Once again, we are grateful to Dr. Haihong Wang and Anonymous Referee #2 and Referee #3 for their time and effort to review our ESSD data description paper. The comments and suggested revisions are appreciated and will improve our manuscript. The author's point-to-point responses to the referee's comments are detailed below.

Referee #1

1. The last two paragraphs of Introduction stating the objecitve of this study need to be improved.

Response: Thanks. We have marked the revision with track changes on the revised manuscript. Please refer to Lines 46-64 for details in the revised manuscript.

2. Line 83: The purpose of selecting full-year data is to remove seansonal and interannual signal in the altimeter data.

Response: Thanks. We have marked the revision with track changes on the revised manuscript. Please refer to Lines 84 for details in the revised manuscript.

Referee #2

I raised the issue that the averaging is problematic and asked the authors to provide an averaging time (or a center time) for the MSS to which it is referred to. DTU18 and CLS15 are referred to center time of 2013.01.01.

Response: Thanks for your referee again. MSS is obtained by time averaging the instantaneous sea surface height (SSH) observed by an altimeter over a finite period (Andersen and Knudsen, 2009). The CLS15 and DTU18 models are established with multi-satellite altimetry data from January 1993 to December 2012. Their fundament is the mean along-track SSH of uninterrupted joint T/P+Jason-1+Jason-2 in the time span from January 1993 to December 2012.

In Table 1, the mean along-track SSH of uninterrupted joint T/P+Jason-1+Jason-2+Jason-3 (hereafter T/P series) in the time span of each group is used as a fundament, e.g. the mean along-track SSH of uninterrupted joint T/P series between January 1993 and December 2011 is the fundament for the first MSS model. The SDUST2020 model derives from the average of nine MSS models. Therefore, the fundament for the SDUST2020 model is the average of the fundaments for the nine MSS models, i.e., the mean along-track SSH of uninterrupted joint T/P series between January 1993 and December 2019 can be considered as the fundament for the SDUST2020 model.

Table 1 Data grouped over 19-year-long moving windows shifted by one year (start date: January 1, 1993) for multi-satellite altimetry data from January 1, 1993 to December 31, 2019

Grouping	Time Span	Satellite altimeter data
Group 1	1993.1.1 ~2011.12.31	T/P (11~364)、Jason-1 (22~259)、Jason-2 (21~128)、ERS-2 (1~84)、GFO (37~208)、Envisat (10~93)、T/P Tandem (369~479)、Jason-1 Tandem (262~368)、ERS-1/GM (1994.04.10~1995.03.21)、Cryosat-2 (2011.01.28~2011.12.31)
Group 2	1994.1.1 ~2012.12.31	T/P (47~364)、Jason-1 (22~259)、Jason-2 (21~165)、ERS-2 (1~84)、GFO (37~208)、Envisat (10~93)、T/P Tandem (369~479)、Jason-1 Tandem (262~372)、ERS-1/GM (1994.04.10~1995.03.21)、Cryosat-2 (2011.01.28~2012.12.31)
Group 3	1995.1.1 ~2013.12.31	T/P (84~364)、Jason-1 (22~259)、Jason-2 (21~202)、ERS-2 (1~84)、GFO (37~208)、Envisat (10~93)、T/P Tandem (369~479)、Jason-1 Tandem (262~372)、Cryosat-2 (2011.01.28~2013.12.31)、Jason-1/GM (2012.05.07~2013.06.21)
Group 4	1996.1.1 ~2014.12.31	T/P (121~364)、Jason-1 (22~259)、Jason-2 (21~239)、ERS-2 (12~84)、GFO (37~208)、Envisat (10~93)、T/P Tandem (369~479)、Jason-1 Tandem (262~372)、SARAL (1~21)、Cryosat-2 (2011.01.28~2014.12.31)、Jason-1/GM (2012.05.07~2013.06.21)
Group 5	1997.1.1 ~2015.12.31	T/P (158~364)、Jason-1 (22~259)、Jason-2 (21~276)、ERS-2 (22~84)、GFO (37~208)、Envisat (10~93)、T/P Tandem (369~479)、Jason-1 Tandem (262~372)、SARAL (1~21)、HY-2A (67~117)、Cryosat-2 (2011.01.28~2015.12.31)、Jason-1/GM (2012.05.07~2013.06.21)
Group 6	1998.1.1 ~2016.12.31	T/P (195~364)、Jason-1 (22~259)、Jason-2 (21~303)、ERS-2 (33~84)、GFO (37~208)、Envisat (10~93)、T/P Tandem (369~479)、Jason-1 Tandem (262~372)、SARAL (1~21)、HY-2A (67~117)、Cryosat-2 (2011.01.28~2016.12.31)、Jason-1/GM (2012.05.07~2013.06.21)、HY-2A/GM (2016.03.30~2016.12.31)
Group 7	1999.1.1 ~2017.12.31	T/P (231~364)、Jason-1 (22~259)、Jason-2 (21~303)、Jason-3(24~69)、ERS-2(43~84)、GFO (37~208)、Envisat (10~93)、T/P Tandem (369~479)、Jason-1 Tandem (262~372)、SARAL (1~21)、HY-2A (67~117)、Cryosat-2 (2011.01.28~2017.12.31)、Jason-1/GM (2012.05.07~2013.06.21)、HY-2A/GM (2016.03.30~2017.12.31)、SARAL/DP (2016.07.04~2017.12.31)

Group 8	2000.1.1 ~2018.12.31	T/P (268~364)、Jason-1 (22~259)、Jason-2 (21~303)、Jason-3 (24~106)、T/P Tandem (369~479)、Jason-1 Tandem (262~372)、GFO (37~208)、ERS-2 (53~84)、Envisat (10~93)、SARAL (1~21)、HY-2A (67~117)、Sentinel-3A (6~32)、Jason-1/GM (2012.05.07~2013.06.21)、Cryosat-2 (2011.01.28~2018.12.30)、HY-2A/GM (2016.03.30~2019.01.04)、SARAL/DP (2016.07.04~2018.12.31)
Group 9	2001.1.1 ~2019.12.31	T/P (306~364)、Jason-1 (22~259)、Jason-2 (21~303)、Jason-3 (24~143)、T/P Tandem (369~479)、Jason-1 Tandem (262~372)、GFO (37~208)、ERS-2 (60~84)、Envisat (10~93)、SARAL (1~21)、HY-2A (67~117)、Sentinel-3A (6~39)、Jason-1/GM (2012.05.07~2013.06.21)、Cryosat-2 (2011.01.28~2019.12.12)、HY-2A/GM (2016.03.30~2019.12.30)、SARAL/DP (2016.07.04~2019.12.16)

Note: The numbers in the brackets following ERS-1/GM, Cryosat-2/LRM, Jason-1/GM, HY-2A/GM and SRL/DP are dates, and the parentheses following the other satellites are cycle number.

Andersen, O. B., and Knudsen, P.: DNSC08 mean sea surface and mean dynamic topography models, J. Geophys. Res.-Oceans, 114(C11), 327-343, https://doi.org/10.1029/2008JC005179, 2009.

When developing SDUST2020 the authors compute 9 "independent" solutions but averaged over 19 years near-identical data. When forming the avearage of this I asked the authors to consider that the data are not independent. I also asked the authors to provide a center time which the MSS is averaged to similar to other MSS. The authors answered with 5 pages of detailed repetition rather than an aswer.

Response: Thanks for your referee again. As shown in Table 1, some altimeter data overlap between each group, but each group of data was independently used to establish and obtain nine MSS models. Then these nine models are weighted to obtain the final SDUST2020 model. The result is still mean sea surface height, which does not violate the meaning of mean sea level.

The issue of correlated data is also an issue with the authors estimate the accuracy of the SDUST2020 model using the theory for averaging of independent data claiming data. This is also outright wrong as the data are not independent.

Response: Thanks for your referee again. How validate the reliability and accuracy of MSS models is a very difficult problem (Andersen and Knudsen, 2009; Jin et al., 2016). This is because the altimeter provides the most accurate SSH determination and because nearly all available altimetry data have already been used in the derivation of the MSS (Andersen and Knudsen, 2009). Usually, reliability and accuracy are validated by comparing with mean along-track altimetry data and other models (Andersen and Knudsen, 2009). Hence, the CLS15 and DTU18 MSS models are used, together with several mean along-track altimetry datasets after collinear adjustment and some other altimetry data independent of the SDUST2020 model. The method used in our study to validate the SDUST2020 model also refers to the practice of Andersen O. B., Pujol, Marie-Isabelle, Schaeffer, P., etc.

Andersen, O. B., and Knudsen, P.: DNSC08 mean sea surface and mean dynamic topography models, J. Geophys. Res.-Oceans, 114(C11), 327-343, https://doi.org/10.1029/2008JC005179, 2009.

Jin, T., Li, J., Jiang, W: The global mean sea surface model WHU2013, Geod. Geodyn., 7, 202-209, http://dx.doi.org/10.1016/j.geog.2016.04.006, 2016.

Pujol, M.-I., Schaeffer, P., Faugère, Y., Raynal, M., Dibarboure, G., and Picot, N.: Gauging the improvement of recent mean sea surface models: a new approach for identifying and quantifying their errors, J. Geophys. Res.-Oceans, 123(8), 5889-5911, https://doi.org/10.1029/2017JC013503, 2018.

Schaeffer, P., Faugére, Y., Legeais, J. F., Ollivier, A., Guinle, T., and Picot, N.: The CNES_CLS11 global mean sea surface computed from 16 Years of satellite altimeter data, Mar. Geod., 35, 3-19, https://doi.org/10.1080/01490419.2012.718231, 2012.

Also in the case of the comparison with Tide gauges later in the manuscript. I asked the authors to consider the tide-system as this contributes>10 cm to the mean difference between the model and tide gauges. This was not performed. Again the authors just repeated what they did in more detail (which doesnt make it less wrong) instead of responding to the question.

Response: Thanks for your referee again. Here, we compare the sea surface heights of these three models (CLS15, DTU18, and SDUST2020) with those obtained by GPS-levelled tide gauges around Japan, respectively, to independently validate the accuracy differences of these models in coastal regions. In this comparison, the sea surface heights obtained by GPS-levelled tide gauges have been adjusted to have the same reference ellipsoid as T/P. In table 6, the STD of sea surface heights difference between MSS model and the GPS-levelled tide gauges reaches decimeter level. The reason is may be closely related to the poor observations of offshore altimeter data. Since, the altimeter data are usually contaminated due to land, islands, sea reefs, sea ice, seabed terrain, and so on, the SSH obtained by satellite altimetry cannot reach the high precision observed by tide gauges in the offshore area.