

## Impacts of Climate Elements on the Annual Periodic Behavior of the Shallow Groundwater Level: Case Study from Central-Eastern Europe

**Authors :** Tamas Garamhegyi, Jozsef Kovacs, Rita Pongracz, Peter Tanos, Balazs Trasy, Norbert Magyar, Istvan G. Hatvani

**Abstract :** Like most environmental processes, shallow groundwater fluctuation under natural circumstances also behaves periodically. With the statistical tools at hand, it can easily be determined if a period exists in the data or not. Thus, the question may be raised: Does the estimated average period time characterize the whole time period, or not? This is especially important in the case of such complex phenomena as shallow groundwater fluctuation, driven by numerous factors. Because of the continuous changes in the oscillating components of shallow groundwater time series, the most appropriate method should be used to investigate its periodicity, this is wavelet spectrum analysis. The aims of the research were to investigate the periodic behavior of the shallow groundwater time series of an agriculturally important and drought sensitive region in Central-Eastern Europe and its relationship to the European pressure action centers. During the research ~216 shallow groundwater observation wells located in the eastern part of the Great Hungarian Plain with a temporal coverage of 50 years were scanned for periodicity. By taking the full-time interval as 100%, the presence of any period could be determined in percentages. With the complex hydrogeological/meteorological model developed in this study, non-periodic time intervals were found in the shallow groundwater levels. On the local scale, this phenomenon linked to drought conditions, and on a regional scale linked to the maxima of the regional air pressures in the Gulf of Genoa. The study documented an important link between shallow groundwater levels and climate variables/indices facilitating the necessary adaptation strategies on national and/or regional scales, which have to take into account the predictions of drought-related climatic conditions.

**Keywords :** climate change, drought, groundwater periodicity, wavelet spectrum and coherence analyses

**Conference Title :** ICSRD 2020 : International Conference on Scientific Research and Development

**Conference Location :** Chicago, United States

**Conference Dates :** December 12-13, 2020