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Geoscientific Model Development Discussions

Interactive comment on "MetSim v2.0.0: A flexible and extensible framework for the estimation and disaggregation of meteorological data" *by* Andrew R. Bennett et al.

Anonymous Referee #2

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1 General Comments

This manuscript describes a new implementation of MTCLIM simulator (Thornton and Running, 1999) in Python. The new code is called MetSim v2.0.0 (I suppose v1 was the beta version...). In comparison with MTCLIM, which was written in C and for single time series, this new version is able to generate spatially distributed sub-daily timeseries, embraces parallelization management of I/O and write its outputs into several formats, among then NetCDF. MetSim is able to generate sub-daily fields of incoming shortwave radiation, outgoing longwave radiation, air pressure, specific humidity, relative humidity, vapor pressure, precipitation, and air temperature given daily timeseries of minimum

temperature, maximum temperature, and precipitation. The new code was compared against the VIC 4.2 implementation, and the authors reported similar results.

The subject covered by this paper is a relevant topic for land surface modeling and hydro-climatology. The state-of-the-art in this subject is far from satisfactory, thus, publications of relevant research in this subject should be encouraged. In this manuscript, however, there are major issues that have to be clarified before publication.

2 Specific Comments

I welcome the retrofitting of MTCLIM to a new programming language that enables the user the generation of spatial fields and the inclusion of state-of-the-art data storage formats such as NetCDF. In my research group, we translated this code to Fortran for the same reason. This effort is understandable and very commendable. It allows to cope with new data standards and modeling requirements. This, however, does not automatically makes the new software "novel" from a scientific point of view, and hence quite difficult to stand a review process that embraces "novelty" and "innovation" in research. I consider that this manuscript, as such, could be published into a repository (github) and get a DOI, but not, on its current state in GMD. This paper has the following major shortcomings:

- Reading the :Aims and scope" of GMD, it is clear that the Authors should embrace either "new parameterizations or technical aspects", or "new methods for assessment of models", or "new standard experiments for assessing model performance or novel ways of comparing model results with observational data" to target this journal. This manuscript doesn't fit in any of these categories. A possibility could be to perform a " full evaluation of previously published model". This last point, however, is not developed in this manuscript because, in my opinion, the comparison with a previos version of the code only demonstrates that the numerical

translation of the old into the new code is bug free. A full evaluation, in my opinion, should include evaluations of the statio-temporal variability of the generated fields, cross-validation metrics (e.g. JackKnife RMSE) against observations, etc., and the use of a large enough sample covering several hydro-climatic regimes.

- From my own experience with MTCLIM, we learned that the constants controlling the various parameterizations (e.g., lapse-rate) need to be regionalized to be aplicable to large domains at high resolution (less than 5 kilometres). Copula-based methods could also be use to keep at least the stochastic consistency of the disaggregated variables. THis could be innovations that would be welcomed by the community. Currently, the manuscript does not attempt to make a full evaluation of the disaggregated fields.
- A critical issue that is not even discused is the generation of fields of precipitation and temperature (max,min,ave) starting from point time series. In this case, if the field has not been obtained by an unbiased estimator such as External Drift Kriging which is additionally consider an exact estimator at the location of the input times series, the resulting fields would fail to represent the spatial variability of the observations.

3 Final Remarks

Based on the comments mentioned above and bearing in mind the GMD publishing standards for a research article, I recommend to reject the manuscript on its present state and invite the authors to introduce innovations that are worth publishing and that go beyond the original framework of the MTCLIM code.

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