First of all, the authors want to thank the referees for the work and time devoted to review the manuscript. We know that all comments will serve to improve the quality and understanding of the work and we hope we have properly answered all the suggestions.

Lines are referred to the track-changes manuscript.

Reviewer #1:

The presented topic is quite interesting not only for local populations and policy-makers but also for the international research community. The authors presented a methodology that uses results from the CORDEX database to force a hydrological model that will feed a 2D hydraulic model. The methodology seems to be coherent and appropriated for the obtained results. The authors were careful in choosing the forcing conditions from the CORDEX project, comparing the historical results with observed precipitation data in the region. The numerical models selected are adequate, being well known tools fully developed and validated for different regions. The manuscript is well written, easy to follow and to understand, with up to date references. The authors seem to have previously experience with the topic, the region selected and the presented numerical models, which were previously configured in already published manuscripts.

However, there are some comments/issues that should be clarified.

The authors state in the introduction that "This provokes that the hydrological cycle regimes are mainly conditioned by the timing and position of winter storms, which in turn, are dependent on the NAO phase". However, is worthy to notice that there are previous studies demonstrating that the precipitation regimes in the Iberian Peninsula are not only dependent of a single atmospheric variability mode.

This information was added and this part of the text was rewritten (lines 47-55).

"The special synoptic conditions of the Iberian Peninsula, where the storm-tracks in the Northern Hemisphere can transport heat and moisture, are able to promote extreme weather conditions over this area (Peixoto and Oort, 1992; Trigo, 2006). In particular, although the hydrological cycle regimes in the Iberian Peninsula are conditioned by several atmospheric variability modes (deCastro et al., 2006), the timing and position of winter storms are highly dependent on the North Atlantic Oscillation (NAO) phase, whose positive mode favors that the western Iberian Peninsula can be subjected to continuous intense large-scale precipitation during winter months, the main cause of the floods developed in the major rivers of this area (Lavers et al., 2011; Trigo et al., 2014)**"**

The authors need to clarify the methodology section. Initially, the reader understands that the hydrological model will be forced which each one of the models that provide a good characterization of the precipitation for the study area, and the authors present Figure 3 and Table 2 with the individual results for each selected model. Then, the reader realized that an ensemble was constructed with the best CORDEX models and this ensemble will force the hydrological model. It is important to use an ensemble because, since the *hydrological model will be forced with results for another numerical model, the ensemble will avoid numerical inconsistencies and reduce the inaccuracies in the hydrological and hydraulic models. The early in the calculation that the errors are minimized, the smaller inaccuracies obtained. However, it will be necessary to include how the ensemble was constructed. It is a simple average or the authors considered a weighted mean? The weighted mean could provide more accurate results by considering the previous performance of the CORDEX numerical models in the weight.*

The hydrological model was forced with the precipitation of each individual CORDEX model that surpassed the validation test. It should be noted that calculations were carried out for any particular model and the final results were averaged. Thus, the ensemble was constructed after hydrological-hydraulic simulations, for the results, by averaging the individual results provided by the hydrological (and hydraulic) model forced with each CORDEX model. In addition to the information provided by each model individually, the ensemble of the results allows offering a global view of changes minimizing the inaccuracies and errors as commented the reviewer. In climatological studies, the outputs of different models are never averaged prior to be used to force hydrological or hydraulic models. We have to take into account that several climate models do not reproduce the same meteorological situation at the same instant. Please, remember that weather models make predictions over specific areas and short timespans, while climate models analyze long timespans to predict how average conditions will change in a region over the coming decades.

As for the use of a weighted mean, it is difficult to establish the weights to carry out such a mean. The accuracy of the models was assessed in terms of two metrics and the "closely to reality" of the different methods was observed to depend on the metric, the area where the rain gage is located and the season.

This was clarified in the manuscript (lines 154-157 and 169-171).

"Once the models that provide a good characterization of the precipitation for the study area have been selected, the precipitation provided by each one is used as an input in the hydrological model to simulate the river flow in the entire Miño-Sil basin. Thus, a hydrological simulation was carried out for each valid CORDEX model considering both historical (1990-2019) and future (2070-2099) periods".

"Some of the results will also be shown by averaging the individual results obtained after forcing the hydrological-hydraulic models with the data provided by each valid CORDEX model (multi-model), which minimizes the biases and uncertainties of each model (Pierce et al., 2009; Jacob et al., 2014)"

The authors should better describe the procedures to construct the forcing with the CORDEX data. In the methodology it was not specify the version of the CORDEX project data. It is CMIP5 or CMIP6? Having a full range of numerical predictions, why the authors only selected the RCP8.5? If possible, it will be interesting to compare with a not so extreme scenario (RCP 4.5, for example).

The data from the CORDEX project used in this work were those corresponding to the CMIP5. This was clarified in the new version of the manuscript (lines 98-100).

Regarding the numerical predictions, we opted to analyze the most extreme scenario, the RCP8.5, in order to evaluate the most extreme changes and

implications that the climate change can cause in the study area in terms of floods. In this sense, a more conservative perspective towards the worst scenario is preferable for this type of applications and for the development of possible mitigation-adaptation measures. Although the comparison between different scenarios can also be interesting, authors consider that it is out of the scope of this study. Moreover, some of the CORDEX models validated for the study area have not available the RCP 4.5 prediction. In addition, in the report published by Schwalm et al. (2020) in Proceedings of the National Academy of Science, they found that, since the RCPs were developed, the historical evolution has been closest to that worst-case pathway. Thus, for the past 15 years, the greenhouse gas emissions have tracked most closely with those projected under RCP 8.5. To sum up, the worst case also seems to be the more realistic. Therefore, we decided to maintain the current analysis focused on RCP8.5 predictions. However, we acknowledge the reviewer for this recommendation because this is an interesting topic that may be addressed in future works.

This information was added in the new version of the manuscript (lines 96-104)

"Historical (1990-2019) and Future (2070-2099) daily precipitation data for the area under scope were retrieved from the Regional Climate Models (RCMs) simulations carried out in the framework of the CORDEX project (http://www.euro-cordex.net/). EURO-CORDEX initiative offers simulations over the European continent considering global climate data from the Coupled Model Intercomparison Project Phase 5 (CMIP5) up to the year 2100, with more than 30 RCMs corresponding to the RCP8.5 greenhouse gas emission scenario. In this sense, some studies have detected that greenhouse gas emissions in recent years have tracked most closely with those projected under RCP 8.5, so this emission scenario seems to be highly realistic and a useful tool to assess future climate risks (Schwalm et al., 2020). EURO-CORDEX models provide daily data with sufficient spatial resolution (0.11º×0.11º) to adequately address the hydrological procedures of the area of scope (Garijo and Mediero, 2018; Lorenzo and Alvarez, 2020; Des et al., 2021)"

It is not also clear the forecasting period. The authors referred that they used historical (1990-2019) and future (2070-2099) periods, and that the data has an hourly scale. However, it is not clear if the historical simulations and the future projections were done for an specific year or if the authors calculate an average for the full period. For historical conditions, using an average period to compare with the observed data is acceptable. However, a difference of 30 years in the projections could produce significant differences in the results.

All numerical simulations were performed for the historical period, considering the entire 1990-2019 period, and also for the future, considering the entire 2070-2099 period. Therefore, both periods analyzed have the same duration (30 years), in order to maintain the coherence for comparison purposes, as comment the reviewer. Thus, in both cases (historical and future), we run 30 years and compare the results for these periods. This was clarified in the manuscript. Only a shorter period was used to validate the CORDEX models due to the availability of measured precipitation data from pluviometers. In that case, the period 2008-2020 was used to validate CORDEX models with real data from pluviometers. However, in all the simulations, periods of 30 years (1990-2019 and 2070-2099) were always taken into account. This was clarified and specified in the new version of the manuscript (Lines 139-141, 156-157, 162-167).

"The capability of each of the more than 30 RCMs models to represent precipitation over the area under the scope was tested comparing RCMs precipitation data and field data from pluviometers managed by MeteoGalicia for the common period 2008-2020".

"Thus, a hydrological simulation was carried out for each valid CORDEX model considering both historical (1990-2019) and future (2070-2099) periods."

"Changes in alert flood situations between historical and future periods were evaluated for each valid model. This analysis was carried out considering the total number of days under flood risk situation detected throughout the historical period (1990-2019) and the changes expected in the future period (2070-2099). The possible variation in the seasonality of the floods has also been evaluated. In addition, the river flow series obtained for the entire historical and future periods considered also allow the analysis of the expected changes in the general variability of river flow."

Why the figure 5 presents the results for the whole year? The authors explained in the methodology that the period that they use to validate the precipitation data was for the wet season (November-March).

The November-March season was used to validate the ability of CORDEX models to reproduce precipitation patterns because it is when flood events occur in the area under study, and therefore, this is the period of most interest for the scope of this study. In fact, figure 5 corroborates this point; the flood events only occur during the November-March period. Once the models were validated, the complete years were simulated in the hydrologic procedure. Taking advantage of the information obtained, for sake of clarity we show the whole year in figure 5. This also allows corroborating when the flood season occurs and its evolution.

The authors mentioned that "The developed procedure takes between 2-3 weeks to execute each model". Please, include the characteristics of the computer used to run those models.

The simulations were executed on a computer with an AMD Ryzen 7 2700X processor, 32GB of RAM and a Nvidia RTX 3080 ti GPU. This information was included in the new version of the manuscript (lines 173-174).

"with the simulations executed on a computer with an AMD Ryzen 7 2700X processor, 32 GB of RAM and a Nvidia RTX 3080 ti GPU"

I recommend to the authors to include the limitations of the study. Is worthy to notice that there are several factors that could conditioning the future river flow that will reach a specific region, and not only the precipitation. The authors are representing the natural flow, but not changes in the man-made interactions with this flow. Changes in the aquifer capacity, in the river margins, in the soil characteristics, in the water use or in the hydroelectric production, among others, are non-easy predictable factors and will not be reproduced by the numerical models. However, they can have strong impacts in the floods.

We agree with the reviewer. The inclusion of the limitations of the study can help in the development of future studies. We add this information in lines 329-335.

“The present work has some caveats, namely that the river flow can be also dependent of other interactions. In this sense, the present study tries to represent and analyze the evolution of the natural river flow based on the expected changes in precipitation patterns, as well as the implications in terms of the future floods. However, river flow is also influenced by man-made interactions, such as changes in river margins, soil characteristics, water use or the hydroelectric management, among others. These factors, which are non-easy predictable, can also have influence on the flood evolution. In this sense, the present study can suppose a basis to following works dealing with the analysis and inclusion, at some extent, of the influence of these other interactions in flood dynamics”

Figure 1c should include the latitude and longitude

Done.

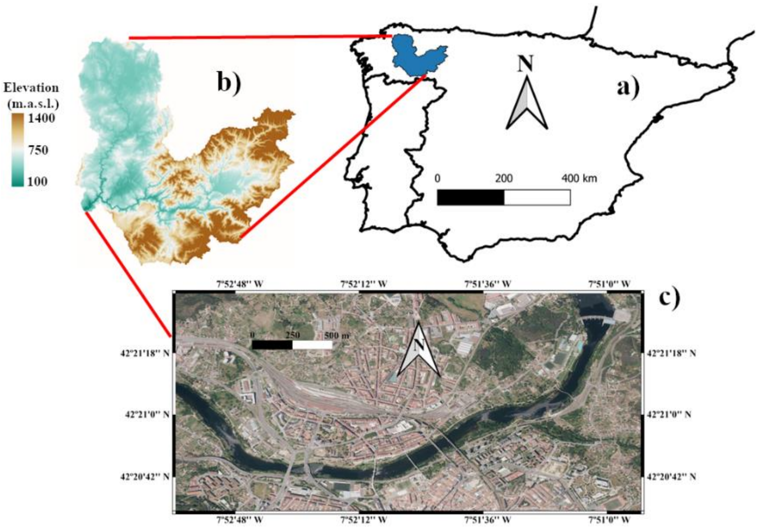

Figure 2: Future evolution of river flow risk instead of “risk river flow” and at Ourense city instead of in Ourense city.

Done.