The authors present a commendable collaborative effort in integrating daily aggregated in-situ R_{eco} measurements from air warming experiments consisting of control plots and warmed plots with open top chambers at 64 Arctic and alpine tundra sites across 12 countries. The dataset spans from 2000 to 2024 and has decent coverage of circumpolar Arctic ecosystems, making it a robust resource for spatial and temporal studies. The dataset has strong potential to contribute to collaboration across nations and research teams in current and emerging studies, allowing for reliable model comparison and leading to a scalable synthesis of Arctic warming and responses in $R_{eco,}$ and becoming a useful resource to further our understanding and identify knowledge gaps of Arctic ecosystems and biogeochemical cycling. Therefore, I think this dataset is fitting for Earth System Science Data and is a meaningful contribution to the literature. However, I found that the future directions of the manuscript were lacking, and I think the authors could be more explicit in mentioning their next steps, as well as mentioning how they will streamline the process of maintaining the database for future data integration and cross-collaboration.

Overall, the manuscript was easy to follow and is well-written. I found that I was able to have a solid understanding of what the database is and its utility. Accessing the database took me some time, but once I had downloaded all the files from Zenodo and had tinkered with them in R, I was able to view them. I appreciate the authors' organization of the datasets and files, as well as the detailed information provided in the supplementary materials. I think TundraFlux is an impressive and valuable resource, and I appreciate it being an open-access dataset.

Below, I have made some line-by-line suggestions for the authors to consider:

Supplementary:

S1: I really liked the inclusion of the start year for each of the sites for the warming experiments. I think it would be helpful to include a column for the end year as well here, or within the same column for the start year, and change it to provide the beginning and end year (e.g., Start – End warming)

ITEX_biomass_method_protocol: The inclusion of this document is a nice addition and a helpful resource for the database. However, it looks like the links included in the document do not work for reviewer access and received a "404 file not found" error.

Main Text

1. **Introduction**

Line 119: Might want to consider including a definition for permafrost (e.g., soil that remains consecutively frozen for at least 2 years)

2. **Description and structure**

Lines 158-164: adding a line or two in this paragraph to mention that warming alters tundra ecosystems in the increasing frequency of thermokarst activity (geomorphology impacts), which may also contribute to R_{eco}. Some references below:

https://www.nature.com/articles/ncomms13043

https://www.nature.com/articles/s41467-019-09314-7

https://ecoss.nau.edu/wp-content/uploads/2016/05/Vogel_et_al-2009-Journal_of_Geophysical_Research-_Solid_Earth_1978-2012.pdf

https://www.researchgate.net/publication/281261197_Permafrost_collapse_alters_soil_carbon_stocks_respiration_CH4_and_N2O_in_upland_tundra

Line 210: This could be a user error on my end, but when opening the Tundra_flux_daily_v1 in my version of R, I see 76 variables instead of 74. Could it be a typo here?

Lines 258-259: You may want to double-check to make sure the DOI works for others to access Zenodo. Additionally, having a direct link here to the dataset would be helpful to readers. Maybe this can be included in the DOI display name?

3. **Applications of the TundraFlux database**

Lines 274-275: I appreciate the authors' efforts in including shoulder season observations in the database.

5. Future Directions

Lines 369-379: Would including other variables be considered for future directions in addition to what is already included in the database? For example, the tundra type or landform (thaw slumps, peatlands, coastal, etc.) for each of the sites would be interesting and helpful for future studies. Additionally, mentioning other potential methods that can be incorporated into, for example, the integration of field-based observations and remotely sensed observations?