Geophysical Research Abstracts
Vol. 14, EGU2012-276-7, 2012
EGU General Assembly 2012

The uncertainty of future annual long-term groundwater table fluctuation regime in Latvia

D. Lauva, I. Grinfelde, A. Veinbergs, K. Abramenko, V. Vircavs, Z. Dimanta, I. Vitola, and A. Gailuma
(didzis@lauvadidzis.com), Latvia University of Agriculture, Faculty of Rural Engineering, Jelgava, Latvia

Various annual regimes of shallow groundwater levels significantly and differently affect agricultural and forestry production. Such regimes can be constructed and compiled if groundwater level monitoring is used and the groundwater levels are known. The primary objective of ground water regime monitoring is to record information on ground water levels in space and time. Measurements of water levels in wells provide the most fundamental indicator of the status of this resource and are critical to meaningful evaluation of the effects it causes. Modeling groundwater levels using future daily climate data allows prediction of future groundwater table fluctuations. The ability to adapt to changes depends on knowing possible alterations of the groundwater level regime. Such knowledge could form the basis of different and flexible approaches to sustainable development in the future. The classical Latvian long-term groundwater level fluctuation regime can be described as M-shaped function which represents two groundwater level maximums (in spring and late autumn) and two minimums (in winter and late summer). The aim of this paper is to model the long-term annual regime of shallow groundwater levels using 14 climate scenario groupings and additionally to analyze them according to the dominance of continentality in Latvia. The mathematical model METUL was chosen as best known and most appropriate model for Latvian climate conditions for modeling future daily groundwater levels using daily temperature, precipitation and humidity. To characterize how variability of different climate scenarios affects the annual regime of shallow groundwater levels, statistical methods focusing on percentile analyses were applied. The results show definate annual long-term groundwater regime changes in the future period (2070-2100) compared to the reference period (1961-1990) over the entire Latvia. The future Latvian long-term groundwater level fluctuation regime can be described as λ-shaped function with one maximum and one minimum. Spatiotemporal differences are similar in both periods with gradual transition adjusted for continentality, being most apparent in the spring months. This study is supported by the European Social Fund project "Establishment of interdisciplinary scientists group and modeling system for groundwater research".No. 2009/0212/1DP/1.1.1.2.0/09/APIA/VIAA/060