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A look for a new model

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Simulation of soil water and energy balance can be implemented by many modeling tools. When the attention is focused on soil moisture during drought the task becomes difficult. During the drought the soil physical processes are very complicated because the soil water is subjected to a number of force fields. Such forces result from the water attraction by the solid matrix for (capillarity and adsorption) as well as from the presence of dissolved salts, the action of the local pressure of the soil gase phase and the gravitational field. Still it is not well investigated and is a new field in the science. In the last 4 decades a great number of field and laboratory experiments and mathematical simulations have been made for studying the processes in the unsaturated zone. It was found that the Richard's equation (wetness distribution) and the Penman-Monteit (FAO, 19980) (ET) represent the soil physics in the best way. The good description and forecast of the soil water, evapotranspiration and groundwater recharge is very important, because the subsurface environment is boundary condition for both Climate Model Research and Groundwater management.

The currently used model is LISFLOOD for the action "Drought"- IES JRC.

When it is considered the models evaluation they can't be distinguished as good or bad. Each model suites a specific goal.

As it was mentioned above the main feature during drought is the matrix attraction forces and the capillary rise - the upward water fringe from groundwater table. The LISFLOOD model doesn't include that wetness distribution, it accounts only for the work of gravitational forces and downward water movement. It means that LISFLOOD is not the best model for description of the complex nature of the soil water distribution and surface fluxes and especially during drought.

The choice of a suitable model for soil water and energy balance is recently increased. After the literature review of a great number of publications it can be concluded that the model for quantitative estimates of soil moisture, evapotranspiration and groundwater at continental and larger scales, should be based on good representation of the physical processes and the model should be the land surface schemes developed for Global Climate Models (GCMs).

The chosen land surface schemes are CLM3 (USA, res.0.125°, Richard's eq.), ISBA (France, res.0.5°, simple balance), MOSES/JULES (Met UK, res. 1 km, Richard's eq.),

those models should be considered as potential ones.