Response to the comments of referee 1

Below, the referee comment marked by "RC1" is followed by our answer, marked by "AC1"and in italics. The proposed new text in the revised manuscript is written in bold.

RC1: This well-written paper provides an introduction to and evaluation of a web-based tool, designed by the authors, to support climate change adaptation: the Climate Change Impact of Water Resources (CCIWR) Explorer. While very thorough and informative in introducing the tool and in sharing the results of the evaluation, the scope of the paper is perhaps somewhat limited. Specifically, the paper currently does not put forth a larger argument/main point as part of an effort to address gaps in existing knowledge in geoscience communication. Prompting questions for the authors are whether and how they can apply the evaluation toward a more generalizable purpose (e.g., lessons learned that apply broadly to the advancement of geoscience communication and beyond the improvement specifically of this tool). There is one comment made at the end of the paper to this effect (pg. 21, starting line 495), but it does not quite offer readers a great deal of insight into the reasons why the evaluation of web-based tools is important.

AC1: We are happy that the referee regards our manuscript as well-written, and very thorough and informative in introducing the Climate Change Impact on Water Resources Explorer web app and sharing the results of the evaluation. The scope of the manuscript as envisioned by us is likely somewhat different from what the referee expected. The manuscript does not aim to provide "the reasons why the evaluation of web-based tools is important". We believe that its main value for a broad audience lies in

1) showing how quantitative information on uncertainty of climate change impacts can be communicated (both in the web app and, based on the web app data, in participatory climate change adaptation processes, the latter described in the discussion section) and

2) how a website that provides map-based information on climate change impacts can be technically implemented using a simple technology (Google Earth Engine) that is accessible for free to researchers.

Both aspects go beyond the tool description and are certainly gaps in geoscience communication, 1) related to information for widely required climate change adaptation and 2) helpful for those researchers and consultants who want to any low-cost map-based geoscientific web application.

We plan to clearly formulate the broader value of the manuscript by revising the last paragraph of the introduction and adding a sentence to the abstract. The proposed final paragraph of the introduction reads as:

In this paper, we present the CCIWR Explorer and show the results of its evaluation by pilot users. We then discuss 1) how the CCIWR Explorer represents uncertainty as compared to similar web apps, 2) the suggestions made by pilot users for improving it and their implementation in the revised version of the Explorer, and 3) how to best apply the Explorer in participatory processes on climate change adaptation in the water sector. This paper is of broad interest to researchers and consultants beyond the specific web application due to the following. Firstly, it shows how, in climate change adaptation processes, whether relating to water resources or other impacts such as crop yields, natural vegetation or wildfires, multi-model ensemble-based information on the uncertainty of climate change impacts can be most effectively communicated through web apps, and, consequently, in

participatory climate change adaptation processes. Secondly, it informs researchers and consultants on how a web app that provides map-based information on climate change impacts can be implemented at low cost using basic programming skills. The code of the web application developed on the Google Earth Engine platform is made available to support the development of similar web applications.

The proposed final sentence of the abstract reads as:

The code of the web application developed on the Google Earth Engine platform is made available to support the development of similar web applications.

RC1: Discussion section 5.1 (starting pg. 14): Here the paper seems to lose its central thread. Rather than discuss the results of the evaluation within existing, relevant literature, there is additional data introduced (i.e., results of discussions in different participatory processes for water management). It seems that for this data to be included in the paper, the approaches/methods used to engage groups and frame discussions should be included within the methods section, and the results of those discussions should be included in the results section. The purpose of the discussion section would then be to discuss the combined results in relation to the existing literature that gives framing to the entirety of the paper (again, the larger argument/main point/gaps in knowledge addressed).

AC1: After considering this comment, we believe that the order of the three subsections of the Discussion section should be changed. We propose to put section 5.1 "Usage of information provided by the CCIWR Explorer in local participatory processes for climate change adaptation" as the last section of the Discussion section, i.e., as section 5.3.

The central topic of the manuscript is the thorough description of the web app on the uncertain impacts of climate change on water resources and its evaluation. It therefore makes sense that the discussion starts with comparing the web app, in section 5.1, to similar map-based web applications that show climate change data (such as the IPCC interactive portal) or simulated climate change impacts on water resources, focusing on the representation of uncertainty (now section 5.2). This would be followed by "Pilot user suggestions for improving the CCIWR Explorer" (now section 5.3, in the revised version 5.2), and only as section 5.3, we would discuss how the information provided by the web app can be used in local participatory processes for climate change (now section 5.1). This is a more suitable order as it proceeds from positioning the web app in previous research/other comparable web apps to discussing how the evaluation results have supported the improvement of the web application and finally to showing how the information provided by the web app can be used in participatory processes.

The discussion on usage of the information in participatory processes was suggested by the editor. As we have previously published on the usage of multi-model-based information on climate change impacts in three different participatory processes, we integrated our experiences and research relevant to this manuscript by referring to five of our publications. Therefore, different from the suggestion of the referee, it would not be suitable to include this information in the methods and results section; it is not a method or result of the submitted manuscript.

RC1: Pg. 15, line 229: The transition between paragraphs is unclear. From here it also becomes a bit difficult to understand the discussion section as it goes into detail about the participatory workshops for which thorough description of methods, etc., is not previously provided (see prior comment). Some of the approach/methods is embedded within this text but not all of it is explained (e.g., line 322 makes reference to previous interviews with stakeholder representatives but it is unclear when, with whom, and for what purpose, etc.).

AC1: We think the referee refers to p15, line 329. We believe that there is enough detail on the participatory processes provided as far as it is relevant for this manuscript. For more detail, the reader can read the papers we refer to in the text.

RC1: Similarly, Section 5.2 does not currently contain discussion of results but rather introduces new information (i.e., comparison of CCIWR Explorer with other tools). This comparison is a somewhat difficult to follow in the absence of visual aids.

AC1: It is quite usual that a discussion section includes how research results or products compare to results or products of similar studies already available in the literature. This is what section 5.2 delivers.

RC1: In sum, it is clear that the authors have put forth significant effort to develop and refine the CCIWR Explorer through different forms of evaluation. To streamline this paper in a way that clearly lays out the different phases of evaluation (in methods and results) and then discusses the combined results in relation to an overarching point the authors choose to make will strengthen it greatly.

AC1: The study did not focus on different phases and forms of evaluation. We developed the web app based on our experiences in quantifying climate change impacts using multi-model ensemble output and communicating this information in participatory processes on climate change adaptation in the water sector and then evaluated the web app by a formal online user evaluation.

In what will be the final section 5.3 of the Discussion section of the revised manuscript, we discuss these experiences of communicating uncertain climate change impact information in participatory processes on climate change adaptation, to recommend how the information provided by the web app is best integrated in such participatory processes. This is not an evaluation of the web app, also because the web app did not yet exist when these participatory processes happened (only the type of data, the multi-model ensemble output, and the presentation as percentile boxes existed then).

We are confident that with clarifying the overall information and content and value of the manuscript in the last paragraph of the introducing and with changing the order of the subsections of the discussion (and some improvements suggested by referee 2), the manuscript will become more easy to read and more informative.