Response to Referee #2

General comments

We thank the referee for the positive assessment and constructive comments on experimental representativeness, operational residence-time effects, and implications for future launcher generations. We have clarified the scope of the conclusions, the limitations of the available climatic and seasonal coverage, and the need for configuration-specific qualification (Sects. 2, 4.1, 6.1.5, and 7).

Future higher-capacity ARLs: We agree that the experiment, which covers residence times of up to 14 days, cannot support quantitative conclusions for longer storage periods. We have therefore added the following clarification to Sect. 2: “Newer high-capacity launchers may allow radiosondes to remain in storage longer than the 14-day interval evaluated here. Future qualification studies should therefore extend the residence-time range and evaluate whether the present operational guidance remains applicable for each radiosonde–launcher configuration.”

Specific comments

Table 1 — Geographical and climatic coverage

We agree that the six sites do not encompass the full range of global climatic conditions and that the storage microclimate also depends on launcher environmental control. In coordination with the response to Referee #1, we have separated the original site table into Tables 1 and 2 and revised the limitations in Sect. 4.1.

Manuscript revision (Sect. 4.1): “Although this diversity provides valuable insights into operational variability, the six sites do not cover the full range of climatic environments encountered across the global observing network (Table 1). In particular, the response of radiosondes stored under more extreme climatic conditions, such as polar or persistently humid tropical environments, remains to be evaluated. The findings should therefore not be extrapolated to untested site–launcher combinations without additional validation.”

Line 157 — Selection of the extended Tateno study

The extended Tateno campaign was motivated by a previously observed dry bias and was intended to investigate possible seasonal influences. The manuscript now explains that the dataset extends from February to September 2025, rather than covering a full year, and acknowledges the limited autumn sampling (Sects. 4 and 4.1).

Manuscript revision (Sect. 4.1): “The extended TAT measurements were undertaken to investigate a previously observed dry bias rather than carrying a whole 12-month experiment. The limited number of observations during Autumn represents a limitation to a balanced four-season analysis and should be kept in mind when interpreting the results in Figure 5.”

Figure 5 — Seasonal categories and sample size

We have added the seasonal sample counts to the discussion of Fig. 5 in Sect. 6.1.5: “The dataset spans eight months rather than a complete annual cycle. However, the selected 7- and 14-day data from TAT span the four seasons in a balanced way with only Autumn being sub-sampled, with each season counting 16 cases for Summer, Spring and Winter, and 4 cases for Autumn.”

Line 522 — Configuration-specific uncertainty and operating procedures

We agree that the uncertainty contribution and operational procedures must be evaluated for each radiosonde–launcher configuration. The conclusions (Sect. 7) now state: “This residence-time uncertainty contribution should be characterized for the specific radiosonde–ARL combination and its operational conditions. Changes in radiosonde type, launcher design, environmental control, or pre-launch procedures require reassessment of this contribution and review of the recommended MGC/SHC sequence and maximum residence time.”

Technical comments:

Line 8 — ARS acronym

Thank you. We have introduced the ARS acronym in the Abstract and Introduction,

Table 2 — Absolute temperature and humidity ranges

We agree that minimum and maximum values could provide additional information. We have retained the summary as mean values and standard deviations to keep the presentation concise; these are now presented in Table 3 following the division of the original site table. The caption describes these as annual-cycle climatological conditions inside the launchers.

Line 436 — Radiosonde sampling and representativeness

We agree that the available sample sizes do not establish representativeness across the general radiosonde population, including production batches and sensor ages. The experiment primarily addresses the combined effects of storage duration and operational conditions. We have added the following limitation to Sect. 4.1: “The limited sample size does not allow a comprehensive assessment of variability across the general radiosonde population, including potential batch-to-batch differences.”

Line 550 — CNR-IMAA and AEMET acronyms

Thank you. We have updated the CNR institutional name to CNR-IMIOT and included the AEMET name and acronym in the manuscript.

Line 559 — Vaisala AS15 designation

Thank you. We now use the manufacturer designation “Vaisala Autosonde® (AS15)” in the main text.