

Review of Manuscript ESSD-2025-356 by Yu et al., 2025 "Long-term Land–Atmosphere Energy and Water Exchange Observational Dataset over central Tibetan Plateau"

General comments

This manuscript presents a comprehensive, high-temporal-resolution (hourly) observational dataset from the Nagqu Plateau Climate and Environment Observation and Research Station (NPCE) on the central Tibetan Plateau (CTP), covering the period 2014–2022. The dataset includes near-surface meteorology, radiation, turbulent fluxes, and soil hydrothermal measurements from four stations representing different land cover types. The manuscript is well-structured, clearly written, and provides sufficient methodological and contextual detail to support the publication of the dataset.

Specific comments:

1. Appropriateness for Supporting Data Publication

The manuscript effectively serves as a companion paper to the dataset. It includes:

- A clear introduction justifying the need for such data in a poorly observed region.
- Detailed descriptions of station locations, instrumentation, data processing, and quality control procedures.
- Visualizations (figures) illustrating diurnal and seasonal variations in key variables, which help users understand the data characteristics.
- References to existing data repositories (DOI links) where the data are hosted.

The paper aligns well with ESSD's goal of documenting and promoting the reuse of high-value scientific datasets.

2. Significance: Uniqueness, Usefulness, and Completeness

Highly significant.

- **Uniqueness:** The CTP is a critical yet underobserved region due to its extreme altitude and harsh conditions. This dataset provides long-term, high-resolution observations from multiple sites with varied land cover—a rare and valuable resource.
- **Usefulness:** The data are directly relevant to:
 - Model validation and improvement (e.g., land-surface, regional climate, and hydrological models).

- Studies on land–atmosphere interactions, energy/water cycles, climate change impacts, and monsoon dynamics.

- Satellite product validation and remote sensing algorithm development.

- Completeness: The dataset spans 9 years with hourly resolution, covers multiple variables, and includes quality flags. Data gaps and quality control steps are transparently documented.

3. Data Quality

High quality.

- The authors describe a multi-step quality control process:

- Range checks based on Tibetan Plateau climate conditions.

- Manual inspection to remove outliers or erroneous intervals.

- Use of standard missing value markers (NaN, -9999).

- Quality classification for turbulent fluxes (levels 0–2).

- Instrumentation is well-documented (Table 1), and consistent sensor types are used across stations to ensure comparability.

- Figures 2–9 demonstrate plausible diurnal and seasonal cycles, consistent with known Tibetan Plateau climatology (e.g., strong solar radiation, monsoon influence, soil freeze–thaw dynamics).

4. Publication Quality

Very good, with minor suggestions for improvement.

- The manuscript is well-organized, with clear sections and informative figures.

- Data are openly available via two DOIs, and file naming conventions and time standards are clearly explained.

- The discussion and conclusion sections contextualize the data within broader research efforts and future plans (e.g., expanded instrumentation and sites).

Minor Suggestions:

- Consider including a summary table of data availability per station and variable (e.g., percentage of valid data per year) to help users assess data continuity.

- Clarify whether the wind direction data (Fig. 5) are from a specific height or an average across levels.
- Standardize station naming in figures and text (e.g., “NewD66” vs. “Kekexili”).
- Briefly mention any known limitations (e.g., sensor drift, maintenance challenges) beyond what is already described.
- Comment on why soil heat flux is not reported, which is critical flux to close surface energy balance. (I understood soil heat flux is a standard observation variable in such important climate stations).
- Comment on why CO₂ flux is not reported, for the same reason as for soil heat flux.
- Fig. 7. The total heat flux (e-f) plots are missing.
- For soil hydrothermal measurements, some comments related to in-situ observation of soil texture, soil hydraulic and thermal properties would be highly valuable for data applications. If the authors have not done such analysis, they may refer to relevant studies that have done so at some locations near the mentioned stations.

Overall Recommendation

Accept with minor revisions.

This dataset is trustworthy and highly useful for the research community. It fills a critical gap in high-altitude land–atmosphere interaction data and is backed by rigorous quality control and clear documentation. The manuscript effectively supports the data publication and encourages reuse across multiple disciplines.

(I suggest that the editorial office check, before the acceptance of the manuscript, the accessibility and completeness of the uploaded datasets for which I have little time.)