

Dear Anonymous Reviewer #1:

We appreciate your thoughtful comments on our manuscript, highlighting the relevance and interest of the project we are developing. The product that resulted from Phase I of this mid-term Atlas project is PREGRIDBAL 1.0. This is already expressed in the first two words of the title: “PREGRIDBAL 1.0” and “towards...”.

We carefully read your comments and appreciate the suggestions and directions to improve the gridded data in version 2.0. In particular:

**Quality control and homogenization:** The quality of individual measurements we used is overviewed by the official AEMET assistant observers network. These group of trained observers manually read the rain-gauge accumulations on a daily basis and report a “Not available” datum when the quality of the reading is insufficient. As already mentioned in the text (Pag. 4, line 10), these “Not available” records in a series of a particular station are treated as if the station did not exist for that day, just as any other unobserved point across the domain. Given the manual nature of the readings and the heterogeneity of the conditions around the stations, we defined a 5% error to all observed values in the catalog (Page. 5, line 18). This error is transferred throughout the calculations and allow bounding the error associated to the catalog products. Regarding homogeneity problems, caused by modifications in the station surroundings, changes in technology or even changes in the observer’s criteria, we acknowledge the lack of a deep homogeneity analysis of the dataset of 418 series of daily accumulations. The homogeneity of highly variable quantities is still a subject of current research, and more specifically the homogeneity of daily rainfall rates. In an area with very high temporal and spatial variability such as the Mediterranean, the challenge is even larger. We plan on applying a homogenization procedure in the preprocess step of the daily values in the next version of the catalog. It is noteworthy that the main source of inhomogeneity in the series from operational networks is the change in location, which is accounted for in the AEMET database, not as a change in location but as the installation of a new station and a cease of operations of the original one. The considerations in Brunetti et al. (2012), together with the algorithms discussed in Guijarro (2014)

Guijarro, José A. 2014. “Quality Control and Homogenization of Climatological Series.” CHAP. In *Handbook of Engineering Hydrology: Fundamentals and Applications*, 501–13. CRC Press.

**Trend analysis and significance:** We fully agree with the reviewer comment. We have reread the text, and removed any mention or interpretation to non-significant trend values. This has affected sections 4.1 and 4.2. Since the definition of the pre-specified threshold dividing significant from not significant trends is user dependent, we have avoided the definition of such a unique threshold across the text to allow the reader put his own judgement on the actual significance level of each discussed trend. Nevertheless, only values above 70% are mentioned in the revised text.

**Guijarro (1986) multiparametric analysis:** As described in section 2.3 Analysis, we use an ordinary kriging with precipitation data only, based on a daily exponential variogram fitted to the data available for each day. Future updates of the catalog will certainly consider the inclusion of alternative covariates to improve the final gridded product.

**Period used to detect trend:** Although the daily precipitation maps are available since January 1<sup>st</sup>, 1914, all aggregate and trend products are produced using data from January 1<sup>st</sup> 1950. We modified the text (Pag. 3, line 29 and Pag. 5 line 23) to make this clearer to the reader.

English has been revised and improved across the document. We appreciate the comment and understand the concern also as not native English speakers.

We appreciate the time and effort put by the reviewer highlighting specific comments on the pdf.  
We have addressed all these comments in the revised version.

Dear Anonymous Reviewer #2:

We appreciate your thoughtful comments on our manuscript, highlighting the merits, relevance and interest of the project we are developing. The product that resulted from Phase I of this mid-term Atlas project is PREGRIDBAL 1.0.

We carefully read your comments and appreciate the suggestions and directions to improve the gridded data in version 2.0. In particular:

Recent bibliography:

**Quality control:** The quality of individual measurements we used is overviewed by the official AEMET assistant observers network. These group of trained observers manually read the rain-gauge accumulations on a daily basis and report a “Not available” datum when the quality of the reading is insufficient. As already mentioned in the text (Pag. 4, line 10), these “Not available” records in a series of a particular station are treated as if the station did not exist for that day, just as any other unobserved point across the domain. Given the manual nature of the readings and the heterogeneity of the conditions around the stations, we defined a 5% error to all observed values in the catalog (Page. 5, line 18). This error is transferred throughout the calculations and allow bounding the error associated to the catalog products.

**Use of covariant parameters (e.g. orography):** As described in section 2.3 Analysis, we use an ordinary kriging with precipitation data only. Future updates of the catalog will consider covariates such as the orography or the distance to the sea to improve the final gridded product. We are confident that these updates will lead to significant improvements in the final products. This is left for future work.

**Significance of precipitation trends:** Although we agree that it is common practice to define a hard threshold to divide significant from not significant trends, the interpretation of the statistical significance as the probability of detecting an actual change in the underlying process converts this artificial threshold in a subjective mark. Nonetheless, we have modified the text and eliminated all mentions and discussions referring to trends with significances below the 70% level. We avoid mentioning the *significant/not significant* character of the trends but rather inform the reader about the specific confidence on that trend. This allows the readers to make informed decisions about our results.

**Access to database:** As much as we agree with the open-accessibility of data collected using public funds, we are unfortunately bind by a MoU with AEMET that does not allow us to share this data. However, all maps and spatial accumulation graphs are made available through the open web portal <http://pregridbal-v1.uib.es>.

English has been revised and improved across the document. We appreciate the comment and understand the concern also as not native English speakers.

We appreciate the time and effort put by the reviewer highlighting specific comments on the pdf. We have addressed all these comments in the revised version.

## ABSTRACT

**Number of stations in abstract:** done. Thanks.

**Reference to previous years:** the catalog that this article presents includes rudimentary daily precipitation maps for the first half of the XX century, which admittedly have limited decision-making value but are left in the catalog with all precautionary notes for completeness and historical reference.

**“weather pattern”:** This must be a misunderstanding since no reference to weather pattern can be found in the text. The expression “precipitation patterns” is used twice as a generic description of precipitation distribution across the territory.

## INTRODUCTION

**Reference to 5<sup>th</sup> assessment:** done. Thanks.

**Credit to recent literature:** We appreciate the aim of the reviewer to make the connections of our paper more explicit in the text. We have referenced the works regarding the MOPREDAS in the introduction as interesting monthly precipitation analysis over continental Spain, but cannot follow the reviewer’s suggestion of performing a comparison with our results for obvious geographical reasons.

## DATA AND METHODOLOGY

**Brief description of Balearic Islands physiography:** done. Thank you.

**Spatial density of stations:** The key in this sentence is the expression “leaving asynchrony aside”, which expresses that this calculation is done using the location of all sites available in the database. In any case, this calculated density is a good estimate of the actual density from 1950 onwards.

**Krige and Dingman references:** These are two well-known references that initiated the geostatistical analysis and the objective of using them is to acknowledge their contribution.

**Precipitation day:** we proceeded to apply the methodology over days with at least one measurement of 24h accumulation of 0.1 mm or more. We don’t believe this is noteworthy to mention it in the text.

**Homogeneity criteria:** About homogeneity problems, caused by modifications in the station surroundings, changes in technology or even changes in the observer’s criteria, we acknowledge the lack of a deep homogeneity analysis of the dataset of 418 series of daily accumulations. The homogeneity of highly variable quantities is still a subject of current research, and more specifically the homogeneity of daily rainfall rates. In an area with very high temporal and spatial variability such as the Mediterranean, the challenge is even larger. We plan on applying a homogenization procedure in the preprocess step of the daily values in the next version of the catalog. It is noteworthy that the main source of inhomogeneity in the series from operational networks is the change in location, which is accounted for in the AEMET database, not as a change in location but as the installation of a new station and a cease of operations of the original one. The considerations in Brunetti et al. (2012), together with the algorithms discussed in Guijarro (2014)

**Anomaly with respect to monthly mean:** This is an interesting suggestion that we will consider in future updates of the catalog. Thank you.

**“this methodology don’t work when strong changes in the orography are produced”:** This is actually false. Anomalies are defined locally at the station level, with respect to local annual averages. No geographical transference of information occur when defining the anomalies. This is described in the modified section 2.3 of the text.

**Relocation of section 2.3.1:** We agree with the reviewer suggestion. The paragraph describing the error characteristics of the raingauges has been moved as suggested.

## RESULTS

**Name of the section “Results” (previous “Products”):** We fully agree with this comment. Done.

**Section 3.2:** This sub-section presents results, and so we think it should not be moved to the “Data and Methodology” section.

**ETCCDI index:** We appreciate this comment and will consider this diagnostics in future updates of the catalog.

**Case studies:** These are clearly presented as illustrative examples of the daily precipitation maps. We strongly believe they help illustrate the type of daily products we obtain.

**Physical causes of maximum annual precipitation (Fig. 5):** The explanation of the causes for this year to be the record is subject of a new research, so it is beyond the scope of this paper. The objective of showing this map is merely illustrative to help the reader realize the products available in the catalog.

## **CONCLUSIONS**

**“Friction and pollution”:** Please note that this sentence is expressed with a degree of uncertainty but the mentioned mechanisms contribute in the long term to the increase of precipitation by increasing the number of condensate nuclei and slightly contributing to the stagnancy of precipitating systems. We believe this ideas are worth mentioning provided the speculative tone of the phrasing.