Response to editor

Thank you for your careful works and valuable comments. The comments and suggestions are very useful for our manuscript. We have carefully studied these comments and suggestions and made some changes in our manuscript.

Comment 1)

Lines near 280 I believe you mean conspicuous positive (not negative) anomalies in Figs. 14a and 14b. Also in 14b the positive anomalies are at 86 km in autumn (not summer) and 91 km in summer (not autumn).

Response:

Thank you for your comment. In response to feedback, we have revised the description on page 16, lines near 280 of the manuscript.

Comment 2)

Table 3 Please provide references for all the entries. The McMurdo entry should be -550 (not 55). I also strongly recommend adding the Table Mountain, CO entry for Na flux (-150 at 86 km, Huang et al. 2015).

Response:

Thank you for your suggestion. We have modified Table 3. Specifically, two key revisions have been made to the relevant section: first, the sodium flux data for the McMurdo has been updated to -550; second, the sodium flux results derived from the Table Mountain, CO have been newly added to the dataset. Furthermore, to ensure the rigor and traceability of the data, we have supplemented each station's parameter with the corresponding reference citations.

Table 3. Summary of Heat and Na Fluxes at Different Sodium Lidar Stations

Stations	Table Mountain, Colorado	SOR New Mexico	Hefei, China	Maui, Hawaii	Hainan, China	Cerro Pachón, Chile	McMurdo, Antarctica
References	(Huang et al., 2015)	(Gardner and Liu, 2007; 2010)	(Li et al., 2022; Chu et al., 2022)	(Liu and Gardner, 2005)	This manuscript	(Guo and Liu, 2021)	(Chu et al., 2022)
Latitude and longitude	40.1°N 105°W	35.0°N 106.5°W	31.5°N 117.2°E	20.7°N 156.3°W	19.5°N 109.1°E	30.3°S 70.7°W	77.84°S, 166.67°E
Observation period	August–September	Late Nov	Fall Mean	Annual Mean	Annual Mean	June	Late May
Resolutions (min)/ (km)	10/0.96	1.5/0.5	10/~3	1.5/0.96	3/~2	1/2	2.5/0.96
Heat flux peak (K m s^{-1})	/	-1.1	-1.04	-1.0	-1.4	-0.4	-3
Heat flux peak altitude (km)	/	~88	89-93	87-95	88-92	~88	~84
Na flux peak (m s^{-1}·cm^{-3})	-150	-225	-30	-80	-65	/	-550
Na flux peak altitude (km)	86	88	89-95	88	92-93	/	~84