

Interactive comment on “Stochastic approach to analyzing the uncertainties and possible changes in the availability of water in the future based on a climate change scenario” by G. G. Oliveira et al.

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Dear Reviewer, first we would like to thank you for reviewing the article. We greatly appreciate you for your valuable comments and suggestions. The comments are very helpful for revising and improving our paper. Thus, all requests were answered (see below).

Questions:

1. Title: It does not clearly reflect the contents of the paper. the title " Stochastic approach to analyzing the uncertainties and possible changes in the availability of water

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in the future based on a climate change scenario" gives indication of analysis availability of water in the future based on a climate scenario i.e. scenario A1B of IPCC SRES. However, the A1B scenario is supplied by the global coupled ocean– atmosphere HadCM3, in four members (versions) of disturbance in the global model – (no disturbance – CNTRL; low sensitivity – LOW; medium sensitivity – MID; high sensitivity – HIGH). Therefore, the key message should be anchored on the sensitivity of the climate system under the A1B scenario. Therefore, it is my opinion that the title " based on a climate change scenario" should read " based on scenarios of climate sensitivity".

Comment of the authors: Thank you for the suggestion. We agree with your opinion and made a change in the title, because it was not clear the fact that we used four versions of the same climate model. However, we understand that the best would be to change the section that reads "based on a climate change scenario" to "based on scenarios of climate change".

See changes in the manuscript: - Page 01, Line 03.

2. Language: The language used in the paper is not fluent and precise. Most of the sentences are very long. To improve readability, the authors should consider breaking them into multiple sentences. Moreover, most sentences have a good mix of both past and present tense.

Comment of the authors: Thank you for the comment. We made some changes in text.

See changes in the manuscript: - Page 02, Lines 07-09. - Page 02, Lines 12-15. - Page 03, Lines 09-12. - Page 04, Lines 23-26. - Page 06, Lines 09-12. - Page 09, Lines 01-04. - Page 09, Lines 27-32. - Page 16, Lines 18-21. - Page 21, Lines 15-19. - Page 25, Lines 11-13. - Page 25, Lines 15-17.

3. Page 2-Line 2/3: The sentence "for purposes of this study, it was adopted the period between 2011 and 2040" should be changed to read "for purposes of this study the

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period between 2011 and 2040 was adopted".

Comment of the authors: We agree with your suggestion.

See changes in the manuscript: - Page 01, Lines 12-13.

4. Page 2-Line 25/26: The sentence "On this topic the IPCC (Intergovernmental Panel on Climate Changes)" should be changed to read "On this topic the Intergovernmental Panel on Climate Change (IPCC)".

Comment of the authors: We agree with your suggestion.

See changes in the manuscript: - Page 02, Lines 05-06.

5. Page 4-Line 5: The authors indicate the 1961–1990 as "present climate". This should be change to "baseline". It should also be noted that the current baseline period for climate change analysis recommended by World Meteorological Organization is 1981-2010.

Comment of the authors: We agree with your suggestion regarding the replacement of "present climate" by "baseline". The choice of the period 1961-1990 to "baseline" is due to the availability of data from the Eta CPTEC model, provided by the National Institute for Space Research (INPE), the main agency of weather forecasts and climate projections in Brazil. Climate projections for the future from this regional climate model were obtained considering the period of 1961-1990 as "baseline". Unfortunately, data were not available for the period 1981-2010. Even so, we decided to choose this climate model because of INPE's recommendations, considering that the Eta CPTEC model is widely used and analyzed by the institute and has presented good results both in weather forecasts, as in climate projections. Some examples of recent studies (see Page 04, Lines 03-09) that used these projections: Pesquero (2009), Chou et al. (2012) e Marengo et al. (2012).

See changes in the manuscript: - Page 03, Lines 07-08. - Page 05, Lines 15-26.

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6. Page 4-Line 13: The sensitivity experiments used are based on A1B SRES scenario. However, since the authors acknowledge the recent IPCC assessments (AR5), would it be appropriate to also use the recommended emission scenarios i.e. Representative Concentration Pathways (RCPs) as per the AR5. Page 9 Section 2.4: would it be critical to clearly state the criteria used to select the climate scenario (i.e. the A1B SRES scenario) used for sensitivity studies.

Comment of the authors: Thank you for the comment. First, it is important to emphasize that the selection of climate change scenario was made at the beginning of a research project that originated the doctoral thesis (2010-2014) of the first author of this study. At that time, the new IPCC scenarios, for the AR5, were not yet available. Furthermore, all the data from the climate model Eta CPTEC were provided by the National Institute for Space Research (INPE). This agency has recommended the use the A1B scenario in four versions with different sensitivities. These versions were already being examined in another spatial scale, in large areas of the South American continent (example: Marengo et al., 2012). Therefore, given this context, we decided to evaluate these scenarios in more detail scale to analyze the impacts of climate changes in medium and small river basins of Brazil. Furthermore, although the A1B scenario is not the more appropriate since the release of the IPCC AR5, it does not compromise the present study, which aims at a methodological approach based on stochastic models. That is, the main purpose of this study is to investigate the possibility to evaluate changes in the water availability using only one climate scenario, by generating synthetic flow series. The main contribution of this study is to show one way in which climate data can be processed to obtain results related to climate impacts on water resources.

See changes in the manuscript: - Page 05, Lines 15-23.

7. Page 21 Section 3: Since the study is using both observed and simulated climate data, would it be appropriate to briefly discuss the spatial/temporal patterns of the climate variables in the basin for both past and future to enable the reader link results

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provided to possible changes in the availability of water in the future based on a climate change scenario.

Comment of the authors: Thank you for the comment. We added some sentences in the manuscript.

See changes in the manuscript: - Page 19, Lines 13-22.

Please also note the supplement to this comment:

<http://www.hydrol-earth-syst-sci-discuss.net/12/C1932/2015/hessd-12-C1932-2015-supplement.pdf>

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