

Interactive comment on “Using an integrated hydrological model to estimate the usefulness of meteorological drought indices in a changing climate” by von Gunten *et al.*

Many thanks to the authors for their great effort to address reviewers’ comments. I recommend the paper for publication after minor editing process which mostly to enhance the clarity and readability of the manuscript.

Minor comment:

P11. L21. I did not understand the following part of the sentence:

‘... because the dryer soil results in lower infiltration during thunderstorms’.

I think dryer soils have greater infiltration capacity than wet soils, remember Horton infiltration capacity. Infiltration capacity decays with saturation, and finally reach at ‘saturated hydraulic value’.

Maybe, I am missing one point here! Possible explanations in my mind are:

- Dryer or bare soils due to less or no vegetation may have lower infiltration capacity than vegetated soils.
- Or forming a soil crust that inhibit infiltration?

The sentence part from the text does not sound logical to me!

Minor Points Regarding the Text:

P2. L24. This sentence sounds a plural sentence. It should be:

Significant CORRELATIONS between ... and ... WERE found.

P2. L25. Can you tell the reason with one word or a few words? Hence, you clarify the reason of the phenomenon.

The correlation between groundwater levels and drought indices seems to be smaller than for other drought impacts due to XXXX, but it was still noticeable (Kumar et al., 2016).

P2. L32. Wording. I think there is a missing word.

.... are often two perspectives...

My recommendation:are often ASSESSED two perspectives of the same drought event.

P4. L6. Wording. I recommend following instead of using ‘test’:

...schemes to COMPARE THE RESPONSE OF different drought indices.

P4. L26. I recommend you to include no water-limitation. My recommendation is:

...under standard conditions with no soil moisture limitation (Allen et al., 1998).

P4. L26. Please change the year of citation Allen et al., to Allen et al., 1998. FAO56 is from 1998.

You can check: <http://www.fao.org/docrep/X0490E/X0490E00.htm>

P4. L27. Wording. I may misunderstood here! My understanding is AET should be calculated daily timescale based on ET_o (Eq9 in Supp.). My suggestion:

...calculated on a daily time scale, and aggregated for each year.

If I am wrong, please add one sentence to describe how to calculate AET.

P6. L4. It should be plural. You are finding more than one values. COEFFICIENTS.

P5. L21-22. Wording. Radiation should be “incoming solar radiation”, or “solar irradiance”. Wind SPEED. My recommendation:

Solar irradiance, wind speed, and relative humidity have been measured.

P5. L21-22. Wording. You already define “annual precipitation”, hence mm/year should be “mm”. Replace mm/year → mm.

P5. L25. My recommendation. Convert volume into “mm/year”. This conversion will help the reader to understand faster. As you did this in P15 L9.

P5. L26. Wording. My recommendation, word order. If you put crop types in advance, the flow of the sentence will be better due to the transition from annual to daily time scale, also closeness of hydrological variables. My suggestion:

... crop types, monthly hydraulic head data, daily discharge and irrigation volume are available.

P6. L17. Wording. This is a recommendation. Applying totally depends on authors. I prefer using “anisotropic” to define the phenomenon. My suggestions:

... the saturated hydraulic conductivity is anisotropic which horizontal one is one order greater than vertical one.

P6. L21. Wording. The word “Data” is plural! Singular form of ‘data’ is ‘datum’. Yes, many sources may use as singular. It is OK. This is on discretion of the authors!

P6. L21. I recommend using numbers less than ten as word. If you disagree, be consistent within the text. As example: 4 models (P14. L18) or four models (P15. L7).

... a three-hour mean.... a nine-hour mean.....

P7. L 17. Insert a space after periods.

P7. L23. Delete ‘only’. The exceptions are....

P8. L14. I think this should be index.

... the same drought INDEX in future climate.

P9. L4. I think this should be plural. Climate scenarios.

P10. L16. a TWO-sided Kolmogorov-Smirnov...

P10. L22. Insert a COMMA after the reference. The second sentence is an independent clause and requires a comma.

... (e.g., Burton et al., 2010), and

P11. L2. Recommendation. I recommend giving mm/year in parenthesis. It is up to the authors!

P11. L7. Recommendation. I highly recommend using a conjunction at the beginning of this sentence to emphasize the different behaviour.

On the contrary, in winter and autumn,

P12. L 21. This sentence is should be plural. Is not it? You showed many linear correlation values between drought indices and hydrological values.

P12. L 20. I recommend delete the negative sign before 0.4.

... decreases by 0.4 when....

P15. L12. Similar above. You already talk about a decrease. No need a negative sign before 2.43.

P15. L19. Replace an with a.

..... with A SPI- and A SPEI-value

P16 L 13, L30: Use a lowercase when defining mediterranean climate.

... the mediterranean climate...

I know that currently having a trouble when writing this text, MS Office automatically correct it and underlines it as an error. But when defining the climate use lower case.

P17. L2. Wording. Similar TO.

...leads to similar results TO previous studies.

P17. L 4. ...and SIX drought indices.

P17. L 28. Wording preference. I recommend:

... in all tested climate SCENARIOS and land-uses.

P18. L 15. ...have been collected and ARE owned...

P18. L16. and ARE currently proprietary.

Figure 7. Can you shift the legend box to left in the top right figure?