

Interactive comment on “SCOPE Climate: a 142-year daily high-resolution ensemble meteorological reconstruction dataset over France” by Laurie Caillouet et al.

Anonymous Referee #1

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The article presents a dataset of reconstructed daily meteorological data. Gridded precipitation, temperature, and reference evapotranspiration were reconstructed over 142 years by means of an analogue approach named SCOPE. The article presents the construction of the dataset as well as different welcomed quality evaluations. The dataset can find various useful applications. The figures are of very good quality and the results are interesting. This is an original work worth being published after consideration of some corrections.

- It was highlighted in different studies that 20CR has larger errors than other re-analyses, which is expected due to the small amount of data assimilated. This

will have an impact on the results of the analogue method. Of course, to cover this period, you have no choice but to use 20CR. It is stated that using another reanalysis would result in different predictions, but you should discuss the consequences of using 20CR on the quality of the prediction. This dataset aims at reconstructing accurate past meteorological conditions, not only statistically correct, but also with the correct chronology (am I correct?). Has it been compared with a reconstruction using ERA20C on a shorter period?

- Safran (& 20CR): comment on the quality of the products. What are the known errors and uncertainties? What can be their impact on the final product?
- Different periods: we get a bit confused with the time periods (archive, target, calibration). Can it be summarized clearly? Is there a period for independent validation?
- It is not clear if the domains for the geopotential heights were the ones from Radanovics (as stated in P4 L22-23) or if they were optimized again (as stated in P4 L29).
- Sect. 2.2.2: Please restructure the section. It starts with “The stepwise subselection . . .” as we are supposed to know about it, but it is explained in the next paragraph. The definition should come earlier.
- Sect. 2.2.3: When you remove a precipitation analogue and duplicate another one, do the same happen with the temperature and the ET for the same dates? If not, how do you keep the physical consistency between variables? Please specify.
- Sect. 2.2.4: Please explain if the reordering is the same for all variables (P, T, ET) when the ensemble members are reordered, so that their ranks stay consistent. If so, is the order based on the precipitation and applied to the rest? If not, as

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- previously, how do you keep the physical consistency between variables? Please specify.
- Sect. 3.1.1: Do the analogues to 1910 correspond to other dates with flood events? It would be interesting to know.
 - Sect. 3.1.2: Comparison to the station precip: It should be mentioned at the beginning of the work if Safran's gridded precipitation is point precipitation or areal mean precipitation. In case of areal mean precip, comment on the fact of comparing areal mean and station precip.
 - Sect. 3.1.2: On the plots of Fig 5, the precip seems to be under-dispersive in summer. It would be desirable, when concluding that the observation falls well into the range of SCOPE climate, to support it with rank histograms.
 - Sect. 3.2.1: How did you select the four different cell? Is this setting representative of the rest of the dataset?
 - Sect. 3.2.1: Your text sounds like the precipitation in Fig. 8 is good, when you are actually missing most of the main events and are producing peaks when no precip was observed. You state that the sequence of dry and wet periods is well represented, and the bias was fixed. However, if the actual chronology is not accurate, can users really use the dataset to analyse past events, or should it rather be used as a climate simulation (not real chronology)? Is Safran a reliable reference here? Please better discuss the results.
 - You try by different ways to reduce the selection of analogues from other seasons. This exchange of seasons causes problems with ET (P18 L7-11). What about coming back to a fixed calendar preselection (moving temporal window)? Does the preselection on temperature really justify adding such complexity to the method (SST and T2m) and having issues with ET? I do not expect a full analysis on this, but it should be discussed.

Technical corrections:

- P1 L15-17: Long sentence. Please rephrase.
- P2 L1-4: Please rephrase.
- P2 L8: Be more specific
- P2 L13: Mentioning “one” of the resulting dataset let us wondering what the others are. Are they equivalent climate reconstructions? If so, why is this one better?
- P2 L15-16: “appropriate space and time resolutions for hydrological applications”: it depends on the catchment size and the goal of the application! As any other dataset, it cannot fit all purposes (e.g. flash floods). Please be more specific on which applications are possible.
- P2 L18: “the most general choices”: what kind of choices? Be more specific.
- P2 L18-21: This paragraph sounds more like a conclusion than an introduction.
- P3 L16: “. . .spatially interpolated on the 2.5 deg. grid required. . .” How did you do the interpolation? Why is it required?
- P4 L7-9: Not clear. Please rephrase.
- P4 L12: Please rephrase.
- P4 L13: “four analogy levels”: Better, explain that these are consecutive subsampling steps.
- P4 L14: 4-day window: is 2 days sufficient for the independence of the geopotential height?

- P5 L2: “independently for the 608 climatically homogeneous zones”: What do you mean? Please be more specific.
- P5 L6: Improve in what aspect?
- P6 L11: It is not clear when stating “the lowest precipitation” if zeros are included or not.
- P6 L12: “resampled”: are they duplicated?
- P6 L13: How is the value of N chosen? Why is three the maximum?
- P6 L27: Why “Julian day”?
- P7 L12: Specify which region
- P10 L7: “heavy amounts”: Please rephrase.
- P16 L3-4: Not clear. Please rephrase.
- P17 L11 – P18 L1: Please explain
- P18 L21: The CRPSS is normalized by the climatology, not the CRPS.
- P18 L22: Which climatological reference did you use?
- P18 L31: What is responsible for the irregular patterns and the negative CRPSS at the annual time step?
- P19 L6-7: Please rephrase.
- P21 L30-33: Not clear. Please rephrase.

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