



Prediction of Drought Based on Medium-term Forecast Data

Filip Chuchma, Petr Münster, and Rostislav Fiala
Czech Hydrometeorological Institute, Brno, Czech Republic (filip.chuchma@chmi.cz)

Weather significantly affects all processes in landscape, including the growth and development of agricultural crops and so to a large extent determines the actual crop yield. Czech climate is characterized by a large variability and occurrence of extreme situations, for example lack of precipitation, leading to insufficient amount of available water in soil and drought as a result of this. As the climate change progresses, the impacts of climate on agriculture are also becoming more significant and this means it is necessary to study and take into account the issue of spatiotemporal occurrence of drought as one of the agricultural limiting factors. Special approaches and methods can have an important role and based on current weather data allow assessing the current water balance in landscape and make qualified estimates of the future trends. Using medium-term weather forecasts one can then predict the development in the near future. Successfully managing the issue of soil moisture characteristics could in practice lead to potential higher stability in crop yield and quality of agricultural products as well as improving the management of related activities. In the Czech Republic, the monitoring of meteorological and agricultural drought is currently performed by the Czech Hydrometeorological Institute and using the agrometeorological model AVISO values of water balance and soil moisture content analyzed. This model is also used to process data from numerical weather forecast in order to predict future development of soil moisture and the potential occurrence and intensity of drought. Source data come from numerical forecast models IFS-ECMWF and since 2017 also GFS-NCAR. The possible uses and reliability of the forecast is continuously analyzed by comparing it with measured values and also using datasets from previous seasons (2014-2016). This includes an analysis of spatial differences between soil moisture characteristics derived from measured and modelled data and differences are also assessed for particular locations. One can see that the accuracy of the forecasted soil moisture for a particular location can be quite variable compared to other seasons for the same time of the year as a result of different current weather conditions. Results are also compared with the analysis of synoptic situation. The outcome of the study should be verification and assessment of the possibility to predict the development of available water in soil and preparing a 10-day outlook including the risk of drought.

Acknowledgements

The authors acknowledge support of the National Agency for Agricultural Research of the Czech Republic for the solution of the project no. QJ1610072.