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Hydrology and Earth System Sciences Discussions

Interactive comment on "Impact of precipitation and land biophysical variables on the simulated discharge of European and Mediterranean rivers" *by* C. Szczypta et al.

Anonymous Referee #2

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This paper addresses an important topic that should be of great interest to HESS readers. The ISBA Land Surface Model was coupled to the TRIP runoff model and various large scale simulations were made. Many configurations of the ISBA-TRIP system, driven by ECMWF latest reanalysis, ERA-INTERIM, atmospheric forcing (with/without modifications) are analysed. The results are generally sound and well supported with figures and tables. I recommend this paper to be revised with due attention to review comments before accepting for publication. It very dense and rich in information, some parts could be lightened to make it more clear for the readers. In particular I suggest to rename the different simulations used and to develop Table 1.

Abstract

Slide 5438,

General comment: (1) The whole article is very rich in information; hence I believe that a more detailed abstract is required. (2) Acronyms are sometimes detailed (e.g. LAI, GRDC) sometimes not (e.g. ERA-, ISBA, TRIP, GPCC), please be consistent.

L.1-3: '3-hourly', 'at a spatial resolution of 0.5', the first sentence is long, does the reader need this level of detail in the abstract?

L.3-7: "Several versions of the representation of evapotranspiration in the ISBA land surface model are used to simulate the runoff which is converted into river discharge by the TRIP river routing model." Evapotranspiration is one element, amongst many others, you use to simulate the runoff. Did you mean 'the impact of various representation of the evapotranspiration in the ISBA land surface model on runoff simulation is assesses. The latter is then converted into river discharge by the TRIP river routing model'?

L.14: '[. . .] from the Global [. . .]'

L.15-16: It is not clear to me, which kind of LAI the original ISBA model is using? Are both ISBA and its A-gs version using the same ERA-Interim dataset?

L.16-17: 'On the other hand, the use of the ISBA-A-gs model allows [. . .]', do you mean ISBA-A-gs with interactive LAI, as in the previous sentence? L.18-19: Does ISBA-A-gs driven by a satellite derived climatology produces better simulation at springtime than the interactive LAI version of ISBA-A-gs or than the original ISBA model? Did you try to drive the original ISBA model with this satellite derived climatology of the LAI? [the answer is found but later, slide 5441, please mention it earlier]

Introduction

Slide 5438,

L.23: See also Ciais et al. (2005) in Nature for the 2003 drought over Europe.

L.23: 'In 2004 and 2010'

L.26: Please consider to remove '[. . .] on the considered area' as drought could also impact areas not affected by drought (e.g. migratory flow).

Slide 5439,

L.20: Please consider replacing '[. . .] it is important to build monitoring systems of the land surface variables and of the hydrological variables over this region' by '[. . .] it is particularly of interest to build monitoring systems of the land surface and hydrological variables over this region'.

Slide 5440,

L.4: Please also refer to Dee et al. (2011) for ERA-Interim.

L.5: '[. . .] evapotranspiration, surface runoff and drainage'

L.5: 'unbiased' does not seem correct to me, please double check or use 'none biases' (also in other parts of the manuscript).

L.10: suggestion; '[. . .] based on a dense network of in situ observations'.

L.14-16: This is for me a 'key sentence' of the study, it could be further developed. If I understood well, the two major goals of this study are (i) reduce the bias of ERA-I precipitation using additional/different sources of data and validate the resulting data set through river discharge simulation, (ii) test different LSM configuration driven the best atmospheric forcing obtained.

L.19-20: '[. . .] which is partly based on ground observations' what is the other parts GPCC is based on?

Data and methods

Slide 5441,

L.12-14: this information is already given few lines above, as this article is rather dense, I don't think that you should repeat things. Please consider to remove this sentence and improve the description of section 2 (L.4-5). In the same way, sentence

L.16-18 does not provide new information but the call to figure 1.

L.16: Please remove 'in this study'.

L.16-17: ISBA-TRIP is referred either to a model or a system, please be consistent.

L.21: '[. . .] and is updated in near-real-time (with a delay of approximately one month)'.

Slide 5442,

L.7: Please update reference to Dee et al. (2011) in QJRMS Dee, D.P., S.M. Uppala, A.J. Simmons, P. Berrisford, P. Poli, S obayashi, U. Andrae, M.A. Balmaseda, G. Balsamo, P. Bauer, P. Bechtold, A.C.M. Beljaar, L. van de Berg, J. Bidlot, N. Bormann, C. Delsol, R. Dragani, M. Fuentes, A.J. Geer, L. Haimberger, S.B. Healy, H. Hersbach, E.V. Holm, L. Isaksen, P. Kallberg, M. Kohler, M. Matricardi, A.P. McNally, B.M. Monge-Sanz , J.-J.Morcrette, B.-K. Park, C. Peubey, P. de Rosnay, C. Tavolato, J.-N. Thépaut and F. Vitart, 2011: The ERA-Interim reanalysis: configuration and performance of the data assimilation system. Q. J. R. Meteorol. Soc. 137, 553–597. DOI:10.1002/qj.828.

Slide 5443,

L.6: '[. . .] over the 1991–2008 period. Over the considered area, 11 263 rain gauges are used' could be replaced by '[. . .]over the 1991–2008 period; 11 263 rain gauges are available '.

L.9: '[. . .] to perform a correction [. . .]' could be '[. . .] to correct [. . .]'.

L.9: Please replace 'this product' by 'GPCC product' for a better readability.

L.15-16, link to Table 1: Readers definitely need such a Table, however I believe that it could be improved. In the text ERA-I, ERA-I-R, . . .etc refer to ECMWF latest reanalysis

and its modifications while in Table 1 they are considered as simulation name, please be consistent. In the same way 'GPCP-rescaled precipitation' and 'GPCC-unbiased precipitation' should be noted as something like 'modification applied to ERA-I reanalysis'. Simulation names are not clear to me, all your simulations are driven by ERA-I (or ERA-I + modification), why STD, AST and NIT do not have the word 'ERA-xx'? Looking only at Table 1 it is possible to see: - ERA-I-RG: GPCP-rescaled precipitation + GPCC-unbiased precipitation + LSM(ISBA-A-gs)+LAI(ISBA-A-gs), - NIT: GPCP-rescaled precipitation + GPCC-unbiased precipitation + LSM(ISBA-A-gs)+LAI(ISBA-A-gs). Then based on this Table there is no differences between simulations 'ERA-I-RG' and 'NIT' for the readers.

L.18: 'is a collection' (?)

L.22: Do you mean with continuous observations for a 5-yr period?

Slide 5446,

L.1-2: "As for ISBA, it is possible to drive ISBA-A-gs with the ECOCLIMAP seasonal LAI climatology" I don't think that is was mentioned earlier that ISBA is driven with the ECOCLIMAP seasonal LAI climatology.

L.13-25: What about simulations named ERA-I, ERA-I-R, ERA-I-G and ERA-I-RG in Table 1?

Slide 5447, The three items described here should be mentioned earlier as they sound like some goals of your study.

Slide 5548,

L.20: You could complete the description of Eff: A value of 0 indicates that the predictions of the system are as accurate as using the mean of the observed data. Negative values occur if the observed mean is a better predictor that your system output.

Discussion General comment: The main contribution of your study are not highlighted

enough, this section is a bit confusing to me. While section 4.1.&2. Rely on your results, 4.3 presents more an interpretation of possible perspectives. I am also missing some structures, e.g. section 4.3; 4.3.1 deals with LAI as well as 4.3.3 but 4.3.2 is with regard to precipitation.

Conclusion

Slide 5461,

L.21-22: '[. . .]model driven by surface ERA-I atmospheric variables,' Please rephrase this sentence.

Figure 2: Please add North and scale.

Figure 6: Too small, it very hard to see anything.

Figures 7-12: Please indicate the considered period on captions.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 9, 5437, 2012.