

Review of: Analysis of the streamflow extremes and long term water balance in Liguria Region of Italy using a cloud permitting grid spacing reanalysis dataset

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General comments:

The paper presents a study where hydrologic simulations are performed in Liguria, Italy, through a cascade approach involving the following steps: 1) ERAINT reanalysis are dynamically downscaled using WRF; 2) a bias correction of monthly precipitation is performed through CDF matching; 3) a statistical downscaling model is used to disaggregate precipitation from the coarse resolutions of 4 km, 3 h to the fine resolutions of 1 km, 1 h; 4) the hydrologic model known as Continuum is applied. The modeled discharge is used for three main analyses:

- (1) The distributions of the simulated and observed discharge maxima are compared at 15 gauging stations.
- (2) A flood frequency regionalization is applied on the simulated discharge values and compared with an existing study based on observations.
- (3) The water balance components at annual scale (I guess...) are analyzed.

In my opinion, the study on the discharge maxima can be potentially interesting to assess limitations and potentialities of the proposed approach. However, I have serious concerns on the paper quality and novelty and, at this stage, I recommend its rejection. In the following, I motivate the reasons of my choice.

- 1) While I am not a native English speaker, I need to point out that the paper is poorly structured and the quality of the English is low. This is a very serious concern that has to be solved even before discussing the technical details. Many sentences are quite long and with poor grammar. In each section, the length of the paragraphs varies too much (from a few lines to an entire page). I suggest the authors to have a native English speaker proofread the paper.
- 2) The paper structure needs to be improved. The methodology presents results of the hydrologic model calibration; there is a section on the datasets, but new datasets seem to appear in the Results (or maybe they are the same, but named in a different way). There are too many figures that can be merged (see below).
- 3) The authors need to describe better what is the novelty of their analyses. The idea of applying a cascade-based approach to issue hydrologic predictions has been used in other studies to evaluate climate change impacts (in this case, climate model outputs are used instead of reanalysis) and improve hydrometeorological forecasts (in this case, outputs of Numerical Weather Prediction models are used instead of reanalysis). The Introduction of the paper does not discuss previous applications that follow the same strategy and does not highlight what are the main contributions of this study (in my opinion, it is the analysis of the simulated distribution of flood extremes). In addition, the authors should clearly state which new analyses and simulations have been performed in the paper –I guess these are bias correction, statistical downscaling and hydrologic modeling– or conducted in other studies –the dynamical downscaling of ERAINT.
- 4) The authors need to present more details on the hydrologic model, including: how the model has

been parameterized, calibrated, and validated with observed data; which soil and vegetation have been used (maybe show a map as well?); which observed hydrometeorological forcings have been adopted and how they have been interpolated in space; and show examples of simulated and observed hydrographs in the calibration and validation periods.

- 5) A discussion on the performances of the statistical downscaling algorithm is missing.
- 6) The relatively long discussion of the comparison of the WRF simulations with an alternative rain gauge network to the one used by Pieri et al. (2015) should be shortened. By the way, are the two rain gauge networks completely different?

Comments on the Figures:

- Figure 1: The authors should add legend, scale, and indicate latitude and longitude of the region.
- Figure 2: How is CORDEX related to the experiment of Pieri et al. (2015)?
- Figures 4, 5, 6, and 7 can be merged. I suggest showing also scatter plots and a table with metrics quantifying the performances.
- Figures 15 and 16 can be merged.