Abstract

The purpose of the diploma thesis is the analysis of changes in the alpine treeline ecotone with focus on the age structure and cover of the Norway spruce (*Picea Abies*) in the Giant Mountains in the 20th century.

The altitudinal position and the tree density of the alpine treeline ecotone is a sensitive indicator which reflects the human impact as well as the climatic and air pollution changes.

Methodical approach included the measuring of the age structure of the Norway spruce by using dendrochronology. In addition the changes of the spruce cover were evaluated from a series of aerial photographs dated 1936, (1953) 1964, 1985 and 2002. Those photographs were orthorectified and classified.

The age distribution in the majority of the sample locations is irregular with some prominent peaks that are corresponding to the periods of good conditions and dips pointing out to the periods of disturbances. There is an evident peak during the 30s and 40s which is the same period of the increase of average temperatures of the growing season. On the contrary, depression during the 70s and 80s is detected only in the case of closed-canopy forest. The increasing number of trees during the 90s is related to the decreasing air pollution and to the higher average temperature. Relatively young age structure of the Luční hora site demonstrates a human activity on the north-facing slope in the first half of the 20th century. In contrast, the south-facing slope of this mountain was disturbed by debris flows at the turn of the 19th and 20th century. The result of the changes of the canopy shows gradual expansion of the trees to higher position and increased tree cover during the entire period of study. The exemption is a decrease of the tree cover on the north-facing slope of Malý Šišák mainly in the last tracking period 1984-2002.

The analysis of the effect of the terrain morphology (altitude, curvature, slope and heat load index) on the tree cover demonstrated a slight dependence on the altitude. Changes of the tree cover depend more on the previous type of the vegetation (tree, grassland, dwarf pine *stands*), especially on the initial tree cover.

The dynamics of the alpine forest limit in this area generally depends on the environment (limited by the temperature) and stand dynamics at each site is further modulated by the local condition.