Response to referee comment Anonymous Referee #1

We appreciate and would like to thank Anonymous Referee #1 again for taking his/her time and effort to read our manuscript. We would also like to thank him/her for the subsequent positive second feedback to our proposed corrections following his/her review. Here we would like to provide a more detailed response to all the points raised by the referee (original comments in black, our response in blue). We hope that with these suggested improvements our manuscript will be fit for publication.

Considering the general comments:

1- I think the title should be rephrased mainly because the manuscript present results from hydrological models (estimations of evaporation) instead of direct measurements. Thus, I believe it could be more realistic the title "Estimation of evaporation . . ...".

We agree that clarifying in the title that we refer to simulations/estimations instead of using direct measurements, will clarify the topic of our paper. We would like to suggest to change it to 'Evaporation from a large lowland reservoir – (dis)agreement between evaporation models from hourly to decadal timescales'.

2- Page 7, line 12 – "we chose to give preference to a long-term dataset . . . rather than shorter-term dataset . . . more close proximity to lake IJsselmeer". I understand this point but can you explain more about the shorter dataset? Where is it? When started and finished? Which are the variables? Have you done a data comparison between this site and De Bilt?

We agree on this point that this information is lacking and we will add a few sentences on this. For now to explain in detail, we can describe the following about it: There are two other locations in the vicinity of lake IJsselmeer where meteorological variables are measured by the royal national meteorological institute (KNMI), namely in Stavoren and Lelystad (Fig. 1). At both these locations the measurements started in 1990. In Stavoren the measurements started mid 1990 measuring only wind speed and direction and air temperature at 1.5 m. Relative humidity was added to the observations end of 1990 and measurements of global radiation only started mid 1993. Other variables that are needed in the analysis started end 2002 (i.e. cloud cover) or are not measured at all (i.e. air pressure). In Lelystad the measurements have started in the year 1990 as well, but measurements of air pressure are starting only mid 1992, and of cloud cover end of year 2002.
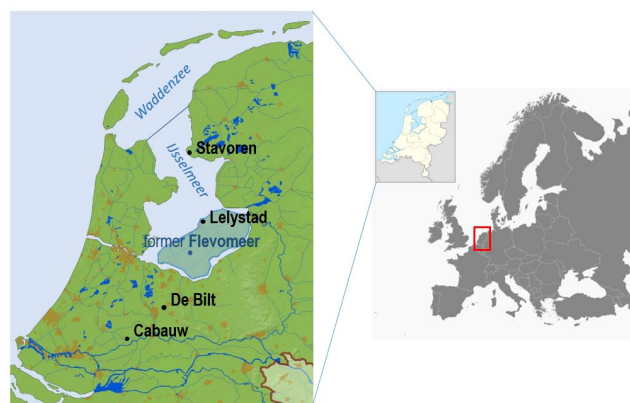
Figure 1: Overview of the area of interest and the locations of the observational stations.

Except for the wind speed, which is lower in De Bilt than in Lelystad and Stavoren, the variables are comparable between Stavoren and De Bilt, and Lelystad and De Bilt (Table 1). In terms of the behaviour of the wind speed, e.g. its daily cycle and frequency distribution, there is no substantial

difference between the locations. In terms of quantity, the lower wind speed in De Bilt will have the largest effect on the wind-driven Granger-Hedstrom evaporation method. However, we think it will not change our conclusions, since we are merely comparing the evaporation methods in a, close to synthetical, experiment, which we then translate to the IJsselmeer region.

Table 1: Comparison of meteorological variables between locations De Bilt, Lelystad and Stavoren.

	De Bilt		Lelystad		Stavoren	
	mean	sd	mean	sd	mean	sd
T_{air} [°C]	10.4	6.8	10.1	6.8	10.2	6.5
u [m s^{-1}]	3.5	1.9	4.4	2.4	5.9	3.0
K_{in} [W m^{-2}]	115.2	189.8	117.1	193.0	123.0	203.0
RH [-]	0.82	0.15	0.84	0.14	0.85	0.11

3- Page 17, line 21 – You present Table 2 as a summary for IJsselmeer region. In your opinion what is the extension of your results? Can be extended for the northern region of the lake, for example?

Thank you for raising this point. The lake itself is large, but in terms of the major meteorological variables (e.g. air temperature, air pressure, global radiation, wind speed and relative humidity) and water depth (i.e. ranging from 1.5 to 6 m) it is not varying massively. However, there will probably be differences between the evaporation rate in the middle of the lake, where the air has had a larger probability to get saturated, compared to where there is more interaction between land-lake closer to the coast. In continuation of this study, we will explore the spatial distribution of the evaporation rate over the IJsselmeer region using satellite data.

4- Page 17, line 25 and 30 – What is the average annual accumulated precipitation in the region? And the magnitude of other input's?

Based on observations from De Bilt, the average annual accumulated precipitation is 821 mm, based on the years 1951 – 2018. It ranges from 536 mm in dry years, to 1240 mm in extreme wet years. Another source of input is through the rivers (e.g. the IJssel river), which is equivalent to rising water levels of 7036 mm in the IJsselmeer region on average yearly. This is based on data that originates from simulations performed with the LHM model (Netherlands Hydrological Instrument), which is not openly available. Sources of output, other than evaporation, are the discharge of water from the IJsselmeer to the neighbouring provinces for agricultural activities, and discharge to the Waddenzee for water level regulations. Based on this data the water balance shows that on average the yearly water level in the IJsselmeer region increases with 2 mm, but it ranges from -490 mm to 479 mm in dry or wet years, respectively.

Considering the specific comments:

'Page 3, Figure 1 – Figure 1 is not cited in the text and, in my opinion should be moved to section 2.3.'
This figure is used to illustrate the difference in behaviour of turbulent exchange above land compared to open water. We use this to demonstrate the relevance of comparing the different evaporation methods, of which most use drivers of evaporation that are relevant above land, but may not be relevant above open water. If the referee agrees, we will keep this figure in the introduction section and we will refer to it in the text more clearly (page 2, line 30).

'Page 5, Equation 1 – Please explain all symbols used in the text. '
Will be corrected.

'Page 7, Figure 2 – Please add a scale to the map.'
Will be corrected.

'Page 8, line 4 – Please add information on Ewater. For example: "distribution of water evaporation (Ewater)" '
Information will be added.

'Page 8, line 5 – Please add a Figure with WST obtained with Flake simulation.'
We could add figure 2 in which the time series of WST obtained with FLake simulation is shown, as well as its daily average cycle. However, we do not see the direct relevance of adding these figures to make our points clear. The referee has indicated in the second response to agree with us to not add this figure.
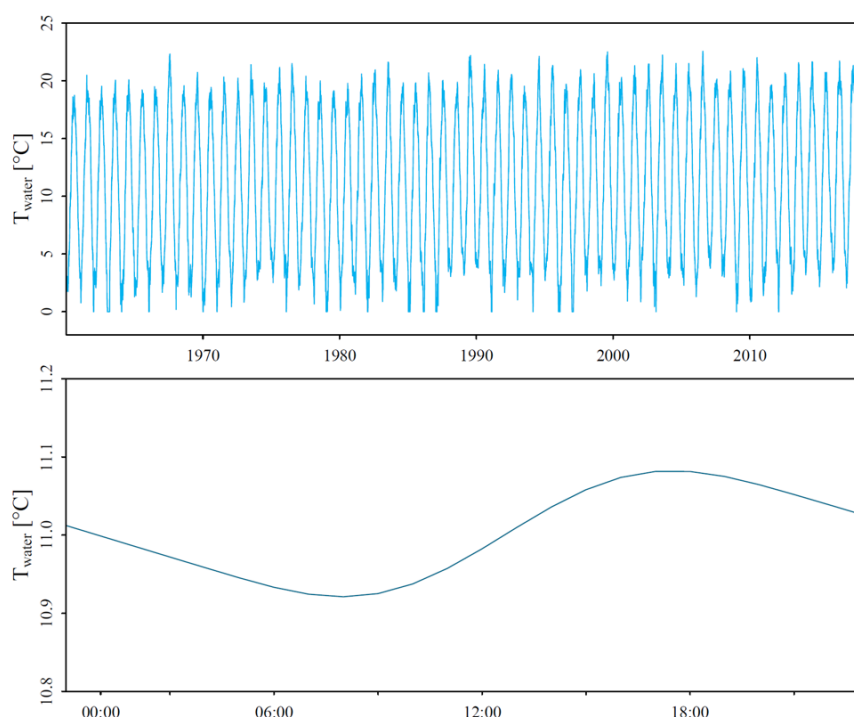
Figure 2: WST simulated using FLake, (top) hourly time series from 1960 – 2018, (bottom) average diurnal cycle.

'Page 8, line 14 – remove "and its sign".'
Will be corrected.

'Page 8, line 32 – "using a grid cell representing De Bilt", please explain/extend this sentence.'
With grid cell it is meant the spatial grid cell of the RACMO model representing the location of De Bilt. This will be added to the manuscript.

'Page 9, line 18 – I would like to see latent heat data from Cabauw in this section.'
We agree with the suggestion of the referee. The latent heat data as measured in Cabauw will be added to figure 3 as a reference.

'Page 10, Figure 3 – In caption please add information of the "lowered 7.5 degrees Celsius".'
Will be added.

'Page 10, line 3 – replace "Celcius" by "Celsius".'

Will be corrected.

'Page 10, line 13 – i) add the methods acronyms. ii) add information that the methods which incorporate heat storage capacity are correlated with u.'
Will be corrected.

'Page 10, line 14 – Air temperature has distinct CCW than what?'
Will be corrected into: 'Air temperature shows a pronounced counter-clockwise (CCW) loop when plotted as a function of global radiation.'

'Page 13, Figure 5 – Green color is difficult to perceive. Please replace by another color.'
Will be corrected.

'Page 14, line 1 – "were to change" replace by "is expected to change".'
We think that "were to change" is the correct verb tense in this case, so we would like to keep it unchanged.

'Page 14, line 17 – Before cite Figure 9 you have to introduce it first. The introduction to Figure 9 is in page 15, line 10.'
Will be changed.

'Page 15, Figure 7 – There are different bar sizes for "0.1" value, please correct. What is Ez? Please clarify.'
This is the result of rounded numbers. This will be more clearly indicated. Ez is the vapour pressure at height 'z'. Together with other symbols this will be clarified in table A1(b).

'Page 17, line 5 – The temperature gradient used in GH method was between water temperature resultant from FL model and air temperature from De Bilt? Please clarify and add information in the manuscript.'
This is correct, and will be clarified.

'Page 17, line 22 – Add the average and dry year's.'
Will be added.

'Page 18, Figure 9 – YY axis are close each other's and numbers are confused, please arrange it.'
Will be corrected.

'Page 18, line 3 – Please rephrase it.'
We suggest to rephrase it into: 'Based on the results of the RACMO realizations, it is demonstrated that the discrepancy between the methods is projected to increase from the year 2000 to 2100.'

'Page 18, line 8 – The surrounding land surfaces are agriculture surfaces?'
We are referring to agricultural land indeed. This will be added.

'Page 18, line 14 – Please rephrase it.'
We suggest to rephrase it into: 'Therefore, the trade-offs that water managers need to make become very precarious, especially knowing that their decision is based on a certain method that can differ significantly from another method in total predicted evaporation.'

'Page 19, Figure 10 – In this figure caption please remove the sentences starting on "The simulations...".'
Thank you for spotting this mistake. Will be corrected.

'Page 20, line 9 – Replace "All radiation methods" by "The methods that use the radiation approach".'

Will be changed.

'Page 20, line 22 – Please rephrase it.'
We suggest to rephrase it into: 'The difference between the methods at yearly timescale is also demonstrated when the total yearly water losses through evaporation for lake IJsselmeer are calculated.

'Page 26, Table A1 – If possible add a new column with method abbreviations. What is the symbol ra ? aerodynamic resistance?'
Will be added. Ra is the extraterrestrial radiation, which is explained in Table A1(b).