Please find our inline response following each comment.

Overall, I like the manuscript. For example, I think it is a good idea to use an earlier study as a starting point, and compare with those results, as well as a comparison between two different countries on two different continents. I also like connections drawn between the perceptions and cultural similarities/differences, and I think some of the discussions related to these issues are new and interesting. Further, I like the idea of having a workshop with metservices to discuss topics and questions when preparing the study/survey. I do think that such a paper fits within the scope of the journal and will be interesting to readers of Geoscience communication as well as to the wider meteorological society. However, I also have some issues that I think the authors need to sort out before the manuscript is ready for publication (major revision required). Below you will find my comments. They are numerous, but you should not be scared; I'm not negative to the manuscript, I'm just engaged in the topic and want to contribute such that it can make a higher impact.

Authors' response:

Thank you very much for your kind words. This has truly been a wonderful interdisciplinary study which we hope will have positive ramifications for the uptake of metocean forecasts.

General comments

1. To me, and others unfamiliar with the methodology used in the study (I assume many from the meteorological services are), it would be good to get a better idea of the concept/method earlier in the manuscript. There are many paragraphs and sections mentioning "CCA" and "(shared) knowledge", but I don't really understand what it is before late in the results section when more concrete examples are given. Perhaps the authors could consider including an example of the result and which knowledge they are talking about already in the abstract. Now the abstract is describing the methodology, but little is said about the results or impact of the study, so including an example of a result could strengthen the abstract anyway, I think. The same can be said about the results section, which is interesting, but is a bit technical or abstract to people not familiar with CCA. Actually, it is not really before I read section 4.2.2 I started to understand what this actually was about. Then it also connected better to the research questions, than earlier in the results section. Again, it would help the reader better understand if there were some concrete examples of knowledge types/impact factors/questions etc. early on and/or throughout the manuscript, to make it easier to read and understand.

   Authors' response:

   Thank you for these helpful comments. In order to give clarity to the method and process, we reorganized the Introduction and Background sections to bring forward the Aims section, where we also added some research questions that

align with the conceptual framing and the method (cultural consensus analysis). This is hopefully helpful in linking objectives and questions with the method.

Furthermore, we added into what is now section 2.2 the following blocks of text with new references (highlighted), these are also visible through the track changes document.

"The type of relationship users cultivate with the ocean, and the resulting information need that is generated, is not only driven by geographical contexts but also by sectoral differences that determine sociomaterial (linked human-technological) settings (Blair et al., 2020; Lamers et al., 2018). Marine meteorological forecast users engage with metocean information as a tool to mitigate risks. Attitudes toward risks are a result of a constellation of individual and cultural factors, tied to bias, attitudes, preferences as well as societal influences and dominant worldviews (Fischhoff et al. 1978; Douglas and Wildavsky 1982; Lichtenstein and Slovic 2006; Kahan et al. 2012). These attitudes together can have a profound impact on the type of weather and climate information sought for decision making (O'Connor et al.2005; Kirchhoff et al. 2013). We also know that mariners and the organizations underlying navigation develop distinctive traits based on unique mental models, organizations and decision-cultures (Lemire 2015; Kuonen et al., 2019; Hederstrom n.d.) and these factors uniquely impact mariners' information needs (e.g. Wagner et al, 2020). Forecast services are used in distinct ways in different sociomaterial settings, and these differences impact the temporal and spatial scale at which information is needed for planning and for tactical decisions. Consequently, the socio-economic value that may be derived from salient forecasting services varies across a wide spectrum of geographic and sectoral contexts as well."

and:

"As more interdisciplinary research includes diverse stakeholders and their observations about the technical, natural and human factors that drive the need for information, it is increasingly apparent that understanding user needs, often in cross-sectoral and cross-cultural settings, is a significant challenge. Culture affects users' perceptions about, and attitudes toward, technologies in general (Lee et al. 2007; Lim & Park 2013), and the meaning and relative importance of salient scientific information (e.g. Martinson & Westwood 1997).Traditional interview and questionnaire methods do not always explain the variation in experiential knowledge that may exist across representatives of a wide range of sectors and decision environments. We used Cultural Consensus Analysis (CCA) (Romney et al., 1986) to document this variation and to look for patterns in user perceptions about the important factors that make forecast products trusted and used."

and into Methods section, 1st paragraph:

"An advantage of cultural consensus analysis is that a small population of respondents can yield rich observations and data about sector (commercial and

recreational) or locality-specific (South African and New Zealand) views and knowledge domains as they may exist among participants."

and in Section 4.2.1, 2nd paragraph we modified the sentence for clarity about group-level knowledge and the consensus model:

"A group's average estimated knowledge score above 0.5 indicates moderate agreement in the group, pointing to about an underlying model of shared knowledge (Weller, 2007). An individual's competence (or knowledge score) is the probability that the informant knows (not guesses) the answer to a question, and it is a value between 0 and 1."

These steps should help to solidify the links between our aims and the methodology used, as well to familiarize the reader with the language.

2. Related to this is another issue, I think the manuscript would become stronger if there is a better connection to the research question throughout the whole manuscript. My impression through the title, the aim section, and the research questions in 3.1, is that the study is mainly about forecast perception and factors driving uptake of information. This fits quite well with the topics discussed in the introduction. However, section 2, which I find interesting, is more about cultural dimensions, naturally the same with the methodology section (CCA) and discussion.

   Authors' response:

   The cultural dimensions establish the "knowledge groups" or the cohesive, group-culture thinking about the issues at hand. Once we establish that these shared knowledge groups exist (or not) based on locality and sectoral affiliation (section 4.2.1) then we present what exactly each group thinks about the issues (section 4.2.2). We made an effort to better organize these thoughts and added the following text at the end of Section 4.2.1 as a transition to Section 4.2.2:

   "In the next section we present the answers (the consensus results) in each group of analysis, for a comparative analysis of the ways in which locality (national affiliation) and sectoral affiliation resulted in the same or different answers to our questions."

   Also, parts of the results (especially 4.2.1) are a bit technical and focus differences between groups and demographics, whereas the research questions are much more concrete about perceptions and usage - section 4.2.2 is more like what I expected to read. There might be something I miss out, or need to read more carefully, but at the moment I am wondering if the authors could consider to better connect what I believed the study was about (perceptions and uptake) and what I think part of the study is focusing (culture and differences between groups) such that it become more coherent. Maybe it needs some

restructuring, or maybe it just needs to make it clearer through the title, introduction of research questions.

Authors' response:

As we responded above, both aspects (culture and perception/usage issues) are linked and important: we first establish the existence of knowledge/perceptions that are driven by geographically or sectorally determined "cultures" and then in Section 4.2.2 show how each "culture" responded similarly or differently to the same questions. To this end, we completely reorganized and cleaned up Section 4.2.1 to shorten it and make it less technical, with a transition sentence to link the culture section to the survey results section in Section 4.2.2.

In order to ease the reading of Section 4.2.1 by making it less technical, and to make it more concise - focusing on only the most relevant information to support conclusions in the main text, we moved a large block of explanatory text into what is now Appendix A. This block of text explained in great detail the patterns of variation in Table 1, but the Figures (2-3) that follow and the analysis of those scatter plots serve the same purpose. This made those several paragraphs superfluous, though someone specifically interested in the methodology may wish to overview this info as an Appendix.

Furthermore, we added this explanatory text in Section 4.2.1 paragraph 4:

"Those who had high levels of agreement with each other are situated close to each other, while those who had high levels of disagreement are scattered proportionally farther apart."

to assist the reading/interpretation of the scatter plots.

3. There are recommendations about how to provide information, but they are quite general (easy navigation, few clicks, accurate forecasts etc.). Hence, I am not sure how useful they are to service providers developing platforms. How many clicks are few clicks? What is easy navigation, and for who? What is an (in)accurate forecast? This makes me wonder who the study is for, operational people or researchers? If the study is aimed at operational meteorological services, to improve value of metocean forecast information, perhaps the study would have a bigger impact if more concrete recommendations can be suggested (if possible, given the data the authors have), and (as explained above), more examples related to the CCA is made throughout the manuscript. I am also wondering if it is possible from Table 2 to see which one is more important to the participants (is it related to the percentages)? e.g. visual experience and number of clicks can be leading the service provider in the same direction, but it can also be a contradiction or dilemma, and which one should they then focus?

Authors' response:

It is difficult to also go into detail with regards to how many clicks are too much. That will basically be an entirely different study and will also differ between user groups. The aim was rather to make it clear to service providers that these aspects of platform development are important and must be part of the initial design as well the construction of tools and platforms. That is where the usefulness lies. It will not be possible to say as an example: "3 clicks are the maximum", as that is a whole new layer of information and would have made the survey far too cumbersome. Thus, depending on the particular tool these parameters must then be minimised, also taking into account the target audience.

With regards to inaccurate forecasts - this is also not linear or trivial to define. Numerical model skill and accuracy definitions are a whole field by itself. They also differ between the atmosphere and the ocean and the particular parameter. In the present study we were rather interested in how important accuracy is for users (in whichever way they define it). If we went into too much detail in this regard the survey would again become too cumbersome and we would have struggled even more to get enough participants. A question regarding accuracy is important for all users, as even recreational users do have their own concept of accuracy (or reliability).

To ensure that the data of the present study is better understood, a more in detail explanation of Table 2 was added (where all the data have been summarized).

Table 2 caption has been updated to better explain the table for the reader, and Section 4.2.2 starts with the following amended text:

"Table 2 presents the results of the survey. These are the direct questions and resulting propositions that were distributed in the survey and form the basis of the present study. The column titled "whole-group CCA" is based on the consensus analysis of all respondents together, and it shows the aggregate group belief (culturally-correct answer) with either agreement (green icon) or disagreement (red icon) with the propositions. The other columns indicate the percent frequency of matching answers (or agreement with the whole-group CCA), in each subgroup. In case a subgroup's own consensus-model (consensus analysis run only including its members) produced a group belief that deviates from the whole-group CCA, the added icon indicates the correct answer in the sub-group."

Specific comments

1. This relates to the survey or the questions. When I read, some data/results come a bit surprising, because I couldn't see the questions or topics being mentioned explicitly earlier. For example, in line 442, it says that the participants were questioned about their trust of their own NMHSs. Where can I see that question?

Is it part of table 2.2 (are all questions asked there), or are additional questions also asked but not shown? That should be made clear in the manuscript.

Authors' response:

Some questions did not fulfil the criteria for CCA. Thus, their results were not added to the manuscript. The raw survey results we deemed still valuable and thus chose to convey this information in the text. To ensure this is clear to the reader a paragraph has been added at the end of Section 4.1, explaining the caveats of the additional data presented there.

2. I am a bit surprised that uncertainties related to climate change are part of the research questions. The title and introduction does not really give an impression that climate change is a topic, and I find little about that in the results as well, I think (until the end of section 4.2.2). Still, it is part of the discussion and conclusion. I think it needs to be clearer in the introduction that this topic is part of the study, since it does not directly relate to the perceptions and uptake of forecast information, at least not to me.

   Authors' response:

   The climate change topic has now been added to the abstract:

   "We discuss the implications from our findings on important factors in service uptake, and therefore on the production of salient forecasts. Several priorities for science-based forecasts in the future are also reflected on considering anticipated climate change impacts."

   In the background of the study:

   "With the continuing rise in Climate Change impacts and changing weather patterns, user understanding, and uptake of forecast products have never been more important (a sentiment echoed in the results of the present study). Here, we will focus on ocean and coastal users and include marine forecasts as the main predictand."

   In Section 3.1 the fourth point also highlights uncertainties regarding future forecasts. Here some text has been added to ensure the reader understands we are referring to Climate Change (CC). It is also important to remember that users' perceptions of CC will play an important role in estimating the relevance of forecasting (and science) in the future. Through this connection CC is thus related to perception and uptake as the environment is already changing.

3. Line 98-99: A distinction between specialist users and the public is made, and I agree level of understanding can be an explainer. However, maybe it is worth mentioning that it can also be easier to agree upon communication with a specialist user group than the general public? Another point (related to this and lines 230-235, which I agree upon) is that some commercial users want/need to be efficient, they are not interested, it is just part of their work, whereas some recreational users are really interested, they don't need to be effective. Hence, a

strict categorisation is difficult, in some situations a person can be an interested specialist, in others spend little time. It can depend on the task, not only the person or group. (see the first paper suggested below for more details.)

Authors' response:

The following sentence has been added to Section 2.1:

"Doksæter Sivle and Kolstø, (2016) investigated the use of online weather information for everyday decision making. Here it has become clear that this distinction is also dependent on the task (for which the forecast is used) and not only on the person or group."

4. Line 143 - would be nice if the authors could consider to give an example of language weaved into ocean-based references and symbolism.

   Authors' response:

   A sentence has been added explain the Mangopare, which also features in the MetService's logo.

   One such example is the Mangopare (hammerhead shark symbol). The double Mangopare has been incorporated into the New Zealand MetService's logo and represents weather prediction and oceanography and their dependence on each other.

5. Line 147 - explain short who Khoisan people are?

   Authors' response:

   The following sentence and reference have been added:

   "*Here Khoisan refers to the first indigenous peoples of Southern Africa (Rito et al., 2013)*."

6. Research question 3.1: Studying forecasts (the content/information) or forecasting platforms? Could be worth clarifying throughout the manuscript.

   Authors' response:

   This has been clarified

7. I am sure it is a sufficient number of participants according to method, but still 31 from South Africa is not much in terms of absolute numbers. I just want to ask the authors to be careful in their language so they do not generalize the findings, e.g. line 257 ("while South African users" - should be participants?).

   Authors' response:

   Line 257's "users" have been changed to "participants".

8. Figure 1G and line 280: It might be me not reading the text well enough, but is it clear whether these groups include both commercial and recreational users, or one of them (e.g. windsurfers or people having a windsurfers rental; commercial fishers, or people having fishing as a hobby etc.)?

   These were generalised questions that all participants answered and thus these are all the participants. Clarifying text was added on the original line 357.

9. Lines 285-290: If possible, a map showing the areas would be useful.

   Authors' response:

   The new Figure 2 has been added.

10. Line 465: A good explanation of what a red cross in Table 2 actually means. Perhaps something similar can be given earlier in the manuscript, to make it easier to read Table 2?

    Authors' response:

    We added the following block of text (highlighted) in the 1st paragraph of Section 4.2.2:

    "The subgroups' consensus models can be found under appropriately titled columns. Where the subgroup's own consensus-model matched the whole-group CCA, we provide the Values are percent of responses that matched the whole-group CCA to show level of agreement. Where a subgroup's own consensus-model deviates from the whole-group CCA, the added icon indicates the correct answer in the sub-group. "

    This, along with Table 2's caption, will hopefully make it clearer to readers how to interpret the symbols and numeric values in the table.

11. Line 512: There are cultural differences, yes. I am speculating - perhaps you know - are there also other differences (economical) steering if people have recreational use of the coast?

    Authors' response:

    Very good points and might also be true. This might add another layer of detail to the results that we did not tease out currently and falls a bit outside of the scope of the present study.

12. I want to suggest a few references that might be of interest to the authors:

    1. Doksæter Sivle, A., & Kolstø, S. D. (2016). Use of online weather information in everyday decisionâmaking by laypeople and implications for communication of weather information. Meteorological Applications, 23(4), 650-662.
    2. In Norwegian, a user survey from 2015 related to marine services (https://www.met.no/publikasjoner/met-info/met-info-2015, number 15/2015, Gjesdal et al.)