"Regional flow duration curves for ungauged sites in Sicily"
by F. Viola et al.
Reply to Anonymous Referee #1

Dear Referee #1,

we are very grateful for your prompt and constructive comments on our manuscript. Following the suggestions of the Editor, we hope to have provided a response to every comment and observation of all the Referees.
Below you can find the replies to your comments. In particular, we used the grey italic format to report all the questions raised by the reviewer and the standard format to report our comments and the actions taken.

General comments:
The manuscript presents a regional model for estimating flow duration curves for ungauged basins in Sicily. The analysed basins have different flow behaviours perennial and ephemeral. The manuscript represents a substantial contribution to scientific progress, specifically substantial data and results for Mediterranean zones.

Replies to the specific comments:
1) Would you explain why several basins have the same colour in Fig 1.
In Sicily there are many gauged nested basins and these basins have been labelled with the same colours (i.e. orange for Belice basin or green for Imera Meridionale) and a more thick black line. The same figure, with the same basin representation, has been already published in another journal for the regional flood frequency analysis in Sicily.

2) The Fig 2 is inappropriate, the discharges reach 10^3 m3/s, while in the text (§20, p7063) the mean daily observed discharges vary from 0.04 m^3/s to 7.6 m^3/s. The discharges greater than 10 m^3/s, result from the extrapolation of the empirical distributions.
Not true. The figure 2 shows (for all the considered basin) the frequency distribution (in term of duration curve) of the random variable "daily flow" i.e. the discharge measured at gauged sites day by day by the *Osservatorio delle Acque*. In the text we provide the mean value of the above mentioned random variable "daily flow". Obviously this is a surrogate of the mean annual runoff [mean annual runoff (mm/year)=mean daily discharge (m^3/s)* 31.536.000 (s/year) *basin area (km^2)/1000].

3) §5, p 7066: which methods have been used to estimate the three model parameters (Dw, a and b)?
This part is explained in the text:
§18-19, p. 7064: the relative duration of wet periods, D_w, can be identified and easily calculated starting from streamflow data (Dw is a relative duration and then it is equal to the ratio between the number of days with discharge and the total number of days considered in the analysis);
§14-16, p. 7065: The parameters *a* and *b* can be estimated using the least square errors method in the range of relative duration between 0.05 and 1.

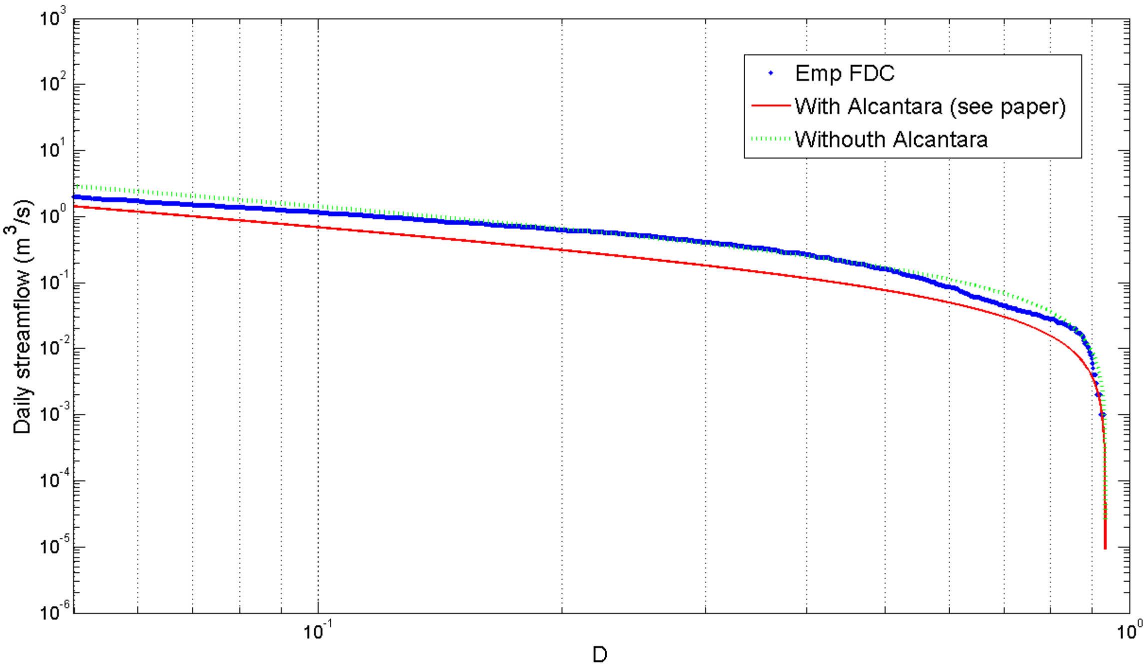
4) §5, p7066: "The same figure shows a good fit between empirical and estimated FDC's". The analysis of the figure is not sufficient to compare two samples or distributions. For the selection of "good distribution", it is necessary to use goodness of- procedures: analytical ones (Kolmogorov-Smirnov, Anderson-Darling, Cramér von Mises , Chi square etc.) or graphical methods like q-q plots.

With regard to this comment, we want to point out that our approach is not statistic but parametric (see lines 17-20, p.7061) even if it not declared in the paper (we will remark that in the reviewed paper). Since we do not explicitly use probability distributions, the use goodness of fit tests would be inappropriate. We provide judgment about the agreement using only RMSE.

5) The graphical analysis of FCD sub-zone 2 (Fig4) shows an important difference between empirical FCD and fitted FCD. It seems to come from a (RMSE, zone 2 =0.34, table 3).

We checked again this part. The high value of RMSE concerning the estimation of coefficient *a* relative to zone 2 is due to the presence of an "outlier" in this zone (the catchment of Alcantara at Alcantara) whose value *a* (equal to 2.58, see table 2) is totally different from the other values of coefficient *a* (ranging from 0.160 to 0.74). This high value of *a* could derive from a hydrological behavior of this catchment different from all the other considered basins (the catchment of Alcantara at Alcantara is close to the Etna volcano with a geology different from the other considered basins).

If we remove this "outlier" from the pool of considered basins in zone 2, the RMSE relative to coefficient *a* decreases from 0.37 to 0.24 (see figure below).



Replies to the technical comments:

a) Add a legend to Fig 1 (colour, black lines, red circle).

We will improve this figure in the reviewed paper. Anyway we will not add a legend relative to the basin because it will make very confuse the same figure.

b) Some basins have black boundaries and others are without boundaries. The boundaries should be standardized.

As mentioned above at point 1, the black boundaries have been used only for the nested basins. We will add this info in the figure caption.

c) Fig 4 has to be divided in two figures: sub-zones and FDC's

We agree with the reviewer and we'll split the figure in the reviewed paper.

d) The size of FDC (Fig 4) is so small to be well interpreted. It should be better to raise the figure scale and add secondary axis on the graph.

We agree with the reviewer and we will improve the figure in the reviewed paper.

e) The scale of the different FDC curves has to be standardized.
We agree with the reviewer and we will standardize the figure in the reviewed paper.

f) It should be better to superimpose Fig 1 (basins) and Fig 4 (zones).
We do not agree with the reviewer since a such figure could result too confused and difficult to read. We'll insert the information concerning the zones of each basin in table 1 or table 2.

g) Table 1 and Table 2 are not readable.
We do not agree with the reviewer. Similar table have been published without any problem in similar papers.