Response to Comments

The authors would like to thank Reviewer 1 for the careful evaluation of our data description manuscript and for providing valuable comments and suggestions. We appreciate the recognition of the importance of the Nam Co Lake site and the value of publishing this eddy covariance dataset. The reviewer has raised several helpful suggestions to improve the manuscript. The following responses address the comments and the issues raised by Reviewer 1 point-by-point. We have responded (in black) to each comment (in blue).

1. The references should be more precise:

The eddy-covariance method has been well established for at least 20 years, apart from minor issues that are not addressed in this publication. Therefore, publications that have used this method in the last 10 years should not be cited; textbooks or similar publications would be more suitable (Aubinet et al., 2012; Mauder et al., 2021).

Mauder & Foken (2006) is not a publication on flagging systems. Here, one could cite Foken et al. (2004). For the 0-1-2 system used, the ICOS publication would be more appropriate (Sabbatini et al., 2018).

With Footprint, you should mention the most recent summary (Leclerc and Foken, 2014).

We thank the reviewer for this valuable suggestion regarding the use of more appropriate and authoritative references for established eddy covariance methodology. We agree that textbooks and synthesis publications provide a more suitable foundation for methodological descriptions in data papers. Accordingly, we have revised the manuscript to replace or complement recent application-based references with the recommended methodological references.

Influence of Nam Co Lake

Although the Fig. 3 is not readable for colour-blind people (Crameri et al., 2020), please correct, black and white if necessary, the influence in the NW sector is considerable. How to correct this is explained by Biermann et al. (2014).

We thank the reviewer for pointing that out. To improve accessibility for color-blind readers, we have updated Figure 3 using the Okabe–Ito color-blind–safe palette.

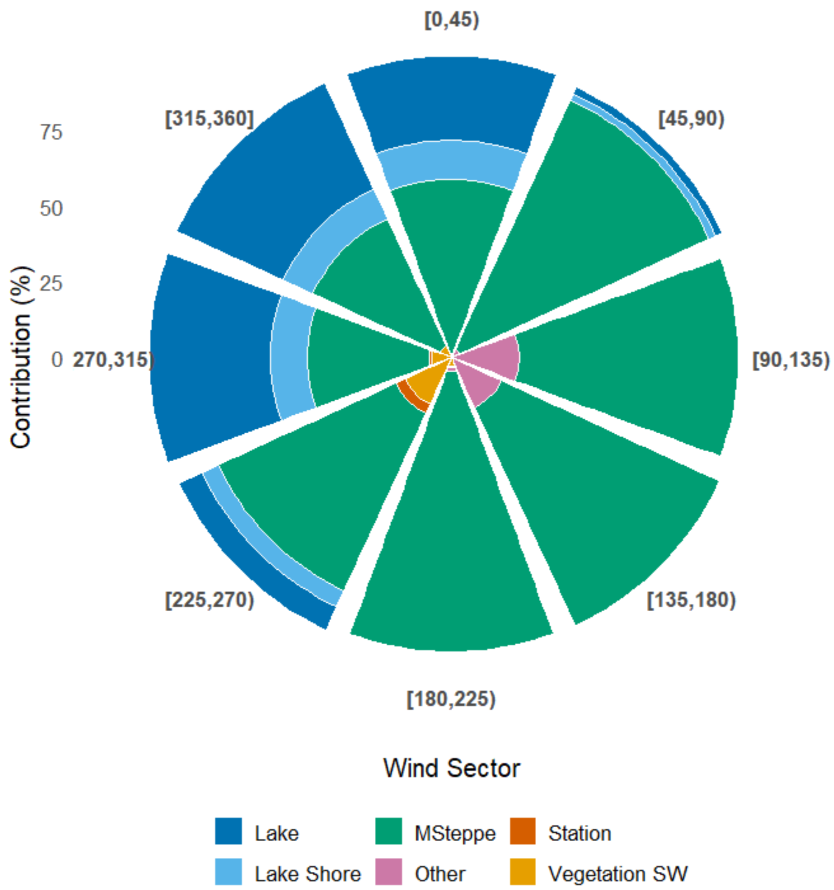

Figure 3: Wind-sector weighted footprint contributions of land cover classes to the eddy covariance fluxes at the 19 m tower. Each sector represents an 8-point compass division of wind directions. The radial length shows the percentage contribution of each land cover class to the flux footprint, and stacked colours indicate the relative percentage contribution of different LULC classes within each wind sector. Data were filtered for qc_flag = 0.

The authors acknowledge the considerable influence of the lake and the lake shore in the NW sector on the flux measurements. However, the primary focus of the dataset is to capture fluxes representative of the heterogeneous landscape, including steppe, lake, and shoreline surfaces. Footprint analysis shows that lake contributions account for 14.4 ± 16.6% of total fluxes. Therefore, the measured fluxes reflect the integrated landscape-scale exchange rather than a single surface type. This is consistent with the study objective.

The published dataset includes the footprint contributions of individual classes, including the lake. This allows data users to separate the lake contribution, perform gap-filling, or analyze fluxes from the main steppe sector specifically. We note, however, that restricting the analysis in this way reduces the number of high-quality observed fluxes, which may increase the uncertainty in gap-filled values.

Biermann et al. (2014) proposed a sector-wise footprint analysis and tile-based approach to derive surface-type-specific fluxes, relying on wind sectors with clear footprint dominance of individual surface types. In contrast, at our site, the NW sector footprint remains inherently mixed, with simultaneous contributions from lake, shoreline, and steppe surfaces. Consequently, a separation into surface-type-specific fluxes using a sector-based correction framework is not feasible without introducing additional assumptions. Since the aim of our study is to provide landscape-integrated fluxes rather than surface-specific fluxes, we retain the full footprint signal and provide the fractional surface contributions within the dataset for transparency.

2. Energy balance closure

The area around Nam Co lake is so heterogeneous in terms of its underlying characteristics that the problem cannot be ignored, see Mauder et al. (2020). This is all the more important because the fluxes are very small but highly relevant (Gerken et al., 2014; Gerken et al., 2015).

We thank the reviewer for highlighting the point on heterogeneity of the study area and the requirement of stating the energy balance closure. The 19 m EC measurement unit at Nam Co integrates fluxes over a broader area that includes alpine steppe with subtle vegetation density variations, more productive and wetter patches near the lakeshore, and occasional inclusion of the adjacent lake surface. We agree that such heterogeneity may contribute to incomplete energy balance closure through mesoscale circulations and advective processes.

For the published dataset period, an analysis of the energy balance closure at the study site showed 75 % closure (Figure below). This is consistent with previously and recently published results from the Nam Co region: Biermann et al., 2014: 70 %, Li et al., 2015: 78 %, and Wang et al., 2026: 82.8 %. The small variations between these values could be likely due to the different measurement footprints in the complex heterogeneous terrain at Nam Co. These values fall within the energy balance closure range (60 % to 90 %) reported for EC systems in complex and heterogeneous terrain (Foken, 2008; Foken et al., 2011; Twine et al., 2000; Yao et al., 2011).

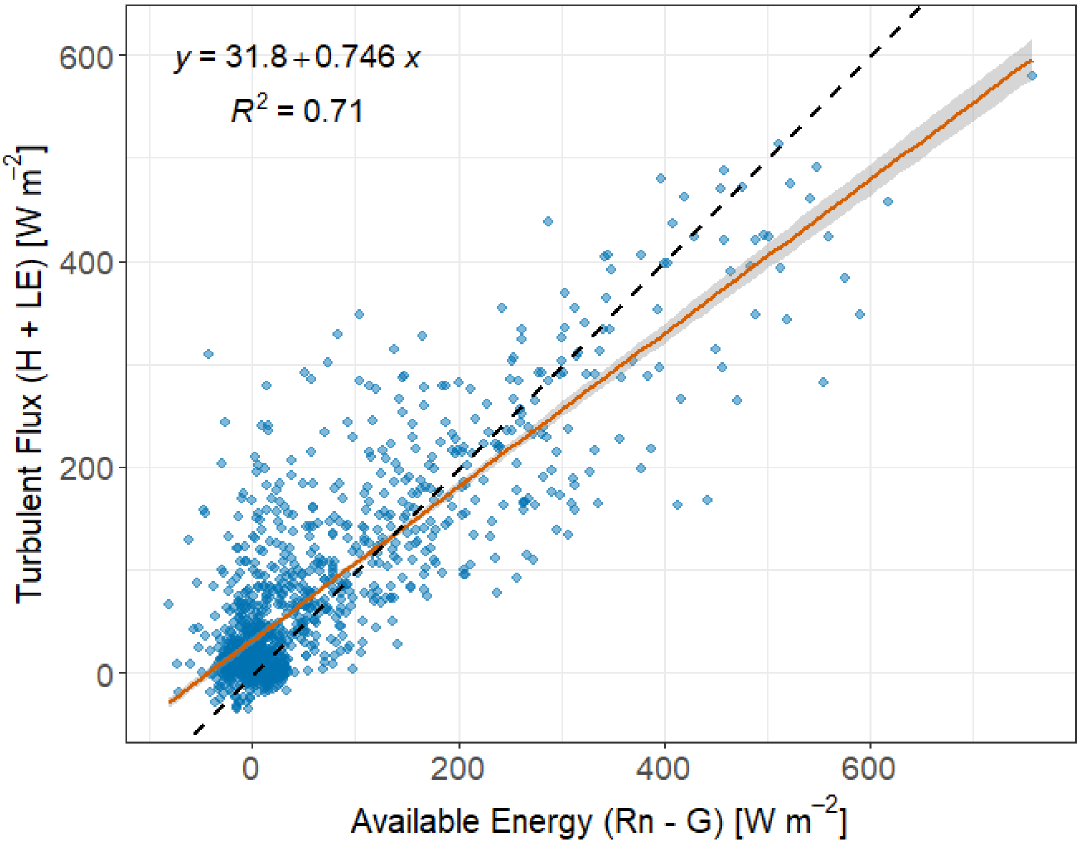

Figure: Scatterplot of 30-min values of available energy (Rn − G) versus turbulent flux (H + LE) for the growing season during the study period. The solid reddish-orange line represents the linear regression fit (95% confidence interval shaded), while the black dashed line denotes the 1:1 energy balance condition. A total of 1148 paired observations are shown.

Given that this manuscript presents a data publication, we provide the original, quality-controlled fluxes without enforcing artificial energy balance correction, allowing users to apply their preferred correction approach if required. We will add a paragraph in the revised manuscript on the energy balance closure calculation under an additional sub-section 2.6. The content is as follows:

2.7.Energy balance closure

Energy balance closure (EBC) was calculated using the turbulent fluxes (H + LE) and the available (Rn – G) energy using the 30-min measurements. Observations from the growing season were used for the calculation. Net radiation (Rn) was calculated from the incoming and outgoing shortwave and long-wave radiation. The incoming long-wave radiation (LWD) was unavailable due to sensor failure for the entire published dataset period. In order to provide an estimate of the energy balance closure during this period, we estimated LWD following the *approach of Brutsaert (1975), using air temperature, relative humidity, and cloud cover fraction (estimated using the incoming shortwave radiation). The method was tested and calibrated using the period during which LWD at the site was available (2006 - 2017). The ground heat flux (G) measurements were shifted forward by 30 min, taking the soil measurement lag into consideration (Li et al., 2015).*

For the published dataset period, the EBC at the study site showed 75 % closure. This is consistent with previously and recently published results from the Nam Co region: Biermann et al., 2014: 70 %, Li et al., 2015: 78 %, and Wang et al., 2026: 82.8 %. The small variations between these values could be likely due to the different measurement footprints in the complex heterogeneous terrain at Nam Co. These values fall within the energy balance closure range (60 % to 90 %) reported for EC systems in complex and heterogeneous terrain (Foken, 2008; Foken et al., 2011; Twine et al., 2000; Yao et al., 2011).

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