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Natural Hazards and Earth System Sciences
Discussions

Interactive comment on "Heat waves in Africa 1981–2015, observations and reanalysis" *by* G. Ceccherini et al.

Anonymous Referee #2

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The paper describes an analysis of the heat waves in the last decades by using a synthetic index and based on both observations and reanalysis data (ERAInterim dataset). The paper is interesting and well written and the language is clear and correct. However, the description of the analysis lacks of details, and some Figure could be more clear. More specific comments follow: Pag. 1, Introduction: further references are needed, especially about the topics of the lack of data needed for the assessment of the heat waves, and for what concerns the climate change-related issues. Also, a reference on the Global Surface Summary of the Day is fundamental to better understand the type of data and the reliability and coverage of the dataset.

Pag. 1, line 31: which is exactly the density of the network in sensors/km2 in the region of interest of the analysis?

Pag. 2, lines 14-15: I would suggest to change the title of the Section 2 in "Data and methodology", the title of subsection 2.1 in "Data" and the title of Subsection 2.2 in "Methodology".

Pag. 2, subsection 2.1: Even if the correct references are present about the 4D-Var assimilation method and the topic of the use of reanalysis data, a specific reference about the ERAInterim dataset is absent, it should be added in the text. Pag. 3, subsection 2.2: Nevertheless the proper reference is present, a detailed description of the HWMId index should be included in the text. This is crucial, because, also if the authors state that this index resume different information about the single heat wave in a single scalar index, the exact definition is vital to understand what is it actually represented by the index itself, and to give a possible assessment of the validity of the analysis.

Pag, 3, lines 18-19: the authors state that the analysis was carried on for both the observational dataset (for each station separately) and for the reanalysis dataset on the whole African territory. Some clarifications are needed: how the values of ERAInterim were used? The index was computed separately for each cell (which was the spatial resolution of the reanalysis dataset? Temporal resolution?)? It appears so looking the Figures 5 and 6, but it should be stated explicitly in the text. If for ERAInterim the whole African territory was used, how exactly the analyses carried on both dataset can be considered comparable? This is an important issue given the low spatial density of the GSOD sensors and, mainly, its inhomogeneous spatial distribution, and it should be clarified.

Pag. 4, lines 4-15: the Figure 2 and 3 illustrate the occurrence of heat waves for periods of 5 years. The authors state that an increasing trend is observable, as clear for Figure 4. I would suggest to use the same vertical limits for all the histograms in order to make them more comparable, or to eliminate them, since they are anyway repeated in Figure 4.

Pag. 6, Conclusions: the authors state that the analysis is of broad interest and suggest

to extend it to the dataset produced by climate models in climate change scenarios. This is interesting, however, it should be stressed that even reanalysis data, such the ones employed in this work, are subject to errors with respect to the observations, where the latest are available. This work itself shows an example with the incoherence between the results of GSOD and ERAInterim with respect to the night temperatures. Thus, at least some considerations about the uncertainty present in reanalysis data and, even more, in future scenarios, should be added, in order to clarify the scope of the analysis-

Considering the above-reported observations, I suggest minor revision before publication.

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