

Response to Review 1

(Review comments in *Italic*, response in upright Roman in blue)

The Tibetan Plateau is a key region to understanding the complex interactions between different earth spheres with heterogeneous land surface conditions. Carrying on long-term field observations are particularly challenging in the Tibetan Plateau, owing to its vast geographic area with steep terrain, varied landforms, complex and diverse climates, harsh environmental conditions. The dataset described in this manuscript is precious and hard-earned. As the dataset with the highest temporal resolution and the most complete measurements, this dataset can be widely used in the analysis of the characteristics of meteorological elements on the Tibetan Plateau, the evaluation of remote sensing products and development of the remote sensing retrieval algorithms, and the evaluation and development of numerical models. While I commend the authors for the significant efforts in integrating this long-term field observations, the paper needs some revisions before being published.

Response: We greatly appreciate the Reviewer's recognition of this dataset. Many thanks for your thoughtful comments, which provide the basis to improve the quality of the manuscript and dataset. A change-tracked version of the revised manuscript will be provided when all reviewers' comments are returned.

1. *As the temporal resolution of this dataset is the highest and the observational elements of this dataset provided is the most complete among the land-atmosphere interactions observations in Tibetan Plateau which open for sharing to date, to clearly show the high resolution of this observation dataset, the word "hourly" should be added to the original title as follows, "A long-term (2005-2016) dataset of hourly integrated land-atmosphere interaction observations on the Tibetan Plateau".*

Response: We agree with the reviewer's comment. The title will be changed in the next version manuscript based on this suggestion.

2. In line 44-45, the sentence is better to modified as follows, "The Tibetan Plateau (TP) is the world's highest and largest plateau with highly complex terrain and is referred as the "Third Pole of the World" (Qiu, 2008). "

Response: We thank the reviewer for the suggestion. The first sentence in the introduction has been modified. Moreover, several sentences in the first paragraph have been adjusted to make the sentences more logical and clarity of thought. The adjusted sentences are as follows: The Tibetan Plateau (TP) is the world's highest and largest plateau with highly complex terrain and is referred as the "Third Pole of the World" (Qiu,2008). Moreover, the TP has the most extensive high-elevation distribution of cryosphere outside the polar regions. There are vast areas of mountain glaciers, snow, permafrost and seasonally frozen earth across the TP (Zhou and Guo, 1982; Kang et al., 2010; Cheng and Jin, 2013). Therefore, it also acts as the "Water Tower of Asia" (Immerzeel et al., 2010). Numerous researches indicate that the TP plays an essential role in controlling regional and global climate through its thermal and mechanical mechanisms (Manabe and Broccoli, 1990; Yanai et al., 1992; Duan and Wu, 2005; Liu et al., 2007). It exerts a major control on atmospheric circulation at the local and continental scale (Ding, 1992; Ye and Wu, 1998; Li et al., 2018) through its latent heat release (Wu et al., 2016) and interactions between the Asian monsoon and mid-latitude westerlies (Yao et al., 2012). Meanwhile, the TP is highly sensitive to climate change (Pepin and Lundquist,

2008; Kang et al., 2010; Chen et al., 2015). It is the driving force for regional environmental changes, and it amplifies environmental changes to global scale as well (Pan et al., 1996; Kang et al., 2010).

3. In line 34, "hourly time resolution" should be "hourly temporal resolution".

Response: We fully agree and taken the suggestion from Reviewer 1 and Reviewer 2 regarding to the "hourly time resolution" together, we change it to "hourly resolution".

4. In line 52, delete the "both", and change the sentence "amplifies environmental changes on a global scale" to "it amplifies the local environmental changes to global scale as well".

Response: Modifications have been made.

5. In line 54, "pattern and evolution of hemispheric atmospheric circulation and climate" should be "hemispheric atmospheric circulation pattern and climate evolution".

Response: Done. Thanks.

6. In line 56, change the "projection accuracy" to "forecast accuracy".

Response: The word has been adjusted, thanks.

7. In line 60, "and sparse and biased spatial distribution of observation stations relative to the high degree of landscape heterogeneity" should change to "The sparse and biased spatial distribution of observation stations is hard to match the high degree of landscape heterogeneity".

Response: Thanks, the sentence has been modified based on the suggestion.

8. In line 61, change the "In addition, there are high uncertainties in the satellite-retrieved land and atmospheric environmental variables of the TP, impairing the establishment of continuous, long-term regional-scale observations in remote areas. " to "In addition, high uncertainties in the satellite-retrieved land and atmospheric environmental variables of the TP impair the establishment of continuous, long-term regional-scale observations in remote areas of the TP."

Response: Done.

9. In line 63, change the "These problems have limited" to "The lack of sufficient observational data limits".

Response: Done. Thank you for the careful reading.

10. In line 82-83, change "playing a crucial role in many disciplines: these include land-atmosphere interactions" to "playing a crucial role in many disciplines, these include: land-atmosphere interactions".

Response: The sentence has been modified.

11. In line 102, change the "long-term hourly dataset of the integrated" to "long-term dataset of hourly integrated".

Response: Adjusted.

12. As soil heat flux was also provided in some stations, so the "soil temperature and soil moisture" in line 129 should change to "soil hydrothermal conditions".

Response: We thank the Reviewer for pointing out this mistake; modification has been made to make the sentence more accurate.

13. In line 137, change "the equipment used" to "the instruments".

Response: As we think the last sentence of this paragraph "which summarizes all the instruments used, including the layer configuration of the PBL tower and soil profile monitoring system, details of sensor models and manufacturers, and other information about the equipment used. " in the original manuscript is not essential, to make the sentence simple and concise, we delete this sentence. But we still thank you for your suggestion.

14. In line 157, change "wind sensors" to "wind speed".

Response: We thank the Reviewer for pointing out this mistake.

15. In line 174, delete the word "one" and change the "1.5m" to "1.5 m", change the "wind sensor" to "wind sensors".

Response: Modifications have been made. Thanks.

16. In line 180, replace the "was" with "were".

Response: Done.

17. In line 199 and 201, replace the word "is" with "was".

Response: Done.

18. In line 203 and 207, replace the "are" with "were".

Response: Done.

19. From line 212 to 214, replace the word "is" to "was".

Response: Done.

20. In line 215, change the "affect accuracy" to "affect the measurement accuracy".

Response: Done.

21. Change the sentence in line 189 to "stricter data quality control procedure will be applied to allow problematic data to be identified and quality flags will be provided for each observational element".

Response: Done.

22. In line 222, change the "radiation observations" to "Surface radiations".

Response: Done.

23. Change the word "are" in line 226 to "were".

Response: Done.

24. In line 245, change the word "steps" to "procedures".

Response: The word has been changed.

25. Change the word "rejected" in line 252 to "discarded".

Response: Changed.

26. Figure 1, the data used to plot the plant functional types map in the Tibetan Plateau should be provided in the manuscript.

Response: This data was obtained from the National Tibetan Plateau Data Center, the reference was added to the manuscript.

Ran, Y., and Li, X.: Multi-source integrated Chinese land cover map (2000), National Tibetan Plateau Data Center, 10.11888/Socioeco.tpd.c.270467, 2019.

27. In Table 2, in BJ site, different sensor models were used or sensors were installed at different heights for air temperature, wind speed and direction, humidity, radiations, precipitation, soil temperature, soil moisture and soil heat flux, it is better to use a transverse line to separate these two periods.

Response: Done.