



Drought Prediction System for Central Europe and Its Validation

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In recent years, two drought monitoring systems have been developed in the Czech Republic based on the SoilClim and AVISO soil moisture models. The former is run by Mendel University and Global Change Research Institute (CAS), while the latter, by the Czech Hydrometeorological Institute. SoilClim is based more on real soil properties and aimed primarily at agriculture, while AVISO complements the system with more theoretical presumptions about soil, showing, rather, climatological potential. Both soil moisture models were complemented by forecasts on a daily basis, taking meteorological inputs from NWP (Numerical Weather Prediction) models and thus giving short- to mid-range outlooks up to 9 days ahead. Validation of the soil moisture and drought intensity prediction was performed and is presented in this work showing its prediction reliability and potential. In the analysis, we focus mainly on the past year, 2017.

The application of both soil models leads to comparable results in the forecast. Among the NWP models, the ECMWF IFS model shows the best score in the forecasted parameters. The scores of the models vary among parameters and periods. Users of the forecast system are thus informed of the most recent biases within the last 1 and 3 weeks together with the forecast itself.

The validation has been primarily performed using relative soil saturation—AWR (%) and the deficit of soil moisture—AWDMED (mm). For these two variables, we compared the soil model estimates based on NWP driven forecasts with the model runs based on observed data (i.e. via the hind-casting model). AWR and AWDMED are used, as they can be compared more-or-less directly with measurements and allow independent ground verification of the system. However, the main output used by the stakeholders is the intensity of drought (AWP). This represents probabilistic interpretation of the actual AWR value in relation to all AWR values occurring at the given grid between 1961 and 2010 during the same period of year. The AWP values are then provided as the principal forecast map (www.drought.cz), as they allow for the interpretation of the current soil moisture situation with respect to the values that should be expected.

The tool has strong predictive power for soil moisture and drought intensity so it is suitable for farmers who need to make decisions about irrigation and production activities. The presented system is fully functional and can be applied in the coming years.