

Subirrigation controlled by feedback from O2stress

Subirrigation from a surface water source can now be simulated in combination with WOFOST and O2stress. The option can also be used without surface water supply for the purpose of water conservation. The control mechanism includes the conditions in the period before the crop actually emerges, via the so-called indirect effects of Waterwijzer. Implementation includes the use of a script for converting the Modflow drainage records to a format that MetaSWAP can read. This information is used for effectively blocking the Modflow drainage by adding a special correction flux to the interchange with Modflow. The mentioned script requires expert knowledge of Modflow and is not yet generally available.

Bypass flow

A first version of bypass flow has been made operational. The option simply passes a fraction of the infiltration at the soil surface directly to the groundwater. It is triggered by the file FBYPASS_SVAT.INP that can be present in the work directory of MetaSWAP or in the directory of the unsa-database. If the file is present at both locations the one in the work directory has priority. For LHM4.2 a fraction of 0.10 has been used for all soil units.

Infiltration simulation with Green-Ampt

The infiltration simulation of MetaSWAP has thus far been very deficient. As an alternative the Green-Ampt method has been successfully implemented and tested against SWAP (with SWAP using very small time steps and compartments). Results are promising. Implementation requires the use of meteorological data on an hourly basis, and also adjusted parameters of the Penman-Monteith evapotranspiration simulation. These changes are still subject to review and will be further detailed when the rollout of LHM43 is presented in the autumn. See <http://nhi.nu/nl/index.php/uitvoering/actueel/modelcodes/>

Reduction of WOFOST demand on computer resources

By reorganizing the computations of the MetaSWAP-WOFOST coupling a significant reduction of used RAM and CPU-time has been realized.

Minimum root zone depth of 0.15 m for WOFOST crops

A minimum depth of 0.15 m has been implemented for the root zone depth of WOFOST crops. This makes it possible to simulate indirect effects of wet conditions without having to use the PostMetaSWAP option. It also avoids numerical artefacts in the calculation of the bare soil evaporation under extremely dry conditions. And third, it also makes the transition after the harvest more smooth in terms of numerical handling. In order to avoid numerical problems the reduction of the root zone after harvest (back to 0.15 m) has also been postponed until nearly at the end of the year, when wetter conditions usually prevail, which makes the transition easier without causing artificial effects on the groundwater level

Sprinkling trigger

Sprinkling was formerly triggered by the mean root zone pressure head of MetaSWAP. This tended to cause too much sprinkling. The option now used is based on the drought stress indicator α_{dry} (*Treldry*), like is done in Waterwijzer 2.0. The parameter is entered in the same field as was formerly used for the critical pressure head. A value of 0.85 is used in LHM 4.2, like in Waterwijzer

Output files

The output via bda files has been removed in order to streamline the code. It also appeared that the option was often being used by accident, without realizing that it costs significant computer resources, both in terms of CPU-time and disk usage.

All output now gets written to folders, which greatly improves the user experience. New options have been realized: output of soil moisture and/or salt content for a specified compartment schematization. This option requires the new file COMP_POST_IDF.CSV. The options are triggered by parameters in PARA_POST.INP, giving upper and lower bounds of compartment numbers for which output is desired, thus narrowing the output down to what is actually needed.

An update of the available keys for the idf output is available at (using Internet Explorer as default browser): ftp://ftp.wur.nl/simgro/par/V8_1_0_2/LHM42/sel_key_files/

Data assimilation of groundwater level in MetaSWAP

The data assimilation of groundwater levels in MetaSWAP appeared to be an unfinished option. This option is now fully functional.

Oxygen stress as calculated using Feddes (1978).

During testing it has been found that both iMOD 5.2 and 5.3 have issues regarding the calculation of oxygen stress according to Feddes (1978). The issue in 5.2 has been tackled, but this has unfortunately caused a new issue in iMOD 5.3. The functionality of the calculation of oxygen stress should be turned off until the release of the next iMOD version. This is done by setting p1 and p2 in LUSE_SVAT.INP (columns 5 and 6) to 99.00 (except for the special case of greenhouses, where the value of 1.0 should be used).

Option for perched water tables (PWT)

During testing of iMOD 5.3 it was found that the new developments have inadvertently affected the PWT option, yielding unexpected results. It was decided not to correct for this at this stage, considering that the PWT option is not being used (anymore) in practice and because the option is in need of conceptual improvement. This means that, until further notice, the PWT option should not be used anymore in combination with MetaSWAP.

Sporadic "Floating invalid" at initialisation of WOFOST: Fixed

It can happen that at initialization the model crashes with the message "Floating invalid". This is usually due to the copying of un-initialized variables to a backup-array, nothing serious. This type of crash has started to occur since the advent of 'virtual machines', and is not the same as the bug that was fixed in Project Robust MetaSWAP involving the storage coefficient. Every effort is being made to fix this, but it can still happen once in a while. The remedy for the user: simply start the model anew. Users are welcome to report such instances, with a screenshot.

Grassland with grazing in MetaSWAP-WOFOST: Fixed

Issue in MetaSWAP-WOFOST involving the sequence of grazing events was fixed.

Output of crop production of WOFOST: Fixed

There was a duplication of a crop production term, meaning that the total arable land crop production was too high.

Problem with cutting off profile: Fixed

There was a problem with cutting off the profile via DBOT_SVAT.INP which has been fixed. Note that not only the depth must be given, but also the storage coefficient.