

Letter to Editor

Dear Editor,

Thank you very much for reviewing our revised manuscript and providing constructive comments. The manuscript has been revised based on all the comments made by the editor.

Please find below our detailed responses to each comment made by the editor.

We think that the revised manuscript has appropriately addressed all the editor's concerns and we hope that you can consider it for publication in Earth System Science Data.

Sincerely,

Pei Zhang

On behalf of all co-authors

Response to Editor

We would like to thank the editor for carefully reading our revised manuscript and providing detailed comments. In the text below we provide our response to each comment point by point.

Editor's comments are in **bold**.

Author's responses are in regular.

Author's additions/modifications in the text are in blue.

Comments to the author:

The reviewers were satisfied with the revision and believed that the concerns and suggestions have been addressed. There are still a few minor errors and issues that need to be fixed before the publication. For example:

- 1. Please carefully check the citations. For example, line 47, (Zheng et al., 2019, 2018), please use time ascending order for the years and put 2018 in the front.**

Thanks for the suggestion. The citations have been checked and corrected using time ascending order in the revised version. For example:

On Page 2 Line 41:

“in the soil-vegetation-atmosphere system (van der Velde et al., 2009; Zheng et al., 2018).”

On Page 2 Line 44:

“and model simulations (Rodell et al., 2004; Entekhabi et al., 2010; Dorigo et al., 2011).”

On Page 2 Line 46-47:

“and model-based products (Zeng et al., 2015; Chen et al., 2017; Colliander et al., 2017;), as well as improving model parametrizations (Zheng et al., 2015a, b, 2017) and remote sensing retrieval algorithms (Zheng et al., 2018, 2019).”

On Page 4 Line 114:

“and additional information about the Tibet-Obs can be found in Su et al. (2011) and Zhang et al. (2021).”

On Page 17 Line 504:

“thus overestimation of soil porosity (Shangguan et al., 2013; Su et al., 2013; Bi et al., 2016).”

Please check and fix issues with the formations. For example,

- 2. line 201, “The GLDAS-2.1 VIC (Variable Infiltration Capacity) product”. Please state the full name first and put the acronyms in the brackets.**

Thanks for the suggestion. All issues of similar kind have been addressed in the revised version. For example:

On Page 6 Line 188:

“The Global Land Data Assimilation System Version 2 Catchment Land Surface Model (GLDAS-2.1 CLSM) product”

On Page 7 Line 201:

“The GLDAS-2.1 Variable Infiltration Capacity (GLDAS-2.1 VIC) product”

On Page 7 Line 208:

“The Modern-Era Retrospective analysis for Research and Applications version 2 (MERRA2)”

3. Line 551, “every 15-minute” please remove the minus symbol.

Thanks for the suggestion. It has been corrected in the revised version:

On Page 4 Line 105:

“record SMST profile dynamics every 15 minutes.”

On Page 18 Line 551:

“monitor SMST dynamics at multiple depths (e.g., 5, 10, 20, 40, and 60/80 cm underground) every 15 minutes,”

There are also issues in the tables and figures. For example:

4. The values in Table 3 are difficult to read because of miss aligning. Please check and improve it if it is possible.

Thanks for the suggestion. Table 3 has been improved in the revised version to make the information more clear.

Table 3. Information for the selected model-based products.

Product	Spatial Resolution	Temporal Resolution	Temporal Coverage	SM Stratification (cm)	ST Stratification (cm)
ERA5	0.25°× 0.25°	Hourly	1979 ongoing	0-7, 7-28, 28-100, 100-289	
Noah	0.25°× 0.25°	3 Hours	2000 ongoing	0-10, 10-40, 40-100	
CLSM	1°×1°	3 Hours	2000 ongoing	0-2, 0-100	0-10, 10-29, 29-68, 68-144
VIC	1°×1°	3 Hours	2000 ongoing		0-30, 30-130*, 130-150*
MERRA2	0.5°×0.625°	Hourly	1980 ongoing	0-5*, 0-100*	0-10*, 10-30*, 30-70*, 70-146*

* The depth of this layer varies with region, and the value shown here is for our study area.

5. Table 5 and 6, please explain the use of symbol “-”.

Thanks for the suggestion. The symbol “-” has been explained below the Table 5 in the revised version:

“ ‘-’ represents there is not statistic for the ERA5, CLSM, and VIC products in the cold season.”

6. Figure 1, please add a description or caption to the main legend to help with interpretation.

Thanks for the suggestion. Description has been added into the caption of Figure 1 in the revised version:

“Figure 1. (a) Location of the Tibet-Obs network over the TP; Spatial distributions of SMST monitoring sites and weather station within the (b) Maqu, (c) Ali, (d) Shiquanhe, and (e) Naqu networks; and (f) an example of instruments configured for each SMST monitoring site. The elevation of the network is shown at the bottom of each subplot. The triangles with different colours represent the SMST measured at different depths. (Base map is from EROS, Copyright: © EROS)”

7. Figure 2, add a comma before the last and in the caption.

Thanks for the suggestion. The comma has been added in the caption of Figure 2 in the revised version:

“Figure 2. Number of available SMST monitoring sites for different depths at each month for the (a) Maqu, (b) Shiquanhe, (c) Ali, and (d) Naqu networks.”

8. Figure 13, the labels in the sub plots c and f seemed duplicated because the lines were already explained in legend.

Thanks for the suggestion. The labels in the subplots have been removed from Figures 11 and 13 in the revised version:

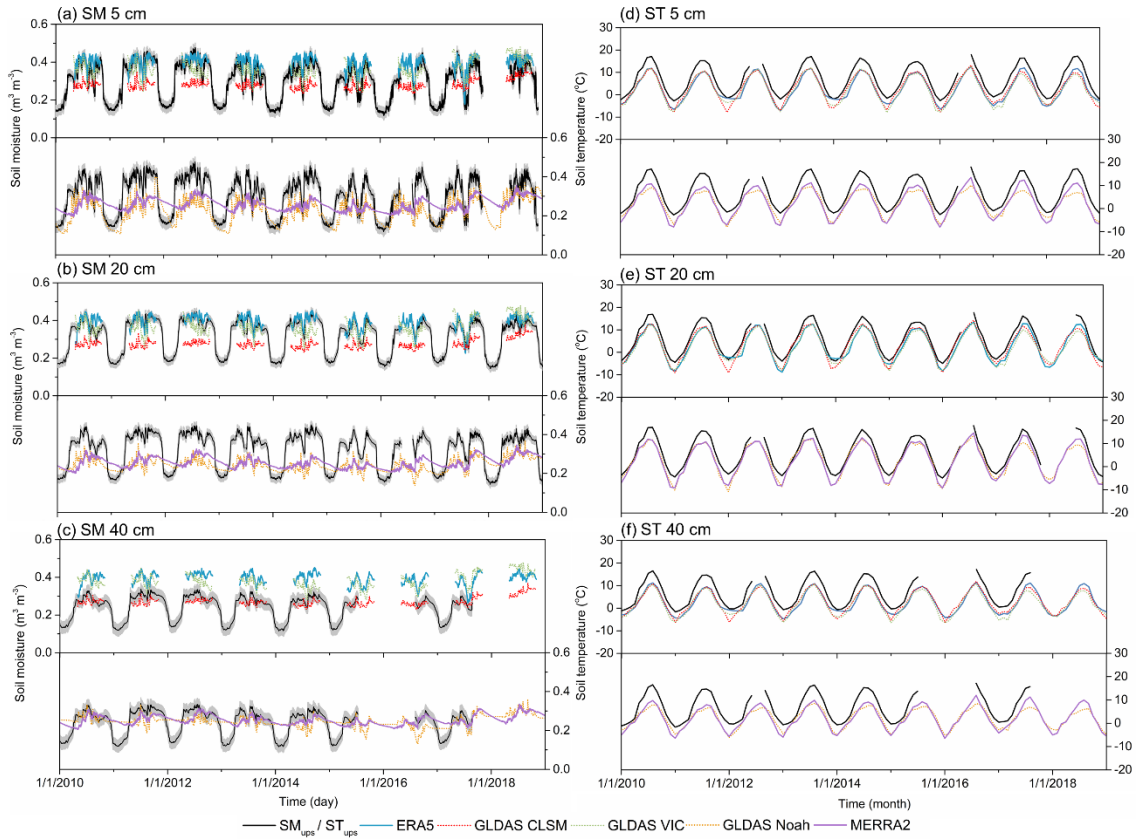


Figure 11. Time series of daily average SM (a-c) and monthly mean ST (d-f) at soil depths of 5 (a, d), 20 (b, e), and 40 (c, f) cm derived from the upscaled SMST dataset and five model-based products from January 2010 to December 2018 for the Maqu network.

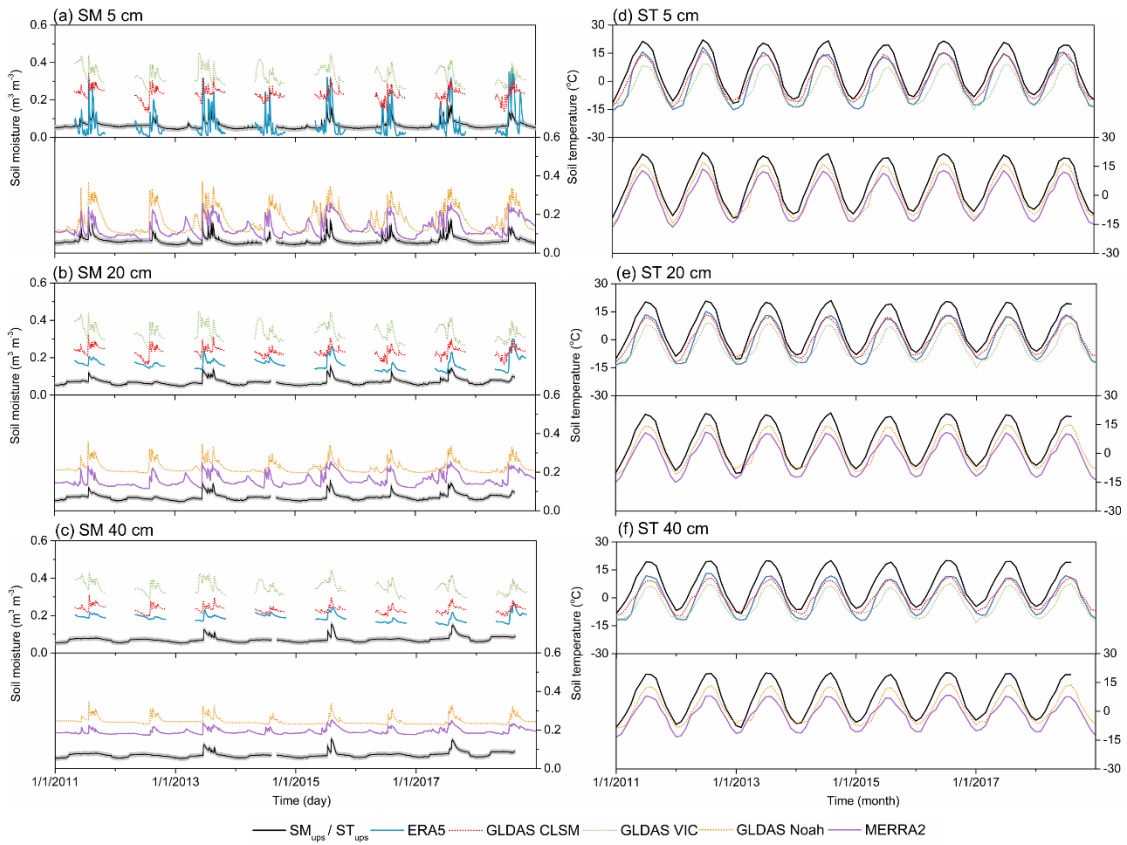


Figure 13. Same as Figure 11 but for the Shiquanhe network from January 2011 to December 2018.

9. Captions of Figure A2 and A3. There is no Table A1 provided in the manuscript. Did you mean Figure A1. Please check.

Thanks for the comment. The “Table A1” has been changed to “Figure A1” in the caption of Figures A2 and A3:

“Figure A2. Same as Figure A1 but for the Ngari network”

“Figure A3. Same as Figure A1 but for the Naqu network”