Hydrol. Earth Syst. Sci. Discuss., 12, C355–C370, 2015
www.hydrol-earth-syst-sci-discuss.net/12/C355/2015/

Hydrology and Earth System Sciences
Discussions

Interactive comment on "Building long-term and high spatio-temporal resolution precipitation and air temperature reanalyses by mixing local observations and global atmospheric reanalyses: the ANATEM method" *by* A. Kuentz et al.

Anonymous Referee #3

Received and published: 2 March 2015

1 Introduction

The manuscript addresses the relevant and interesting topic of the estimation of long-term climatological series. It uses a total of 22 locations within the Durance River watershed, in southern France, as a test case. Focus is placed on temperature and precipitation variables.

The novelty of the work lies in the introduction of a model, ANATEM, which consists

Full Screen / Esc
Printer-friendly Version
Interactive Discussion
Discussion Paper

of a combination of two well established procedures: linear regression and the analog method. The nature of these procedures – focusing on local and large scale information – justifies indeed that gains can be made from their combination.

The obtained results are encouraging and, in my opinion, worthy of publication in HESS. I have, however, some remarks which I would like to see addressed.

2 General comments

I am writing with some advantage, as two earlier reviews have already been made. Disagreeing with them on one point, I did not find the manuscript particularly well written. Some effort should be placed in order to make it so. Future contributions would benefit enormously from the review of a native speaker.

The presented results are encouraging. Nonetheless, in many examples there is relatively little improvement from the application of a simple linear regression and ANATEM. I believe the biggest advantage of applying ANATEM is not the improved accuracy of mean estimates, but rather the representation of uncertainty it produces. This is not sufficiently emphasized in the text.

The introduction is interesting and provides a nice overview of the scientific relevance of the work and the challenges associated with it. I would have benefited, however, from a deeper overview of mathematical models an approaches employed to similar ends. ANATEM is solely compared with linear regression (a very simple model) and the analog method (developed in 1969). Ideally, it should be compared with more recent and potentially more performing alternatives (one that instantly comes to mind is non-linear regression). Understanding that this could require a large amount of work, I believe the authors should introduce at least a list of “competing” models.

Although straightforward in hindsight, I found the goals of the work hard to precise at

HESSD
12, C355–C370, 2015

the first stages of the reading. I recommend that a graphical scheme is added to the manuscript in order to facilitate its reading.

Also, I believe a simple scheme covering what periods and stations are used in order to calibrate the models, as well as what periods and stations are used in their evaluation would be worthwhile.

Finally, from the introduction and conclusion sections, one is inclined to think the manuscript is focused on the analysis of "long-term" climate records. From the remaining sections it appears the focus is on the proposal and evaluation of the novel ANATEM model that aims at reconstructing (not analyzing) long-term series. I consider the introduction of ANATEM a worthy objective and find the introduction and conclusion sections a bit misleading. Perhaps they could be adapted in order to increase the value of the paper.

3 Specific comments

As mentioned before, the manuscript could probably benefit from a number of writing corrections. One prevalent issue is the use of the word "we", which I believe should be avoided. In the technical corrections, below, the authors will find some suggestions.

There is a fair amount of text which, in essence, is explaining how a simple linear regression works and how it is applied to the problem at hand. This occurs in §3.1 and, again, in §3.3.1. I hope readers will be mostly familiar with such concepts. If the sections could be made shorter, particularly, 3.3.1, it would add to the clarity and flow of the text.

The methods are applied using only one neighboring station. Why not to use more? If more were available a range of interpolation techniques would become available (e.g. Kriging with covariates: KED, co-Kriging, universal Kriging).

HESSD

12, C355–C370, 2015

Notation could be revised. Estimates are denoted with a circumflex accent in some parts of the manuscript, yet not throughout. They should be. An example is §3.3.1, line 11 "... TLM,d is the air temperature estimate ..."

Figures 12 and 13 are too small and hard to read. Also, there is some spelling in French (besides the location names, evidently). In the analysis sections, the authors refer the stations by their name, but this can become confusing. To some extent they could make use of the numbers put forward in Figure 1.

Personally, I find the claims based on the correlation metric are taken too far. For instants, why does a high correlation show that a model captures well both short and long-term variability? More importantly, I have doubts regarding the interpretation of figures 12 and 13. Low differences in terms of correlation should hint that the models are very similar. For instants, a low correlation difference between ANATEM and LM, should mean that most of the information contained in ANATEM comes from LM. I am not sure the analyses of the figure's results – particularly regarding spatial patterns – go in that sense. Also, the references to plots d) and e) might be switched.

The conclusion ends with the mention of an application of the ANATEM results to the reconstruction of hydrological long-term series. I can imagine why the authors – having conducted the work – felt inclined to add this to the manuscript. I also believe that, however interesting the topic is, it requires a number of additional considerations which have not, nor should be, addressed in the present contribution. The paper is already valuable due to the introduction of ANATEM – particularly its uncertainty estimation feature. I see no need to close it with a 15-line long reference to another work.

HESSD

12, C355–C370, 2015

4 Technical corrections

4.1 Abstract

5. kind -> kinds; remove the comma.

8. climate of “the” World.

9. scale -> scales.

10. time-series, that suffer (. . .) -> time-series (which suffer from . . . density).

12. informations -> information.

13. . . . allows the building of long-term . . .

16. watershed -> River basin.

18. “The” ANATEM has been. . .

19. remove the “and”; (. . .) time-series. It was able to. . .

4.2 Page 313

22. the even larger -> a large; . . . in recent decades . . .

23. a key requirement for relevant -> extremely important

24. It is however -> Such estimates are, however,

26. models”,”

HESSD

12, C355–C370, 2015

4.3 Page 314

6. high above -> substantially above or below.

6. uncertainties -> uncertainty.

7. related uncertainty (. . .) than-> multi-decadal variations can match of even surpass . . .

10. do not -> fail to.

18. In the authors' judgment, they suffer at least from a certain lack of. . .

19. Today, characterizing. . . (remove the today at the end).

20. to -> in order to.

4.4 Page 315

1. year -> years.

2. this -> such an. . .; remove "for instance"

5. "," more recently"," for a larger (set?, group?) . . .

6. remove "obviously rather"; with a "typically" very low.

7. archives -> archive.

8. (. . .) check "phases".

10. preventing -> hindering; . . . of "some" series . . .

13. usually not -> seldom.

16. like for instance -> such as

HESSD
12, C355–C370, 2015

17. “or” geochemical...

18. core -> cores.

18-20. An efficient procedure for the reconstruction (. . .) flow variations is simulation. Through it, simulated discharge time series are obtained using a hydrological model forced with past. . .

22. than the “one” for which.

4.5 Page 316

3/4. As, unfortunately, their (. . .) resolutions rarely fit resolution needs (. . .) of hydrological...

5. . . . data is also required. It can be obtained. . .

10. and from both data at a time -> and from a combination of both.

12. remove “both”.

13. built -> prepared; scale -> step.

15. remove “further”.

16. for -> covering; year -> years.

18. basin’s meteorological. . .

21. remove “with the models”.

4.6 Page 317

4. sub-watersheds -> subcatchments; highlight -> display.

HESSD

12, C355–C370, 2015

5. snow dominated -> dominated by snow.

6. this -> that.

8.estimated -> taken.

9. Consider moving “For each watershed over the 1948-2010 period” to the beginning of the sentence.

10. In the following”,” the 1948-2010 “period” will. . .

11-12. “observations”. The latter are not direct recordings, but. . .

20-21. lost, very few and incomplete series being still available today.

27. The series also started -> Their coverage also starts; corresponding -> selected.

4.7 Page 318

2. remove “quite”.

11. work, “the” large. . .

18. only -> solely; at reconstruction itself -> being reconstructed.

20-22. Please rephrase.

4.8 Page 319

2. remove “at a time”.

4. . . .data are available at the reconstruction point; remove “concomitant”.

6-7. proxy information is available but data. . .

9. regression”-“like.

HESSD

12, C355–C370, 2015

10. . . . predictors should be well correlated with observations. (remove the rest).

11. . . . observations during the observation period. (remove the rest).

14. remove extra point.

15-16. Confusing. Please rephrase.

17. Remove second comma.

18. . . . be used as the independent variable in a simple linear . . .; called -> denominated.

22-23. alpha is the slope and beta the intercept.

4.9 Page 320

5. exhibit -> exhibits.

6. Then -> In this case.

20-21. remove “more adequate for precipitation and”.

22. no negative values -> never negative.

4.10 Page 321

9. remove “considered”.

13. Currently, the method is largely . . .

16. remove “over the past”.

22. As long as -> Provided that.

HESSD
12, C355–C370, 2015

4.11 Page 322

13-15. In the present work, the Analog (. . .) et al. (2012) is used.

20. have -> has.

24. Please clarify what a moving seasonal filter is. What was the window size, etc.

4.12 Page 323

3. characterizing -> evaluating.

5. “the” ANA model; in the following -> as.

14-15. therefore -> consequently.

16-25. An overall confusing paragraph. Should be rephrased with an emphasis on clarity.

4.13 Page 324

1. “th” in superscript; Let’s -> One can (. . .) as.

2-4. remove “that would have been”; remove all following “LM”. Add “when applied to estimated temperatures at day ANA_d^k.

7. by this same model for the -> for.

10-25. Review this section. This is too long in order to explain something as well established as a simple linear regression. The equations are also a bit redundant in my opinion.

HESSD
12, C355–C370, 2015

4.14 Page 325

1-5. See last comment.

10. than -> to.

11. the model for -> most of the ensemble. Also, is the “observed temperature” really leading the effect? Please rephrase.

17. however -> nonetheless; remove the comma; “the” precipitation (the s should be dropped).

21. on -> following; than -> as.

22. An -> The; is to use -> uses.

4.15 Page 326

3. seem -> appear.

4. . . . but can be unreasonably high in certain cases.

4.16 Page 327

14. arbitrary -> arbitrarily.

15. fairly no -> little.

16 . . . . performances. This is true because . . .

HESSD

12, C355–C370, 2015

4.17 Page 328

1. . . . allows the reconstruction of the daily. . .

5. reconstruction -> reconstructed.

6-7. remove all following “generated”.

20. is carried out -> was evaluated.

4.18 Page 329

Why was the L’Ubaye at Barcelonnette series chosen? 8. . . . “the” last 60 year”s” . . .

9. do -> does.

22. model -> models.

24-25. Confusing sentence. Please rephrase.

4.19 Page 330

3. is performing -> performed.

8. remove “around”.

11. confirms -> confirm.

25. infra -> intra.

4.20 Page 331

1-12. Please rephrase the section.

HESSD

12, C355–C370, 2015

21-22. ... criteria ANA exhibits . . .

23. quantile -> quantiles.

25. The LM model presents. . .

4.21 Page 332

4. . . . “the” ANATEM model . . .

10. remove “thus”; outperforms -> outperform; “the” ANA model.

14. step -> steps.

18. model presents -> models present; . . . for “the” precipitation . . .

22. step -> steps.

4.22 Page 333

1. “the” LM; has -> shows; . . . has no . . .

2. “and” a limited.

5. “the” ANATEM; has -> shows.

6. . . . “and” a limited . . .

9. . . . “the” ANA model . . .

14. remove “criterion”.

19. remove “we discuss”.

22. reconstructions -> alternatives are discussed.

HESSD

12, C355–C370, 2015

25-. Is fairly not influenced by -> appears to be mostly independent from.

4.23 Page 334

2. has -> had.

10. thinner -> smaller; range -> one.

11. *The use of “the” before the models’ names should be checked. It would be suitable in many occasions here and below.*

20. . . . does not “appear to” really influence the . . .

23. 69 -> 0.69.

24-25. Rephrase.

25. It is not the watersheds that should have the performance.

26. have -> displayed.

4.24 Page 335

1-8. Review the paragraph. I do not believe it is correct.

16. nowadays -> the present.

18-20. What does the sentence inform the reader about really? The variability is even larger from year to year. . . By the other hand, the periods referred to are not related to long-term trends. . .

25. correlation of -> correlation between.

HESSD
12, C355–C370, 2015

4.25 Page 336

1. larger -> stronger.

10. watershed -> watersheds; . . . five HISTALP precipitation series . . .

12. is also -> are.

16. “Notwithstanding”, the main reason is probably . . .

18-20. Please clarify what is meant, give values, and check phrasing.

21. Remove “besides”.

24. add dot.

4.26 Page 337

7. kind -> kinds.

17. observation -> observations.

22. others -> other.

28. allow -> allows; very satisfactory -> adequate.

4.27 Page 338

1. reanalyses -> series.

7. exhibits ->exhibit.

8. floods -> flood.

9. droughts -> drought.

HESSD

12, C355–C370, 2015

10-11. remove.

From here on, in particular, I consider the prolific use of “we” inadequate. Please rephrase where needed.

22-23. . . . has been applied in a straightforward fashion. (remove the rest of the phrase).

24. “We” and, even more so, “fancy” should be avoided.

27. shown -> addressed.

4.28 Page 339

3. to make -> of making.

4. remove “close of farer”.

7. The considered region covers. . .

7-10. Could be improved. Please rephrase.

20-end. Too long and, in my opinion, off topic and not needed to value the paper.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 12, 311, 2015.