Reply to the comments of referee 2 (Dr Guijarro)

Thanks for your kind comments that, undoubtedly, will help to improve the first version of the manuscript.

General comments: I agree with referee #1 on the importance of the subject and the convenience of the publication of this work.

Thanks for your good opinion.

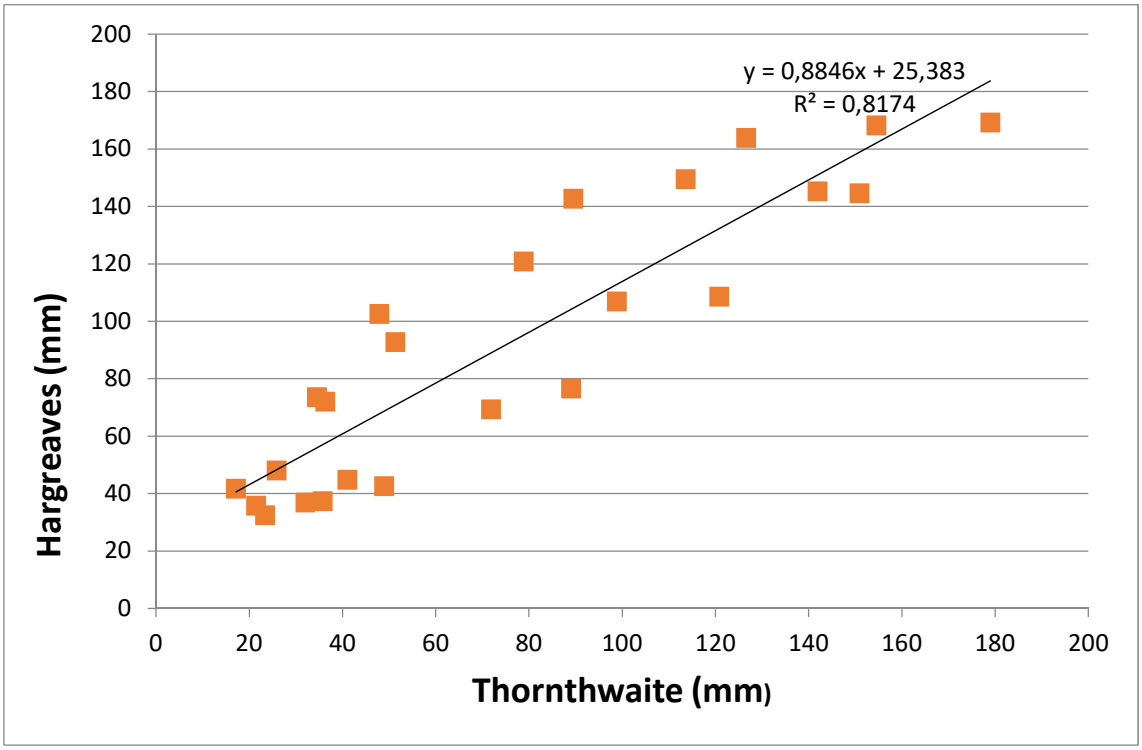
It is also clear the need to use empirical formulas to calculate evapo-transpiration rates, due to the lack of direct measurements. In this sense, the Hargreaves method is much used when the variables observed at a site are limited. However, the airports are observatories with a more complete range of observations, and therefore more complex alternatives, such as the Penman-Monteith method, could have been used. Unfortunately, radiation is measured only at the Palma airport and, while a comparison on ET values computed with Penman-Monteith and Hargreaves formulas would assess the validity of the latter within the studied climatic area, that effort could give birth to a new article by itself.

We have used the Hargreaves formula to calculate the daily potential evapotranspiration (PET) during the hydrological year 2015-16 because the data provided by the three airports of the Balearic Islands, and by the used automatic weather stations, are appropriate for this methodology. The Penman-Monteith method would probably provide more accurate values of PET, but as pointed out by the reviewer, this approach is not applicable in our study owing to the lack of the required data. We agree that a comparison between the PET values provided by the two methods at the Mallorca airport would be very interesting, not only for the hydrological year analyzed in our study but also from a climatologic point of view.

More debatable is, as referee #1 also points out, the use of both Thornthwaite monthly hydrological balances and daily balances with the Hargreaves estimates. Thornthwaite approach has been extensively used in the past when dealing with monthly series, and can still be used for comparison purposes, especially on monthly climatic averages. However, it has been reported that Thornthwaite method under-estimates ETP in arid climates, but if more realistic empirical formulas are used (Guijarro, 1986, cited by the authors), monthly hydrological balances following Thornthwaite result in soils being completely dry all year round in extensive zones of the Balearic islands, which is also unrealistic. Therefore, climatic balances should be derived by applying daily balances to the reference period and then computing the monthly values, or at least the Thornthwaite method should also be applied to the 2015-16 year to assess the impact of using these different approaches.

The Thornthwaite approach applied for obtaining PET monthly climatic values uses directly the monthly mean temperatures provided by AEMET for the period 1981-2010. The aim is to build a reference water balance for a comparison with the particular water balance of the hydrological year 2015-16. For this hydrological year, the PET monthly values have been calculated from the daily values obtained by the Hargreaves method. We agree that some comparison between the two methods for this year is necessary to fully justify the reference to

the climatic water balance. Although not included in the paper, a comparison between both methods was done in the course of the study. Specifically, monthly PET values using Thornthwaite method were calculated for the hydrological years 2014-15 and 2015-16 at the E1 site in Mallorca. Analogous monthly values were obtained from the daily PET values given by the Hargreaves formula. The E1 station is located in the most arid region of the island. The two time series show a correlation coefficient of 0.9 (see Figure). For the warmer/colder months the Thornthwaite method reveals larger/lower monthly PET values than the other approach. This discussion will be included in revised version of the paper.



Specific comments:

115: "These are the longest homogeneous climatic series without gaps..." Has their homogeneity been assessed? I would remove ' homogeneous' otherwise.

We agree. We will remove 'homogeneous'.

With respect to comments on lines 132-136 and 155-156 a reference could be added to the sentence in line 156: "do not respond to the same circulation patterns, as previously reported by Guijarro (2002 and 2003)" GUIJARRO JA (2002): Tendencias de la precipitación en el litoral mediterráneo español. In Guijarro et al. (Eds.), El agua y el clima, Asociación Española de

Climatología, A-3:237-246, ISBN 84-7632-757-9. GUIJARRO JA (2003): El flujo geostrófico superficial en el Mediterráneo Balear durante el periodo 1948-2002. Rev. climatol., 3:45-59.

References will be included

The statement in lines 137-138 is debatable. Different regimes can be seen in different parts of Mallorca (Sumner et al., 1995). SUMNER G., GUIJARRO J.A., RAMIS C. (1995): The impact of surface circulation on significant daily rainfall patterns over Mallorca. International Journal of Climatology, 15:673-696.

The statement will be revised. Some ideas from the indicated paper will be included.

Technical corrections:

131: 'end'→'and'

This will be corrected.

254: "to which the local vegetation was subjected to." Too many 'to's? Remove the last one?

Sentence will be changed as suggested.