The revised manuscript has been substantially improved after the first-round review. The authors have added clearer positioning of the work as a system-level LST product-generation framework rather than as a set of new individual algorithms; they have expanded the validation with OzFlux sites, added representativeness screening for in-situ sites, introduced bias correction for the VNP21A1 cross-validation, and provided additional diagnostics for cloud filling and downscaling uncertainties. These changes address many of the main concerns raised in the first round. The revised manuscript now presents a more coherent and better supported dataset paper for an hourly, angular-normalized, cloud-filled, and 0.01° downscaled FY-4A LST product from 2018 to 2023. The dataset is potentially valuable for the LST, surface radiation, evapotranspiration, and land–atmosphere interaction communities, especially because the product provides directional, nadir, and hemispherical LST layers rather than only a conventional directional LST field. The authors also now explicitly state that the novelty is mainly in the unified processing chain and angular consistency of the final product, not in each individual methodological component.

I appreciate that the authors have responded carefully to most comments. The response document shows that they revised the DTC equation, added Appendix A for the hemispherical integration approximation, expanded site validation, added cloud-filling and downscaling uncertainty maps, added texture metrics, clarified the role of reanalysis data, and discussed limitations related to nighttime TRD, cloudy-sky TRD, ATC modeling, and reanalysis dependence. In the revised manuscript, the angular normalization performance is now more convincing: the comparison against near-nadir VNP21A1 shows a reduction in RMSD from 4.53 K for FY-4A directional LST to 2.56 K for normalized nadir LST, with the improvement especially evident at larger VZA. The all-weather hemispherical LST validation is also improved, with reported RMSE values of 2.48 K under clear sky and 3.65 K under cloudy sky over the selected eight sites.

However, several points still require clarification before publication.

Response: Thank you very much for your comprehensive evaluation of our revised manuscript and for recognizing the substantial improvements made in response to the first-round comments. We sincerely appreciate your constructive and professional suggestions in this round, which have helped us further strengthen the manuscript in terms of methodological clarity, validation completeness, uncertainty analysis, and product positioning. The main modifications include:

1) A T-based validation for the final 0.01° downscaled LST is added to indicate the absolute accuracy of published LST product. The RMSE and MBE almost remained unchanged at both resolutions, which could be explained by the high spatial representativeness at 0.05° and 0.01° for the selected sites.
2) As you suggested, a clarification regarding the texture metrics (LVR and SSIM) was added. They only indicate that the downscaled LST could better preserve the prescribed ATC-based spatial texture compared with simple bilinear interpolation, instead of independent sub-pixel evaluation.
3) More details regarding the temperature scale of final LST product was emphasized (i.e., the final LST is in the MODIS-referenced scale, not FY-4A scale). Besides, more details about the bias-correction of VIIRS LST (from initial LST to the MODIS-referenced LST) is provided.
4) The metrics for each site was provided, and a T-based validation without site screening was performed to better assess the reliability and representativeness of each selected validation sites.
5) A more accurate description of physical understanding of directional, nadir, and hemispherical LST under cloud-sky condition was added as you suggested.
6) The QA band of the final LST dataset was provided, and the corresponding description was provided in the revised manuscript as you suggested.

Following your comments, we have carefully revised the manuscript point-by-point. Detailed responses are provided below, where our responses are marked in red, and the corresponding revisions in the manuscript are highlighted in blue.

Major comments

1. The final 0.01° product is not independently validated.

The manuscript validates the angular-normalized nadir LST mainly at 0.05° against bias-corrected near-nadir VNP21A1, and validates 0.05° all-weather hemispherical LST against in-situ pyrgeometer-derived LST. The downscaling step is evaluated mainly through model fitting RMSE and texture similarity metrics using ATC-derived texture as reference. This is useful, but it does not constitute an independent accuracy assessment of the final 0.01° product. Since the released dataset is the 0.01° ANCFDS-LST, the authors should either provide a direct validation of the final 0.01° product at the in-situ sites, or clearly state that the absolute temperature accuracy assessment is primarily for the 0.05° product and that the 0.01° assessment is limited to spatial texture consistency. A comparison with Landsat/ECOSTRESS clear-sky LST for selected regions and dates would further strengthen the paper, but at minimum the existing validation claims should be carefully qualified.

Response: Thank you for your detailed suggestion regarding the validation of the 0.01° downscaled LST product. We acknowledge that the validation in the original manuscript mainly focused on spatial texture evaluation, while the direct accuracy assessment of the final 0.01° product was insufficient. Following your suggestion, we additionally evaluated both the 0.05° and 0.01° LST products against in-situ LST measurements for daytime/nighttime and all-weather conditions. As shown in Fig. R1, the RMSE (MBE) is 3.34 K (-1.27 K) for the 0.05° LST and 3.34 K (-1.28 K) for the downscaled 0.01° LST. The nearly unchanged accuracy indicates that the downscaling process introduces very limited additional uncertainty. Another reason is that the validation sites were strictly screened to ensure strong spatial representativeness at both 0.05° and 0.01° scales, thus the retrieved LSTs at the two scales exhibit comparable accuracy.

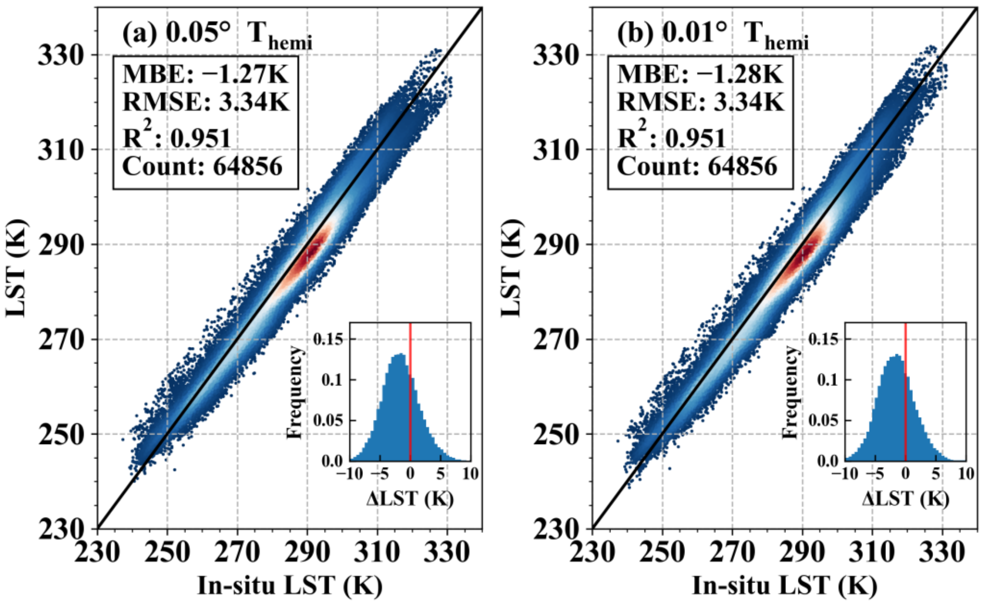

Fig. R1 The accuracy of all-weather hemispherical LST products (a) before and (b) after downscaling.

The above supplementary analysis was added in revised manuscript. Thank you again for your constructive suggestions.

In Subsection 4.3:

T-based validation results for the all-weather T_{hemi} product before and after downscaling are presented in Fig. 14. The RMSE remained unchanged at 3.34 K for both the 0.05° and 0.01° resolutions, while the MBE changed only marginally from -1.27 K to -1.28 K. These nearly identical validation statistics suggest that the downscaling procedure introduces minimal additional uncertainty. This consistency can be attributed to two main factors. First, the downscaling framework employs a residual redistribution strategy, which preserves the large-scale thermal information of the original 0.05° LST product. As a result, the accuracy of the downscaled 0.01° T_{hemi} product remains strongly constrained by the performance of the original coarse-resolution LST. Second, the validation sites were rigorously screened to ensure strong spatial representativeness at both the 0.05° and 0.01° scales. Consequently, the retrieved LSTs at the two spatial resolutions are expected to exhibit comparable validation accuracy.

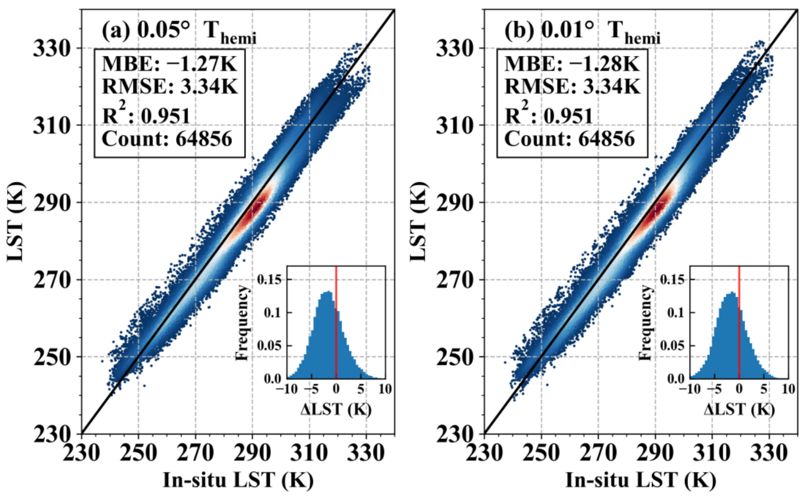

Figure 14: The accuracy of all-weather hemispherical LST products (a) before and (b) after downscaling.

2. The downscaling texture metrics are partly circular.

The authors use local variance ratio and SSIM to show that the 0.01° product better matches ATC-simulated texture than bilinear interpolation does. However, the downscaling method itself uses ATC-simulated 0.01° LST as the initial high-resolution thermal texture field. Therefore, the LVR and SSIM results demonstrate consistency with the imposed ATC texture prior, but they do not independently prove that the downscaled thermal heterogeneity is physically correct. The authors should explicitly acknowledge this in Sect. 4.3 and avoid over-interpreting the texture metrics. The manuscript should state that the metrics evaluate preservation of the prescribed ATC-based texture rather than independent sub-pixel LST accuracy.

Response: Thank you for this insightful comment. We agree that the LVR and SSIM metrics are not fully independent evaluations of the downscaled thermal heterogeneity, because the ATC-simulated 0.01° LST was already used as the prior thermal texture field during the downscaling process. Therefore, the reported improvements in LVR and SSIM mainly indicate that the downscaled product better preserves the prescribed ATC-based spatial texture compared with simple bilinear interpolation, rather than demonstrating independent sub-pixel LST accuracy. In practice, the independent evaluation is usually limited by the serious cloud coverage of other LST product (such as VIIRS LST). Following your suggestion, we have revised Subsection 4.3 to explicitly acknowledge this limitation and avoided over-interpreting the texture metrics as an independent validation of the downscaled heterogeneity. Thank you again for your detailed and constructive suggestion.

In Subsection 4.3:

Downscaled LST is expected to exhibit enhanced spatial texture, which is quantitatively evaluated in this study. The local variance ratio (LVR) and the structural similarity index (SSIM) were employed as metrics to compare the spatial textures of bilinearly interpolated LST (derived from 0.05° all-weather LST) and the downscaled 0.01° nadir LST. Values of LVR and SSIM closer to 1 indicate a higher similarity between the reconstructed and reference spatial textures. **The reference texture was reconstructed using the ATC model, which also provided the prior thermal texture information during downscaling. Therefore, the LVR and SSIM metrics mainly evaluate the consistency and preservation of the prescribed ATC-based spatial texture (Jia et al., 2024), rather than serving as an independent assessment of sub-pixel LST accuracy.** As shown in Fig. 13, the median LVR increases from 0.41 to 0.97, while the median SSIM improves from 0.83 to 0.91, **indicating that the downscaled LST better preserves the imposed spatial texture characteristics than bilinear interpolation.**

3. Clarify the temperature scale after FY-4A–MODIS and FY-4A–VIIRS bias corrections.

The manuscript states that FY-4A LST was linearly adjusted to match MODIS MxD11A1 before TEKDM calibration, with slope 1.0240 and intercept −5.7378. It also states that VNP21A1 was bias-corrected to FY-4A using nighttime matchups before cross-validation. This is methodologically reasonable for reducing inter-sensor systematic differences, but it creates ambiguity about the final product's radiometric reference scale. Are the released Tdir, Tnadir, and Themi values on the original FY-4A official LST scale, the MODIS-adjusted FY-4A scale, or a hybrid scale? The authors should state this explicitly. In addition, the VNP21A1 cross-validation results should preferably include uncorrected and bias-corrected metrics, at least in a supplement, so that readers can separate angular-normalization improvement from inter-sensor bias removal.

Response: Thank you for your insightful suggestion regarding the temperature scale after bias correction. Following Ermida et al. (2018), we first corrected FY-4A LST to the MODIS temperature scale before TEKDM calibration, and the subsequent cloud-filling and downscaling procedures were all based on the corrected LST. Therefore, the released T_{dir}, T_{nadir}, and T_{hemi} products are all provided on the MODIS-referenced FY-4A temperature scale rather than the original FY-4A operational LST scale. We have clarified this explicitly in the revised manuscript. In addition, we agree that it is important to distinguish the improvement from angular normalization and that from inter-sensor bias correction. Therefore, we provided cross-validation results using VIIRS near-nadir LST before and after bias correction as you suggested. For directional LST, the RMSD (MBD) decreases from 6.21 K (-4.04 K) before bias correction to 4.53 K (-1.85 K) after bias correction, indicating an improvement of 1.68 K in RMSD and 2.19 K in MBD due to bias adjustment. After angular normalization, the nadir LST achieves RMSD (MBD) values of 3.48 K (-2.13 K) before VIIRS bias correction and 2.56 K (0.06 K) after bias correction. This supplementary information allows readers to better separate the contributions from inter-sensor bias removal and angular normalization. Thank you again for your constructive suggestions.

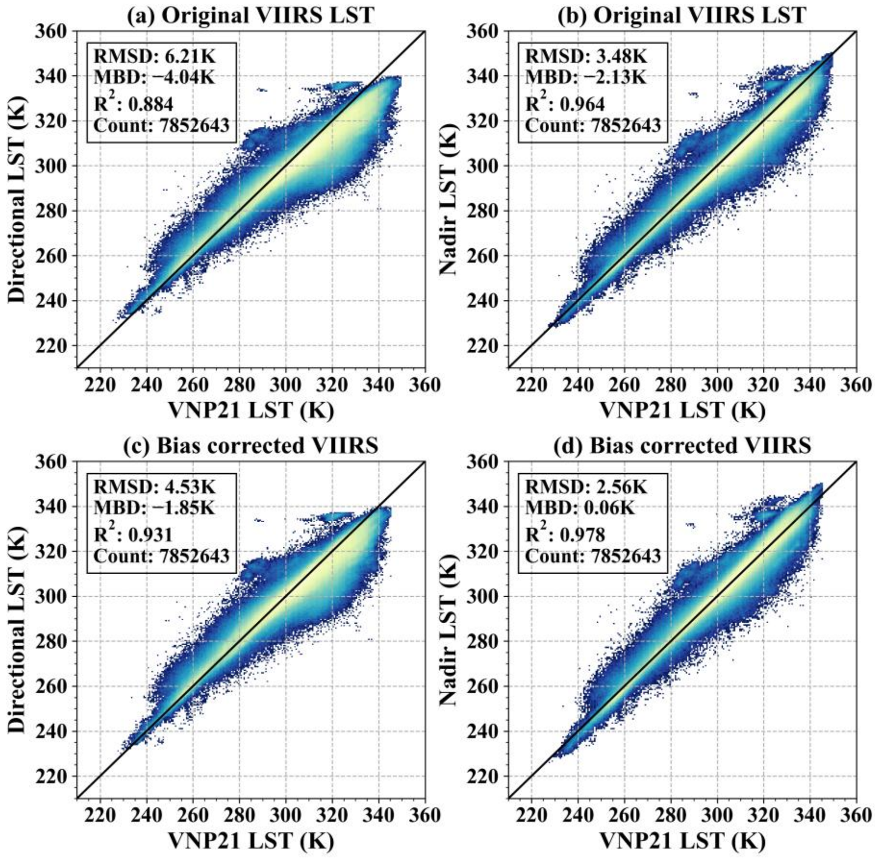

Fig. R2 Validation of FY-4A directional and nadir LST using VIIRS near-nadir LST as reference before and after VIIRS bias correction. Panels (a) and (b) show the validation results for directional LST and nadir LST, respectively, using the original VIIRS LST. Panels (c) and (d) show the corresponding validation results using bias-corrected VIIRS LST.

In Subsection 2.1:

The parameters a and b were determined based on nighttime matchups under the condition of VZA< 50°, VZA difference< 5°, and LST difference< 5 K, referenced to Ermida et al. (2017, 2018a). A total of 132,972,698 matchup pairs were collected from 2018/1/1 to 2023/12/31 in the disk of FY-4A, resulting in a slope of a = 1.0240 and an intercept of b = -5.7378. **It should be noted that all subsequent cloud-filling and downscaling procedures were performed based on the bias-corrected FY-4A LST, and thus the final released products are provided on the MODIS-referenced LST scale.**

In Subsection 2.2:

Here, VNP21 LST values with the VZA< 5° were employed for cross-evaluation of T_{nadir} as done by Wei et al. (2025). Meanwhile, the MODIS-referenced FY-4A LST product was temporally interpolated to match the exact observation time of VIIRS LST. The resulting near-nadir VNP21 LST was first resampled to a spatial resolution of 0.05°, **and then bias-corrected to MODIS-referenced FY-4A LST using nighttime matchups** (consistent with the bias correction applied between MODIS and FY-4A LST products). **A total of 12,379,672 matchup pairs were collected over the full disk of FY-4A in 2020, yielding a regression slope of 0.9478 and an intercept of 13.9510. This relationship was subsequently applied to the daytime VIIRS near-nadir LST. After bias correction, the root mean square difference (RMSD) between the VIIRS LST and MODIS-referenced FY-4A LST decreased from 6.21 K to 4.53 K, while the mean bias**

difference (MBD) was reduced from -4.04 K to -1.85 K. Finally, the RMSD, MBD, and coefficient of determination (R^2) were used as three evaluation indicators for the cross-validation. The extracted VNP21 LST results for four typical days are shown in Fig. 1. Only several narrow strips were extracted due to the limitation of VIIRS field-of-view (VZA< 5°). VNP21 LST shows significant seasonal variation. It is relatively lower in 2020/3/1 and 2020/12/1 than that in 2020/6/1 and 2020/9/1 in the northern hemisphere and the situation is reversed in the southern hemisphere.

Reference

Ermida, S.L., Trigo, I.F., DaCamara, C.C., Pires, A.C., 2018. A Methodology to Simulate LST Directional Effects Based on Parametric Models and Landscape Properties. Remote Sensing 10, 1114. https://doi.org/10.3390/rs10071114

4. The representativeness-based site selection improves validation quality but may also introduce selection bias.

The revised validation uses eight sites selected from HiWATER, OzFlux, and Tibetan Plateau candidates based on Landsat LST spatial STD and nighttime FY-4A–in-situ RMSE. This is a reasonable way to ensure spatial representativeness, but because one of the screening criteria uses the agreement between FY-4A and in-situ LST, the final reported validation accuracy may be optimistic relative to the full range of surface conditions within the FY-4A disk. I recommend that the authors briefly report the validation statistics for all candidate sites, or at least state how much the RMSE changes before and after site screening. The response document mentions that the original clear/cloudy RMSE values were 2.99 K and 4.56 K and improved to 2.48 K and 3.65 K after site replacement/screening; this useful information should be included in the manuscript or supplement.

Response: Thank you for your valuable suggestion regarding the potential selection bias introduced by the representativeness-based site screening. We agree that using the nighttime FY-4A–in-situ RMSE may lead to relatively optimistic validation statistics. Following your suggestion, we additionally reported the validation results before site screening as supplementary information (Fig. R3). The clear/cloudy RMSE values were 4.04 K and 4.64 K (including all the 28 candidate sites), and improved to 2.48 K and 3.65 K after site screening (including 8 selected sites). In addition, we have revised the manuscript to explicitly provide the representativeness indicators for each selected site, including the Landsat 8 LST STD and the RMSE between nighttime FY-4A LST and in-situ LST, allowing readers to better assess the reliability and representativeness of the selected validation sites. Thank you again for your insightful suggestion.

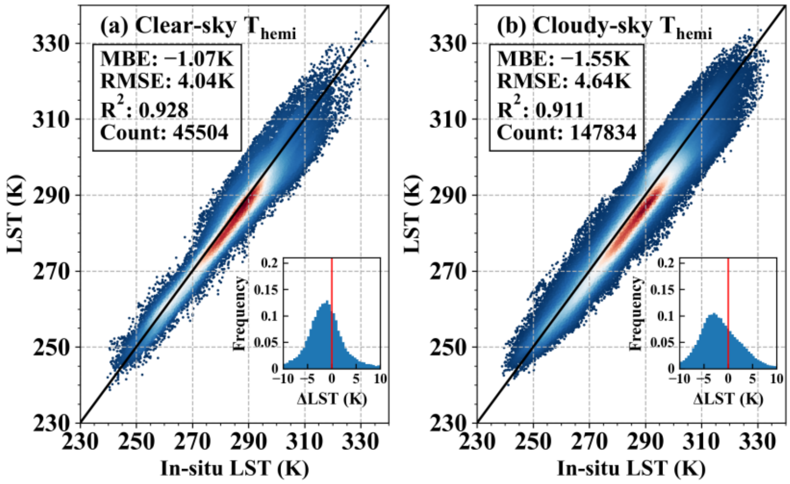

Fig. R3 Validation of FY-4A (a) clear-sky and (b) cloud-sky LST without site screening.

In Subsection 2.3

As shown in Fig. 2, 5 sites from the Heihe Watershed Allied Telemetry Experimental Research (HiWATER) experiment within the Heihe River Basin (HRB) and 3 sites from the Terrestrial Ecosystem Research Network (TERN) OzFlux network in 2020 were selected, which had been used in LST evaluation studies (Beringer et al., 2016; Che et al., 2019; Li et al., 2025, 2020). More detailed information of in-situ sites is listed in Table 2. **In addition, the median standard deviation (STD) of Landsat 8 LST within a 0.05° window and the RMSE between nighttime FY-4A LST and in-situ LST are also provided, as these two metrics were used to assess the spatial representativeness of the selected validation sites (see Subsection 5.3).**

Table 2. Information of the in-situ sites

Network	Site name	Longitude (° E)	Latitude (° N)	Elevation (m)	Temporal resolution (minute)	Land cover type	**STD of Landsat 8 LST (K)**	**RMSE of nighttime LST (K)**
HiWATER	DM	100.37	38.86	1560	10	CRO	**1.57**	**1.97**
	DSL	98.94	38.84	3787	10	GRA	**1.58**	**2.72**
	DS	100.99	42.11	927	10	BSV	**0.79**	**2.83**
	HZZ	100.32	38.77	1732	10	GRA	**2.03**	**2.04**
	SDQ	101.14	42.00	935	10	GRA	**1.95**	**2.15**
OzFlux	Gingin	115.71	-31.38	99	30	SAV	**0.80**	**2.42**
	GWW	120.65	-30.19	505	30	SAV	**1.42**	**2.38**
	Robson	145.63	-17.12	667	30	EBF	**0.81**	**3.21**

In Subsection 5.3:

Ultimately, 8 out of 28 candidate sites were retained, all satisfying the criteria of nighttime RMSE< 3.57 K and STD< 2.17 K.

5. Cloudy-sky Tdir and Tnadir need clearer interpretation.

The CRF correction is formulated for hemispherical LST, but the manuscript states that cloudy-sky Tdir, Tnadir, and Themi are obtained by adding the same CRF correction to CatBoost-estimated hypothetical clear-sky LST. Since cloudy-sky thermal directional anisotropy is not directly observed

or validated, the physical meaning of cloudy-sky Tdir and Tnadir should be stated more cautiously. I suggest explicitly noting that cloudy-sky Tdir and Tnadir are model-derived layers inferred under the adopted CRF and angular-normalization assumptions, whereas the physically most defensible all-weather quantity is Themi. This is important for downstream users who may otherwise treat all three layers as equally validated.

Response: Thank you for this insightful suggestion regarding the interpretation of cloudy-sky T_{dir} and T_{nadir}. We agree that the CRF correction was physically formulated for hemispherical LST, while the cloudy-sky T_{dir} and T_{nadir} layers are model-derived quantities inferred from the hypothetical clear-sky LST–ancillary variable relationship. Following your suggestion, we have revised the manuscript to explicitly clarify the physical meaning and applicability of the three all-weather LST layers. In particular, we now emphasize that T_{hemi} is the physically most defensible all-weather quantity, whereas cloudy-sky T_{dir} and T_{nadir} should be regarded as reconstructed directional and nadir-equivalent LST estimates derived under the adopted modeling assumptions (i.e., the assumed hypothetical clear-sky LST–ancillary variable relationship and the application of the same CRF correction derived for hemispherical LST). We believe this clarification will help downstream users better understand the applicability of different product layers. Thank you again for your insightful suggestion.

In Subsection 3.2:

After the pixel-by-pixel estimation of ΔTCRF, the mean (μCRF) and standard deviation (σCRF) of ΔTCRF could be calculated for each image. To reduce the impact of extreme values, the maximum and minimum limits of ΔTCRF were set to μCRF ± 3σCRF. In the end, the cloudy-sky Tdir, Tnadir, and Themi are obtained by summing CatBoost-estimated hypothetical clear-sky LST (i.e., using Eq. 13) and ΔTCRF (i.e., using Eq. 17). **It should be noted that T_{hemi} represents the physically most defensible all-weather LST quantity, whereas cloudy-sky T_{dir} and T_{nadir} are model-derived estimates based on two independent assumptions: the assumed hypothetical clear-sky LST–ancillary variable relationship and the application of the same CRF correction derived for hemispherical LST.**

6. The product should include, or at least document, quality flags.

The data availability section states that each GeoTIFF contains three sequential bands: Tdir, Tnadir, and Themi. For an all-weather, angular-normalized, and downscaled LST product, users need to know whether each pixel is original clear-sky FY-4A, angular-normalized clear-sky, ML gap-filled cloudy-sky, nighttime uncorrected, or downscaled from a high-uncertainty region. I strongly recommend adding a QA layer or separate flag file indicating clear/cloudy status, day/night status, whether TEKDM was directly solved or temporally composited, and whether the value was reconstructed. If the current dataset cannot be changed, the authors should at least provide a detailed QA table and uncertainty guidance in the documentation.

Response: Thank you for this constructive suggestion regarding the inclusion of quality information in the released dataset. We fully agree that pixel-level QA information is important for users to correctly interpret the reliability, processing pathway, and potential uncertainty sources of an all-weather, angular-normalized, and downscaled LST product. Following your recommendation, we have additionally provided a description about the generated QA file corresponding to the released dataset. The QA layer records key processing information for each pixel, including whether the pixel has undergone angular normalization correction and whether the value was reconstructed through the cloud-filling procedure. Additionally, all TEKDM parameters were temporally composited regardless of whether they could be directly solved, and therefore this information was not included in the QA file. Similarly, nighttime conditions can be directly identified using SZA > 90°, so a separate nighttime flag was not provided. We have revised the manuscript to provide a clearer description of the QA information. More detailed explanations of the QA flags, processing flow, generation pathway are also provided on the data release webpage to facilitate product usage by different research communities (https://doi.org/10.11888/RemoteSen.tpdc.303249). We believe that the QA file substantially improves the transparency and usability of the released dataset. Thank you again for your constructive suggestion.

In Data Availability Section:

The hourly, 0.01°, all-weather Tdir, Tnadir, and Themi product (ANCFDS-LST) from 2018 to 2023 is freely available at https://doi.org/10.11888/RemoteSen.tpdc.303249 (last access: 30 January 2026; Na et al., 2026). Data are stored in GeoTIFF format with three sequential bands (Tdir, Tnadir, and Themi respectively), and the units of each file is kelvin. A scale factor of 0.1 and offset of 0 have been applied for value encoding. **Quality check (QC) flags are also provided. A value of 1 indicates clear-sky LST with angular normalization applied, whereas a value of 0 denotes reconstructed LST generated using the all-weather estimation procedure.**

Minor comments and editorial corrections

Several wording and consistency issues remain. These are minor but should be corrected because the manuscript is still not fully polished.

Response: Thank you for detailed review, we revised the manuscript accordingly as you suggested.

In the abstract, the sentence "After the spatial downscaling, the 0.01° all-weather Themi with abundant texture details" is incomplete and should be rewritten, for example: "After spatial downscaling, the 0.01° all-weather Themi exhibits abundant spatial texture details."

Response: Thank you for your detailed review. We revised accordingly.

In Line 40:

After the spatial downscaling, the 0.01° all-weather T_{hemi} **exhibits** abundant texture details.

"the Heihe River Basin and the Australia" should be changed to "the Heihe River Basin and Australia."

Response: We revised accordingly. Thank you for your suggestion.

In Line 39:

temperature-based validation over 8 sites in the **Heihe River Basin and Australia** shows a root mean squared error (RMSE) and mean bias error (MBE) of 2.48 K and -0.83 K under clear-sky conditions

Line 344 still says "introduced to abundant the spatial texture"; this should be "introduced to enrich the spatial texture" or "introduced to provide spatial information not captured by satellite observations."

Response: We revised accordingly. Thank you for your suggestion.

In Line 349:

It should be noted that the reanalysis variables are introduced to **provide the spatial information that was not captured by satellite observations**, rather than to replace satellite information.

The conclusion says that the in-situ hemispherical LST reference is from "the Heihe River Basin and the Tibetan Plateau," but the revised validation sites are from HiWATER and OzFlux, i.e., the Heihe River Basin and Australia. This inconsistency should be corrected.

Response: Thank you for your detailed review. We revised the manuscript accordingly.

In Line 712:

Taking the in-situ hemispherical LSTs in the Heihe River Basin and **Australia** as reference, the RMSE decreased from 2.22 K of the T_{dir} to 2.00 K of the normalized 0.05° T_{hemi}.

The sentence "The generated all-weather Themi generates comparable accuracy" should be revised to "The generated all-weather Themi shows comparable accuracy."

Response: Thank you for your detailed review. We revised the manuscript accordingly.

In Line 715:

The generated all-weather T_{hemi} **shows** comparable accuracy with the existing four all-weather LST products (i.e., ERA5, CLDAS, Jia2023 and Dong2022).

The manuscript should consistently use "cloudy-sky" rather than alternating among "cloud-sky," "cloudy-sky," and "cloud-covered." Similar consistency is needed for "clear-sky," "all-weather," "T-based," and "R-based."

Response: We revised accordingly. Thank you for your suggestion.

In line 351:

The clear-sky LST values remain unchanged, and also act as the training labels for **cloudy-sky** LST estimation.

In line 516:

Under **cloudy-sky** conditions, the RMSE (MBE) values are 3.54 K (-0.53 K) at the DM site and 4.09 K (1.97 K) at the SDQ site during daytime

The wording "the normalized 0.05° Themi" and "0.05°FY-4A" should be formatted consistently with spaces between values and units/symbols.

Response: We revised accordingly. Thank you for your suggestion.

In line 166:

the **0.05° FY-4A** LST was linearly adjusted to match the 0.05° MODIS MxD11A1 LST using a linear transformation

In line 714:

the RMSE decreased from 2.22 K of the T_{dir} to 2.00 K of the normalized **0.05° T_{hemi}.**

The authors should check subject–verb agreement throughout, for example "ML-based LST reconstruction methods have been widely used because it could…" should be "because they can…".

Response: We revised accordingly. Thank you for your detailed suggestion.

In line 335:

ML-based LST reconstruction **methods** have been widely used because **they can** accurately simulate the non-linear correlation between the hypothetical clear-sky LST and vegetative, meteorological, and topographical parameters (Li et al., 2024a; Ma et al., 2024a; Zhang et al., 2024).

Final assessment

The revised manuscript is much stronger than the original version and, in my view, is close to being suitable for publication as an ESSD dataset paper. The dataset is valuable, the angular-normalized LST concept is important, and the authors have made substantial revisions in response to the first-round comments. The remaining issues are mainly about clarification, avoiding overstatement, documenting uncertainty and QA information, and improving language. I therefore recommend minor revision before acceptance.

Response: We sincerely thank you for the positive and constructive overall assessment of our revised manuscript. We greatly appreciate your recognition of the improvements made in response to the previous comments, particularly regarding the dataset value, methodological clarity, and product design. We are also grateful for your helpful suggestions on further clarifying key aspects, avoiding overstatement, and improving the documentation of uncertainty and QA information. We have carefully addressed all remaining concerns in the revised manuscript and supplementary materials, and believe these revisions have further strengthened the clarity and robustness of the study. Thank you again for your detailed and insightful suggestions.