Author’s response to Referee Comment 2

I am grateful that the referee has taken the time to write a second review of the manuscript, providing helpful suggestions for making improvements to the manuscript. Below are my responses, which I hope will give answers to the referee’s satisfaction. A number of modifications, mostly additions, have been included in the manuscript revision which is presently being prepared for submission.

1. From referee item 1:
   [Section 3] contains a lot of quantitative information, and it may be helpful to know how the end-user might translate the information, for example the distribution in table 2.
   I realize that the discussion on the results in Table 2 might benefit from additiopnal considerations. So in response to the referee’s suggestion, a new paragraph has been added, with the following contents: *The conclusions that can be drawn from these results are that the largest expansion of sea ice extent in the model (SVIM) result are underestimations when compared with observations (ice chart data). This is the case for a general forecast bulletin, as the SVIM median is in the range 20 – 30 km, while the median of the ice chart data is in the range 30 – 40 km. The underestimation is also seen for extreme cases, as the frequency of maximum expansion exceeding 60 km is about five times as high for the ice chart data. Note that the ice chart data deviates from microwave products, particularly in the final months of the melting season (e.g. Sect. 6 in Melsom et al., 2019). Hence, the true sea ice extent is unknown.*

2. Also from referee item 1:
   It would also be interesting to see if the ranks achieved by the model have a temporal or spatial pattern.
   I agree that this is interesting, but it is also challenging, particularly with a very dynamic ice edge in a limited domain as in the 2 year case study in Section 3. (The fact that the domain is limited has implications for the degrees of freedom, given the spatial decorrelation length, as e.g. discussed in relation to equations 9 and 10.) In response to the reviewer’s valid request, I have chosen to add results by splitting the domain in two parts, separated by the 40°E meridian. The results will be discussed in the revision, and presented in a new panel in Figure 5. I provide the revised version of Figure 5 at the end of this reply. The meridian of separation will be highlighted on the map in Figure 3.

3. From referee item 3:
   [line 203] seems to imply that a random distribution of 235 integers between 0 and 9 will have 4.015 and 4.985 as the 0.005th and 0.995th percentiles respectively. I tried to reproduce this with various integer distributions with mean at 4.5 and cut-off at 0 and 9, but was not able to do so.
   First, I realize that my reference to percentiles was incorrect, this will be rewritten to “*0.5th and 99.5th percentiles*”. Secondly, the number of digits was unnecessary large, and the range will be rewritten to “*percentiles of ranks are 4.02 and 4.98, respectively*”. Finally, regarding how these values can be found, first observe that for ranks, the underlying distribution is flat. Then, code in R for estimating the percentiles is as follows:

```
minVal <-   0
maxVal <-   9
nVal   <- 235
nCases <- 1000000
aveVal <- vector(mode="numeric",length=nCases)
for (n in 1:nCases) {
    values    <- sample(minVal:maxVal,nVal,replace=TRUE)
    aveVal[n] <- sum(values)/nVal
}
lim99lo <- round(0.005*nCases)
v99lo   <- sortVal[lim99lo]
lim99hi <- round(0.995*nCases)
v99hi   <- sortVal[lim99hi]
print(paste(v99lo,v99hi))
```

```
quit("no")
```

The final print statement should give values that can be rounded to 4.02 and 4.98, respectively.

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Revised version of Figure 5