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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 #2

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The study presented in this paper deals with a new methodology for the reconstruction of long-term hydrometeorological time series (precip and air temperature). The new 'ANATEM' modeling technique proposed relies on the combined use of both local and large-scale information, taking benefit of the latter information for correcting the modeling obtained with the first. One great value-added of the ANATEM model is the inclusion of a probabilistic approach offered by selecting n (here 50) nearest analog meso-scale atmospheric daily situations instead of only considering one analog days as usually done with analog downscaling. This allows for an elegant estimation of un-

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certainty of the reconstructions. The paper is very well written and properly organized ; it certainly deserves publication in HESS.

Below are a few comments and suggestions that might be of help for improving the paper.

General comments

- It might be important to tell why those 2 geopotential heights were chosen.

- According to the spatial grid upon which the ANA model is based, it would be worth precising that large-scale information refers here to meso-scale circulation (rather than large synoptic scale).

- p.320 : The authors mention a general, stochastic form of the local model and then state they would only consider uncertainty using the ANA model turned probabilistic by taking 50 analog days instead of the only nearest one. But what would have been the value-added of using a stochastic LM instead of a pure deterministic model ?

- Upon which criteria was the spatial domain chosen in order to implement the analog model ?

- I would recommend presenting the ANATEM model for precip of section 3.3.2 another way : as is, it is not clear what the rationale was that eventually lead to such a formulation, although the results and mathematical formulation show the model is definitely appropriate for dealing with both low and high values issues. For instance, the Dufour and Garçon (1997) reference is very difficult to obtain whereas it is needed to understand how parameters a(k,d) and b(k,d) were defined. I would suggest adding a short description of it.

- Also, explain eq.11 (just mention it comes from Taylor expansion)

Minor comments and suggestions

- p.315 line 18 : 'For the reconstruction of past streamflows variations, an efficient

HESSD

12, C98–C101, 2015

way is simulation, where simulated discharges times series' : remove 's' at the end of 'streamflows' and 'discharges' - p.316, line 10 : 'reanalysis'

- p.317 line19 : 'forty precipitation measurement stations' : replace with '40' in order to make the text homogeneous (e.g. '22 watersheds' 3 lines above).

- p.318 line 9 : 'as soon as the end of the 19th'

- p.322 line 19 : 'The similarity criterion is proposed by Teweles and Wobus (1954)'

- p.322 line 26 : 'in a 60-day interval'

- p.324 line 3 : it would be worth writing 'observed air temperature for this kth day'

- p.324 line 18 : 'in the line of slope 1'

- p.325 line 21 : 'elaborated on the same principle as explained in Fig. 2'

- p.326 line 10 : 'to be expressed as functions of'

- p.328 line 11 : specify 'standard deviation' for 'SD '- p.332 section 4.3.1 : it is not made use of Fig.10 (annual temperature)

- p.332 line 7 : '[. . .] variability is very well captured (mean *r* between 0.95 and 0.99)'

- p.333 line 14 : 'variability criterion than for the other criteria'

- p.334 lines 20-21 : 'mean correlation ranging from to 0.62 to 0.68 (Fig. 13a).' remove 'to' before 0.62

- p.334 lines 21-22 : 'watersheds close to the local reference station' → specify 'Gap' in parentheses.

- p.334 lines 24-25 : 'However, the similarity in terms of large scale forcing influences probably influences the performance.' → needs rephrasing.

- p.335 line 5 : 'ranging from 0.0 to 0.07' → replace with 'up to 0.07'

HESSD

12, C98–C101, 2015

- p.335 line 16 : replace 'In order to better characterize low-frequency variability, a smoothed mean of the 22 series reconstructed for the 22 watersheds respectively has been computed by LOESS (Cleveland, 1979).' with 'In order to better characterize low-frequency variability, all 22 reconstructed series were smoothed using a LOESS low-pass filter (Cleveland, 1979)'. Also, please indicate the length of the smoothing window used for local regression.

- p.337 lines 1-2 : 'It would be worth considering additional work in order to explore the importance of such issues.'

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