified by alternation of climatic conditions and tectonic patterns. However, on account of overlay compilation during the small- or medium-scale mapping such areas are not taken into account.
The main objective of this research study is to reveal the specifics of an ecotone altitudinal belt landscape structure and to make a quantitative assessment of the landscape-forming factors which cause the priority of certain geosystems development. A “landscape structure” is implied in this study as a relative position and a ratio of different geosystems.
Landscape structure analysis was based on a 1:100,000 scale landscape map created by authors using topographic and thematic maps, spaceshots and materials of longstanding field researches. The mentioned map covers a territory of Mongun-Taiga highland massif (3970.5 meters) located at the centre of Altai-Sayan mountain region.
An accent property of massif’s landscape structure consists in a presence a marked altitudinal zones purely at the bottom and top massif parts: highmountain steppe, periglacial zone and snow-ice formations. And the wide ecotone area develops exactly between these belts in altitudinal range 2200-2800 meters.
Its specificity is that phytocenosises of mesophytic, xerophytic and cryophytic groups combine here in complex and approximately equal combination under the similar climatic conditions. The similarity of a vegetation patterns of a nearby altitudinal levels was verified by integral occurrence indexes with close values.
Then the fields of spatial distribution of calculated values of summery air temperature and precipitation amounts were overlaid with a landscape map. This combination has allowed to reveal a scope of climatic parameters with the geosystems highest occurrence indexes within. The revealed highly compact intersection of geosystems climatic niches just right to illustrate an absence of obvious dominating landscapes.
In that way there is a relative balance between heterogeneous elements in the altitudinal range concerned. In other words, the distribution of highmountain tundra, meadow and steppe landscapes is almost even.
On the whole it was figured out that phytocenosises sensitivity to one of considered factors (that is temperature-humidity conditions) is in inverse relationship with the other one (geomorphological characteristics).
It should be also noted that the relief features and attributes have a leading role in a formation such a comprehensive landscape structure. The presence of intrazonal meso- and hygrophilous species among the peculiar to arid mountain regions cryophile and xerophytic ones is the most indicative example of this. Thus, for example, meadow geosystems can be formed against the arid background mainly at the bottoms of local depressions and cavities because of the extra humidification over the seasonal glaciers melting.
The most distinctive contacts of high-mountain arid vegetation patterns were marked out on the basis of comparison between the landscape map, space shots and digital terrain model.