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Hydrology and Earth System Sciences
Discussions

Interactive comment on "How to predict hydrological effects of local land use change: how the vegetation parameterisation for short rotation coppices influences model results" *by* F. Richter et al.

Anonymous Referee #3

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General comments The paper parameterises the hydrological model system WaSim (Schulla and Jasper 2013) using of Leaf Area Index (LAI), stomatal resistance (Rsc) and leaf unfolding (LU) date. Data were collected in a short rotation coppice (SRC) plantation of a poplar clone (Max 1, Populus nigra x P. maximowiczii) in the 2nd (2012) and 3rd (2013) years of the mono-stem cycle. With the aim to assess the effect of parameterisation uncertainties of poplar SRC land use on modelling results, the hypothesis tested is that the variables measured (LAI, Rsc and LU) fit better than values extracted from literature.

The paper is too long and its different sections are not easy to understand. Some paragraphs which are not closely related to the topic could be eliminated (see also Technical corrections). In particular, data on long term phenological estimate of Populus tremula could be left out. In fact, due to different microclimate patterns the phenology of adult plants in the forest is not the same as the one of the younger plants of SRC cultivation.

The main result emerging in this work concerns the exact knowledge on the precise growing period the beginning of which is affected by the species/clone utilized, local environmental parameters and plantation density. SRC cultivation during the first 1-2 years have not yet developed a full canopy closure. This can have a strong effect on local microclimate and on energy fluxes between canopy and atmosphere and soil and atmosphere.

Plant available soil water is not coherent with stomatal resistance values (Rsc) implemented in WaSim (Figures 5 and 6), because these values are not compatible with the SRC canopy behavior on a daily and monthly basis. The absolute minimum Rsc value measured of 80 s m-1 cannot be maintained during the entire growing season and since it is reduced to its half, it becomes even more irrealistic , because of the isohydric behaviour of poplar clones (see Tardieu and Simonneau 1998, Journ. Exp. Bot. 49:419-432).

Local land use change with poplar SRC indicates high levels of ETR and GWR (Table 5). It is suitable to compare these estimated values with alternative crops and other poplar plantations of the same region (see Petzold et al. 2011, Eur. J. Forest Res 130:695-706).

Specific comments Figure 1 is repeated in panel (a) of Figure 4 and therefore has to be deleted from the latter.

Figure 2 lower panel. In my opinion the Vapour Pressure Deficit (VPD) of the air, calculated from meteorological data recorded in situ, rather than the maximum daily temperature, could better explain the seasonal variation of stomatal resistance.

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Figure 3 panels a-c. Please specify Temperature in the upper titles. Long term estimates of panels (e) and (f) do not add information on SRC phenology characterised by repeated rotations within very few years.

Technical corrections Please insert a glossary of Abbreviations

Page 406 - line 17 delete “the description of” Page 407 - line 21 perennial rather than “all year” Page 407 - line 22 “combined “ rather than “in combination“ Page 407 - line 23 “compared” rather than “comparing” Page 407 - line 29 “canopy interception evaporation” rather than “interception evaporation” Page 408 - lines 22 and 26 “growing season” rather than “growing period” Page 408 - line 27 “values reported in literature” rather than “literate values” Page 409 - line 3 delete “most extensive investigations were carried out at the” and continue with “study site is” Page 409 - line 15 after “. . .Max1 (Populus ....)”insert “, hereinafter Max1” Page 409 - line 22 “low: only” rather than “low – only” Page 409 - line 23 “(. . . for the long term mean value of the same period of the year)” rather than “(. . . for the long term mean)” Page 409 - line 24 “.. for the mono-stem cycle of the poplar SRC” rather than “. . . for the poplar SRC” Page 410 – lines 4-11 delete from “Comparing to . . .” up to “. . . et al., 2014” Page 410 – line 13 “Meteorological and local soil measurements” rather than “Micrometeorological and local soil measurements” Pages 411-412 delete from line 10 of page 411 “The Tharandter ..” up to line 5 of page 412 “. . . climatological measurements.” Specify briefly the source of long term meteorological records of Wildacker and Grillenburg. Page 412 – lines 11 and the following: correct LI191SA with LI-191 SA and LAI2000 with LAI-2000 all in the text Page 412 – line 22 “. . . of short-wave (400-700 nm)” rather than “. . . of short-wave” Page 412 – line 25 “. . . below the canopy” rather than “. . . for the vegetation layer” Page 412 – line 26 “. . .above the canopy” rather than “. . . to the vegetation layer” and “. . .below the canopy” rather than “at the lower bound of vegetation layer” Page 413 – lines from 23 to 28: any specification on view cap used for LAI-2000, rings analyzed and sampling method used with LI-191 SA Page 414 line 8 “its” rather than “it’s” Page 414 line16 “every week or two weeks” rather than “every week”

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Page 414 line 18 “plots” rather than “..locations in the poplar SRC” Page 414 lines 19-20 delete “so called”, “to be measured at different times” rather than “to measure the same leaf at different times”. Please specify the number of sun leaves marked. Page 416 lines 19-23 delete from “”This IGP. . .” to “Seidler (1995)” and thus citation from References section, too. Page 417 line 4 “a poplar SRC in the 3rd growing season of its mono-stem cycle” rather than “an approx. 3 year-old poplar SRC”. The mono-stem cycle specification indicates that the roots have the same age of the stems! Page 417 line 25 “from 1969 to..” rather than “of 1969 to ..” Page 418-419 lines 23-24 and 1 of page 419. Delete from “Maximal..” to “(not shown)” Page 419 line 9 delete “at the poplar SRC Reiffenhausen” Page 419 line 10 “SD” rather than “SDs” Page 419 line 25 “We used in situ phenological” rather than “We used phenological”. Delete “in Reiffenhausen” Page 420 line 7 “from” rather than “to” Page 420 line 8 insert “(Table 2) after “respectively” Page 421 line 7 “2012-2014” rather than “2012-1014” Page 421 line 14 “Goettingen and Wildacker, respectively” rather than “Goettingen and Wildacker” Page 422 line 2 “(LAI-2000 and LI-191 SA using Rsc80 in both cases)” rather than “LAI200 Rsc80 and LI191SA Rsc80” Page 422 line 9 and line 16 “measured” rather than “observed” Page 422 line 17 “plant available water (PAW)” rather than PAW Page 422 line 18 “Nash-Sutcliffe criterion (NSC)” rather than “Nash-Sutcliffe criterion” Page 424 line 23 “PBIAS” rather than “PBAIS” Page 425 line 2 “longest meteorological period without missing data” rather than “longest period meteorological forcing data are available without missing data” Page 426 line 23 “affected” rather than “effected” Page 426 line 26 “Populus species” rather than “populus clones” and “(Populus grandidentata, P. tremula and P. tremuloides)” rather than “(Populus grandidenata, Populus tremula and Populus tremuloides)” Page 427 line 28 “.. shows a wide variability in the date of leaf unfolding” rather than “. . . shows a wide spread in the date leaf unfolding started” Page 428 line 5 “evident” rather than “visible” Page 428 line 15 “ground water recharge (GWR)” rather than “GWR” Page 428 line 27 “ .. occurring thermal inversion” rather than “. . . occurring inversion conditions” Page 431 line 18 “.. local soil water budget” rather than “local water budget”

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Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 12, 405, 2015.