Geophysical Research Abstracts
Vol. 16, EGU2014-12289, 2014
EGU General Assembly 2014


# Application of cluster analysis and multiple regression to calculate the effect of vegetation and topography on snow accumulation and snowmelt

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Snow is the important component of hydrological cycle in the central Europe. Large quantity of water is accumulated as snow during winter period and this water runs off into rivers in relative short time during spring period. Increased risk of floods in central Europe exists namely in alpine and pre-alpine catchments which have the pluvio-nival flow regime. Research of snow accumulation and snowmelt processes is important for runoff forecast and reservoir management.

The research is carried out in small mountain catchments in the Czech Republic. Experimental catchments are differing in elevation range, aspect, slope and type of vegetation cover. Automatic and field measurements of the snow depth and snow water equivalent (SWE) have been caring out at specific localities since 2008. Each locality is specified with elevation, aspect, slope and vegetation type (open area, clearing, young forest, sparse mature forest and dense mature forest). Measurements of snow depth and SWE are carried out at 19 localities both during snow accumulation and snow melt period.

Data of snow depth and SWE were assessed using both simple statistical analysis and multiple regression and cluster analysis in order to describe the spatial distribution in snow accumulation and snowmelt. The correlation of SWE with vegetation type, elevation, aspect and slope was tested. The main findings of the research show that vegetation type has the most significant influence on the snowpack distribution and on the snow accumulation and snowmelt dynamics. Significant correlations were also proved for aspect (especially for southern slopes). The study completes similar results carried out in different study areas and climatic conditions but moreover it shows changes of importace of governing factors during snow accumulation and snowmelt periods. The results demonstrate a good applicability of cluster analysis and multiple regression for description of snowpack distribution.