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Hydrology and Earth System Sciences
Discussions

Interactive comment on "A 50-year analysis of hydrological trends and processes in a Mediterranean catchment" *by* Nathalie Folton et al.

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We would like to thank reviewer #2 for his positive feedback on our paper and these constructive suggestions. See below the detailed responses to the comments sent.

About note 1 on the methods to evalue the BFI :

We understand the point of the reviewer. With regards to the procedures used to evaluate the BFI, and as suggested by the reviewer, we will improve section 3.2. A sub-section 3.2.3 "low flow indices" will be added to discuss BFI calculations. We have considered two different approaches: the first method is the basic hydrograph separation proposed by the Institute of hydrology (1980) (already mentioned in the manuscript) and the second approach uses a recursive digital filter suggested by Lyne

and Hollick (1979) to separate the hydrological processes. The results of these different approaches have been analysed on the catchments. The trends on mean BFI are very similar and regardless of the calculation method. These additional details will therefore be included in the new subsection 3.2.3.

About note 2 on trend analyses on the SPI and SFI:

Concerning the remark on the analysis of trends on SPI and SSI, it is true that second-order statistics of variables are not included in the analysis because of the sampling problems. In order to give more details about the interpretation of trend analyses on SPI and SFI, a homoscedasticity test was realised by the Bartlett's test (1937). This test is used to test if different samples have equal variances. We verified the homogeneity of variances for SPI and SFI accumulated on 1 month to 24 months (with a p-value of 5% to accept H0 hypothesis: Identical variance). We compared the variance calculated over the first 25 years (P1) and over the last 25 years (P2). The SPI variance was found homogeneous over the two periods with the exception of the SPI24, for which the P1 variance is higher than P2 variance. As for the previous results on the SFI, the results the homoscedasticity test on SFI depend essentially on the hydrological functioning. So, the catchments characterized by a hydrological functioning mainly controlled by precipitations (Rimbaud, Valescure) show a significant increasing of SFI variability, for SFI accumulated on 1 month to six months. This suggests that these watersheds are more influenced by decreasing precipitation, creating more of a gap between high and low water periods. For the catchments characterized by a lower dynamic (Vaubarnier and Mauret), the test indicates a significant decreasing of SFI variability for longer accumulation (SFI12 and SFI24). This is probably related to the presence of longer periods of drought over the period P2, reducing the variability of mean flows. These additional results provide input to the analysis and are added in the text in the discussion section to improve the manuscript.

About note 3 on the conclusion:

We agree with reviewer #2 that the conclusion section is somewhat vague and we have revisited the text. Additional elements on the different response of the various sub watersheds to climate change will be added. Hence the importance of the hydro-geo-logical factors will be highlighted to explain the variability of observed changes in the catchment.

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