Editor:

There seems to be a technical issue with the file upload — the equations are not rendering correctly and are unreadable. Please check and re-upload a file where all content is presented properly.

Response: We sincerely appreciate you pointing out that technical issue with the file upload. We have identified and resolved the formatting inconsistencies that caused the equation to render incorrectly. We have uploaded the revised files, which display all content correctly. We apologise for any inconvenience caused and appreciate your patience and support.

We have received the second round of reviewers' comments on your revised manuscript. While some improvements have been made, major concerns regarding the clarity, methodological justification, and support of key conclusions still require your careful attention.

Given the potential scientific significance of your work, I'd like to offer one final opportunity for revision. Please note that acceptance/rejection of your manuscript will depend entirely on your ability to fully address all remaining concerns in this round.

Response: We sincerely appreciate your constructive comments and the precious chance to improve our paper. We revised the paper extensively in response to your feedback and that of the second-round reviewers, making targeted adjustments to the issues you highlighted.

Clarity: The manuscript has undergone substantial rephrasing and restructuring to ensure precise and logical expression. We believe the revised manuscript could foster clearer communication of our findings.

Methodological justification: We supplemented the intensity classification of DFAA events and analyzed the probabilities of events with different intensities in future periods. This enables an exploration of the reservoir's mitigating capacity from both intensity and frequency (reflected through probability) perspectives.

Support of key conclusions: We restructured the discussion section and removed content that was not closely related. We emphasized the distinct characteristics of FTD and DTF, explored the relationship between reservoir mitigation role and capacity, and introduced additional data to reinforce persuasiveness. Moreover, we added the limitation section, highlighting the paper's shortcomings in reservoir regulation.

In addition, with regard to the annual DFAA probability being half the sum of the dry season and wet season DFAA probabilities, we adjusted the inappropriate expressions and illustrations in the revised version. We are deeply grateful for your patient guidance and support. We hope this modification will meet your expectations.

Reviewer #1:

Thanks for authors' efforts on replying to the comments and making revisions. My comments are as follows.

Response: We sincerely appreciate your invaluable time and effort in reviewing our paper and providing us with your insightful comments and suggestions. Your valuable insights are of great significance to our paper's improvement, and we are grateful for your thoughtful feedback. We have carefully considered each of your comments and hereby report the following responses.

1. **The primary concern of this paper is that it remains unclear how climate change impacts the LMR basin. For instance, statements such as "FTD is more challenging though DTF is more probable to occur" and "Reservoir operations reduce DFAA's risks" in the abstract are confusing and lack clarity. Moreover, the study relies solely on one metric—probability—to evaluate the impacts of climate change and reservoir operations. Yet, as noted in the references, several studies have already investigated climate change impacts on the Lancang-Mekong River basin using additional metrics such as duration, intensity, and severity. It would strengthen the paper if the authors could incorporate comparisons with these studies in the discussion section.**

Response: Thank you for your detailed review of our research!

(1) Your insightful comments on the expression have alerted us to potential shortcomings. We recognize that the introduction may lack clarity in logic or strength in conclusions. Therefore, in the revised version, we substituted the statements 'Reservoir operations reduce DFAA's risks' and 'FTD is more challenging though DTF is more probable to occur' in the introduction with the revised expressions found in lines 15 to 22 of the revised manuscript, as shown below. We believe that the revised expressions are more precise and effectively convey our research results.

The findings reveal that DFAA in the LMR Basin is primarily dominated by DTF (drought to flood), with probabilities of DTF exceeding those of FTD (flood to drought) at mild, moderate, and severe intensity levels. The increase in DTF probability for future periods is also significantly higher than that of FTD. Mild DTF and mild FTD account for 58% to 90% and 75% to 100% of their total probability in the future, making the mild-intensity events the most frequent DFAA. Reservoirs play a significant role in reducing DTF risks during both dry and wet seasons, though their effectiveness in controlling FTD risks, particularly during the dry season, is relatively weaker.

(2) You pointed out that our study only evaluates the impacts of climate change and reservoir operation using probability as a single metric, whereas existing studies also consider frequency metrics. We acknowledge that this was a limitation we had not sufficiently addressed. Therefore, in the revised manuscript, we introduced the intensities of DFAA events, analyzing their trends at mild, moderate, and severe levels

under climate change, as well as the reservoir regulation's role in mitigation. The specific details are as follows.

In the revised manuscript, we added Table 2 and Figures 6, 8, and 10 to illustrate the intensity characteristics of DFAA under climate change and reservoir operation. The intensity classification of DFAA events is outlined in Table 2 and on lines 332 to 344. The analysis of various intensity events under climate change is presented in Figure 6 and lines 476 to 499. Figure 8 and lines 533 to 554 explain the mitigating effects of reservoirs on various intensity events. Figure 10 and lines 615 to 652 discuss the relation between reservoirs' regulation capacity and their storage. To enhance comprehension, Figures 6, 8, and 10 are listed below.

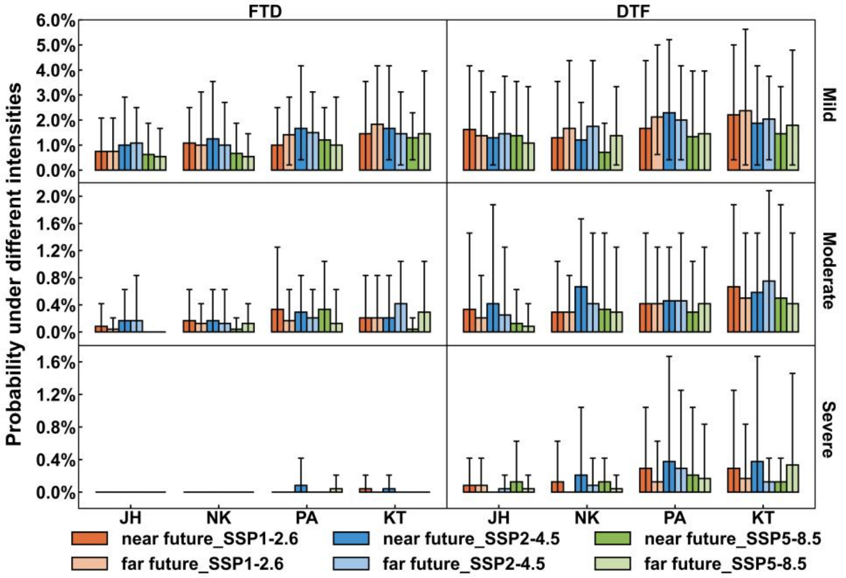

Figure 6: Annual probability of DFAA at different intensities under the natural scenario, averaged across five GCMs and their ranges in the near future (2021-2060) and far future (2061-2100) periods under three SSPs. Here, JH, NK, PA, and KT respectively denote JingHong, Nong Khai, Pakse, and Kratie stations.

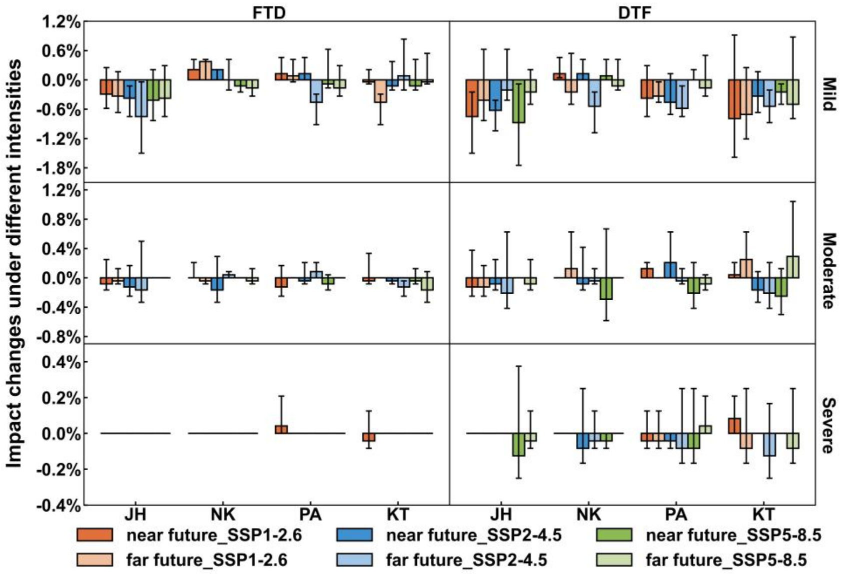

Figure 8: Reservoir impacts on DFAA under different intensities, averaged across five GCMs and their ranges in the near future (2021-2060) and far future (2061-2100) periods under three SSPs. Here, JH, NK, PA, and KT respectively denote JingHong, Nong Khai, Pakse, and Kratie stations.

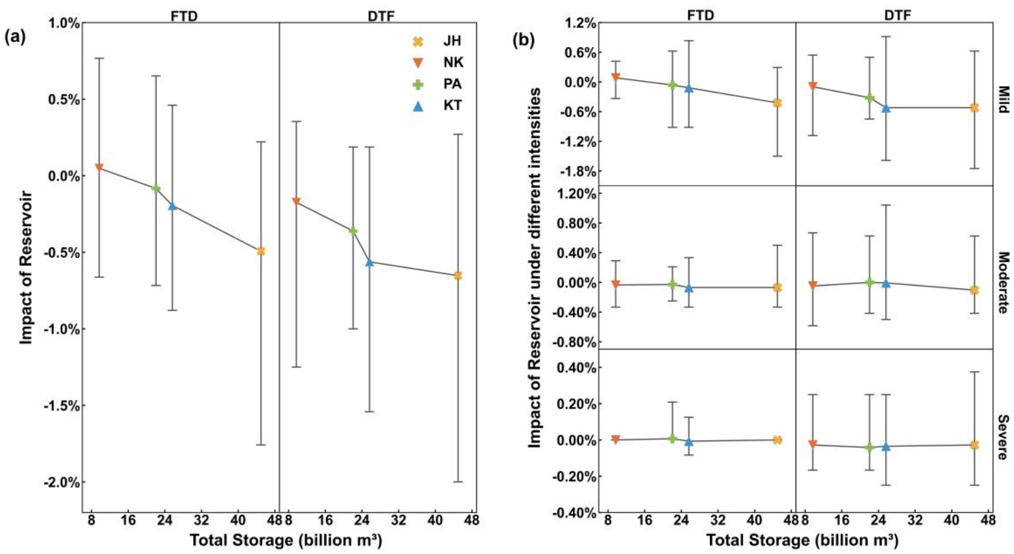

Figure 10: The relationship between reservoirs' mitigation effects and their total storage. Symbol points denote the average values for each station under three SSP scenarios during the near future (2021-2060) and far future (2061-2100) periods, while error bars indicate the maximum and minimum values. Here, JH, NK, PA, and KT respectively denote JingHong, Nong Khai, Pakse, and Kratie stations. (a) The impact of reservoirs on the total probability of DFAA. (b) The impact of reservoirs on DFAA of different intensities. Please note that, as Jinghong and Nong Khai stations are not expected to experience severe FTD in the future, the relevant information has not been included in the figure.

(3) We appreciate your comment to supplement our discussion with existing studies, and we have carefully considered it. However, we would like to clarify that, as noted in lines 78 to 80 of the revised manuscript, to our knowledge, there are very few existing studies on DFAA events in the LMR Basin. Consequently, we reviewed existing literature on DFAA in other basins, as referenced in lines 42 to 49 of the introduction section in the revised manuscript. Given the significant differences in hydrological characteristics and geographical locations between study regions, it is challenging to conduct comparative analyses of specific conclusions. Moreover, to our knowledge, existing research has scarcely addressed reservoir regulation's impact on DFAA events, both in the LMR Basin and in other regions. Therefore, we were unable to compare our findings on reservoir mitigation effects with existing studies.

Nevertheless, we have striven to integrate discussions with previous research within our manuscript. In section 4.1 of the discussion, we underscored the similarities between our research and prior studies. Consistent with previous relevant research, our research found that FTD and DTF events display distinct characteristics, as explained in lines 578 to 585 of the revised manuscript, listed below.

The distinct characteristics of DTF and FTD events have been identified by previous research. Shi et al. (2021) found that FTD events predominate in the Wei River Basin. Wang et al. (2023) projected that in the Poyang Lake Basin, the temporal spread of DTF events will expand in the future, while that of FTD events will constrict. Ren et al. (2023) found that under SSP1-2.6 and SSP2-4.5 scenarios, the Huang-Huai-Hai River Basin will experience more DTF events, whereas under SSP3-7.0 and SSP5-8.5 scenarios, it will experience more FTD events. This study identifies differences between DTF and FTD events as well, and further highlights the different characteristics of reservoirs' mitigating effects on these events.

2. **Regarding reservoir operations, only a single operation rule (stated in line 254) is applied across multiple years, including both near- and far-future scenarios. Using one fixed rule to assess reservoir performance over such diverse temporal scales is not persuasive. A more nuanced approach that accounts for changing conditions is needed.**

Response: We appreciate your comment regarding reservoir operation rules.

We would like to note that applying consistent reservoir operation rules across multiple years or study periods is a widely adopted methodology (Lauri et al., 2012; Ly et al., 2023; Piman et al., 2013; Wang et al., 2017; Yun et al., 2021a; Yun et al., 2021b).

For instance, Piman et al. (2013) implemented the HEC-ResSim reservoir operation model to assess the influence of reservoir construction on the 3S basin under diverse future scenarios. Lauri et al. (2012) and Ly et al. (2023) utilized specific nonlinear reservoir operation methods to investigate the impacts of reservoirs and climate change on the flow regimes of the LMR Basin over the next 20-30 years, and the effects of climate change and hydroelectric operations on the downstream flow of the Mekong River and the flooding of Tonle Sap Lake in the near, medium, and long term respectively. Wang (2017) incorporated SOP as the reservoir operation rule, applying it across multiple future study periods (near, medium, and long term) to investigate the role of reservoir construction in reducing future flood risks in the LMR Basin. Yun (2021a) and Yun (2021b) divided future periods into near and far future, both utilizing SOP as the reservoir operation rule. Their studies respectively analyzed the effects of reservoir operations on extreme drought and wet events, as well as the trade-offs between hydroelectric generation and flood protection benefits under climate change scenarios.

The examples provided consider the impact of reservoirs on future hydrological conditions and employed fixed reservoir operation methods. Thus, we believe it is reasonable to maintain the same regulation method for both near and far periods.

We understand your comment that different years require different reservoir operations, as operations should adapt to varying inflows. We would like to highlight that our operations do account for inflow variations and adjust accordingly. We acknowledge that this manuscript was not sufficiently emphasized in the previous draft. Therefore, we strengthened this explanation in the revised version. The details can be found in lines 248 to 249 of the revised manuscript, as shown below.

Strategies are adapted in response to inflow fluctuations and administered on a daily scale. Each reservoir is assigned based on location.

References:

Lauri, H., de Moel, H., Ward, P., Räsänen, T., Keskinen, M., and Kummu, M.: Future changes in Mekong River hydrology: impact of climate change and reservoir operation on discharge, Hydrol. Earth Syst. Sci., 16, 4603–4619, https://doi.org/10.5194/hess-16-4603-2012, 2012.

Ly, S., Sayama, T., Try, S.: Integrated impact assessment of climate change and hydropower operation on streamflow and inundation in the lower Mekong Basin. Prog Earth Planet Sci 10, 55, https://doi.org/10.1186/s40645-023-00586-8, 2023.

Piman, T., Cochrane, T., Arias, M., Green, A., Dat, N.: Assessment of flow changes from hydropower development and operations in Sekong, Sesan, and Srepok rivers of the Mekong basin. J. Water Resour. Plan. Manag. 139, 723–732. https://doi.org/10.1061/(ASCE)WR.1943-5452.0000286, 2013.

Wang, W., Lu, H., Leung, L. R., Li, H.-Y., Zhao, J., Tian, F., Yang, K., Sothea, K.: Dam construction in Lancang-Mekong River Basin could mitigate future flood risk from warming-induced intensified rainfall. Geophysical Research Letters, 44, 10,378–10,386. https://doi.org/10.1002/2017GL075037, 2017.

Yun, X., Tang, Q., Li, J., Lu, H., Zhang, L., Chen, D.: Can reservoir regulation mitigate future climate change induced hydrological extremes in the Lancang-Mekong River Basin? Sci. Total Environ. 785, https://doi.org/10.1016/j.scitotenv.2021.147322, 2021a.

Yun, X., Tang, Q., Sun, S., Wang, J.: Reducing climate change induced flood at the cost of hydropower in the Lancang-Mekong River Basin. Geophysical Research Letters, 48, e2021GL094243, https://doi.org/10.1029/2021GL094243, 2021b.

3. The discussion section makes it difficult to clearly compare the study's findings with previous work, and several conclusions are presented without sufficient support from the results. For example, what explains the statement "DTF and FTD exhibit quite different characteristics, in that DTF is more frequent but FTD is more challenging" (line 532)? Similarly, where in the results section can readers find evidence for "Hydrological forecasting technology enhances the potential of reservoirs" (line 560)? Likewise, what results support the claim that "The mitigation effect of reservoirs on DFAA risk is closely associated with storage distribution of mainstream and tributary reservoirs (line 579)"? These points need to be more explicitly linked to the presented findings.

Response: We express our gratitude for your thorough review and insightful comment.

In the revised version, we implemented various revisions to address your concerns, such as refining the discussion section with enhanced data support, providing additional explanations, revising the expression for greater clarity, and removing less relevant content, thereby enhancing the paper's overall quality and coherence.

(1) The statement "DTF and FTD exhibit quite different characteristics, in that DTF is more frequent but FTD is more challenging" was derived from the results section and further elaborated in the three paragraphs following it. We recognize that the expression in the previous version was not sufficiently clear. Therefore, we refined the explanation and structure of Section 4.1 in the revised manuscript to enhance clarity. The revised statement can be found in lines 586 to 613 of the revised manuscript, and the principal changes are outlined as follows.

The average probability of DTF across all periods is 2.1% under the natural scenario, which is significantly higher than the 1.4% average for FTD (Fig. 5a). The probability of DTF consistently exceeds that of FTD under three different intensities (Fig. 6). ...... Compared with FTD events, reservoirs more effectively control DTF probabilities, significantly lowering DTF risk in both dry and wet seasons (Fig. 7). ...... Although FTD is less likely than DTF, reservoirs control FTD less effectively, especially in the dry season (Fig. 7). ...... This difficulty in regulation is what makes FTD a major challenge.......

(2) We appreciate your comment that the section on 'Hydrological forecasting technology enhances the potential of reservoirs' is weakly connected to the paper's main argument. We agree with it. This part was initially included as a future prospect in the discussion section. Upon reflection, we believe the revised manuscript is sufficiently comprehensive, and removing the part pertaining to hydrological forecasting would not compromise the paper's overall structure and completeness. Thus, we decided to remove the part, i.e., Section 4.2 of the previous version. This deletion has enhanced the paper's clarity and focus. We are deeply grateful for your valuable feedback, which has been crucial in refining our research.

(3) The statement regarding 'The mitigation effect of reservoirs on DFAA risk is closely associated with storage distribution of mainstream and tributary reservoirs' is based on Figures 1c and 6 from the previous manuscript. We acknowledge that the previous manuscript lacked a direct comparison between these two aspects, leading to clarity issues. To address this, we incorporated Figure 10 into the revised version, which effectively demonstrates the connection between reservoir storage and its mitigation impacts on DFAA risks across different intensities. Moreover, we enhanced the section with additional explanations and discussions to make it more readable and logically structured. The revised statement is presented in lines 615 to 652 and Figure 10 of the revised manuscript, with the main points listed as follows.

The reservoir systems provide enhanced mitigation efficiency against DFAA at JingHong and Kratie compared to those at Nong Khai and Pakse (Fig. 7). Reservoir storage in the region above JingHong and the Pakse to Kratie region is significantly larger than storage in the JingHong to Nong Khai and Nong Khai to Pakse regions (Fig. 1c). Reservoirs' capacity to reduce total DFAA risk closely relates to the total storage of mainstream and tributary reservoirs, consistently showing a positive correlation for DTF and FTD events (Fig. 10a). ...... The positive correlation between total reservoir storage and the reduction of total DFAA risk indicates that basins with larger total storage are better equipped to resist DFAA events. ...... Both mild DTF and mild FTD show a positive correlation with total reservoir storage, consistent with total DFAA events (Fig. 10b). In contrast, moderate and severe DFAA events do not strongly correlate with reservoir storage (Fig. 10b). ......

4. **The overall quality of English expression in the paper should be improved to enhance clarity and readability.**

Response: We appreciate your attention to the language expression in the paper.

We recognize potential for improvement in this aspect and have revised it for greater clarity and professionalism. We optimized sentence structures, polished the language, and ensured more precise, consistent English throughout. These revisions will better convey the research results and improve the manuscript's overall readability. Please kindly review the revised manuscript.

Reviewer #2:

This paper investigates the Drought-Flood Abrupt Alternation (DFAA) phenomenon in the Lancang-Mekong Basin under climate change and reservoir operation. The results conclude that climate change increases the risk of such DFAA, while reservoir operation plays a mitigating role, which aligns with the current broad consensus. Overall, the topic is relevant and addresses regional concerns, and the paper is well-structured. However, I have several concerns that the authors should explain and incorporate into their revision.

Response: Your detailed review of our research is greatly appreciated. We appreciate your constructive comments on our manuscript, which have greatly helped us to improve the quality of our work. We believe that the revised version of our paper will be more rigorous and clear, effectively conveying our research findings. Below, we address each of your comments in detail.

1. **The reservoir operation rules are based on the SOP, without distinguishing the capacities of reservoirs, e.g., annual regulation for large reservoirs & daily regulation for smaller ones. Moreover, since most mainstream reservoirs in the upper Mekong are primarily for hydropower, constraints such as installed capacity and firm power should be considered. Additionally, it is worth exploring whether adjusting reservoir operation rules could improve their functionality in mitigating transitions from floods to droughts and vice versa.**

Response: We sincerely appreciate your insightful comment on our research!

(1) Your comment regarding the lack of differentiation in reservoir regulation scales is valuable. However, as the regulatory time scales and specific operation rules for individual reservoirs within the basin are largely inaccessible, our analysis was constrained to examining only one regulation scale: daily regulation under the SOP rule. We recognize that this limitation exists and, as such, added a section on limitations in the revised manuscript. The revised content is included in lines 664 to 668 of the revised draft, with the key modifications detailed below.

Despite this, the study uses uniform operation rules for reservoirs of different storage scales within the LMR Basin. It implements daily regulation for all reservoirs. The study does not use differentiated regulation scales (daily, annual, or multi-annual) based on storage. It also does not consider unique operation rules in different sub-basins. These simplifications may cause uncertainties in how reservoirs mitigate effects. This is a limitation of the study.

(2) We agree with your perspective that upstream reservoirs should consider constraints such as installed capacity and firm power. However, since we focused on the reservoir's regulation capacity rather than its power generation function, we did not include power-generation-related constraints such as installed capacity and firm power, as you mentioned. Nevertheless, we recognize the significance of your suggestion and will carefully consider it in future research related to reservoir power

generation. Thank you once again for your valuable insight and comment.

(3) We appreciate your suggestion to explore whether adjusting reservoir operation rules can enhance their capacity in mitigating DFAA events. We appreciate your insightful perspective and thank you for your constructive feedback. However, we believe that the current scope of our study and its findings are extensive and comprehensive. We are committed to exploring this subject further in future research.

2. **The structure of the Introduction section requires reconsideration. For instance, the quantitative indicators are presented in the second paragraph, which disrupts the coherence of the background and regional issue description.**

Response: We appreciate your suggestion on the structure of the introduction section.

We have revised and relocated the quantitative indicator description to section 2.5, as shown in lines 297 to 303. This change improves the logical flow and structure of the introduction. Thank you for your input.

3. **The historical period is set from 1980 to 2014, yet the hydrological model simulations extend to 2020. Given that the current year is 2025, the near-future period should ideally start from 2021, and the timeline needs updating accordingly.**

Response: Thank you for your attention to the timeline of this research.

The future meteorological data used here is based on the CMIP6 data set, which includes historical data (meteorological data from 1961 to 2014 for various GCMs) and future projections (meteorological data from 2015 to 2100 for various GCMs under different emission scenarios). Since the historical portion of the CMIP6 data set only extends to 2014, this study defines the history period as ending in 2014. Additionally, to maintain consistency in the length of the near future and far future periods, the near-future in this study is defined as 2021 to 2060, while the far-future is set from 2061 to 2100.

As you mentioned, the validation period for the hydrological model is set from 2010 to 2020, with an extension beyond 2014. This is because major reservoirs in the LMR Basin were predominantly built around 2010 (Zhang et al., 2023; Morovati et al., 2024). The Nuozhadu reservoir, distinguished by its substantial storage of 21.7 billion m3, started operations in 2014 (MERFI, 2024). The validation period is intended to assess the model's performance following reservoir construction. Restricting the validation period to 2014 would result in an insufficient time frame and fail to adequately reflect the regulatory capacities of mega dams, thus not fulfilling the original purpose of the validation period. Therefore, the validation period is extended to 2020 in this study.

References:

MERFI: Dataset on the Dams of the Greater Mekong. Bangkok, Mekong Region Futures Institute, https://www.merfi.org/mekong-region-dams-database (last access: March 2025), 2024.

Morovati, K., Zhang, K., Shi, L., Pokhrel, Y., Wu, M., Someth, P., Ly, S., and Tian, F.: On the cause of large daily river flow fluctuations in the Mekong River, Hydrol. Earth Syst. Sci., 28, 5133–5147, https://doi.org/10.5194/hess-28-5133-2024, 2024.

Zhang, K., Morovati, K., Tian, F., Yu, L., Liu, B., Olivares, M.A.: Regional contributions of climate change and human activities to altered flow of the Lancang-Mekong river. J. Hydrol.: Reg. Stud. 50, 101535, https://doi.org/10.1016/j.ejrh.2023.101535, 2023.

4. The Results section currently focuses on describing phenomena but lacks interpretation of the underlying causes of these changes. This part needs strengthening, particularly for notable phenomena that may attract attention. For example:

(1) Lines 440-441: Why do high-emission scenarios often lead to lower risks of DFAA?

Response: We appreciate your suggestion and inquiry.

The decrease in DFAA risk under the high-emission scenario is mainly because droughts and floods tend to occur together rather than in succession. As shown by Dong et al. (2022), the SPI index indicates decreased fluctuations in the SSP5-8.5 scenario compared to SSP1-2.6 and SSP2-4.5 scenarios, as illustrated in the figure below. This suggests a lower probability of rapid transitions between drought and flood events under the SSP5-8.5 scenario.

In the revised manuscript, we included an explanation of this phenomenon, as outlined in lines 446 to 448, which reads as follows.

Such a pattern is attributable to the enhanced tendency for flood and drought events in the LMR Basin to cluster rather than alternate under the SSP5-8.5 scenario (Dong et al., 2022).

References:

Dong, Z., Liu, H., Baiyinbaoligao, Hu, H., Khan, M., Wen, J., Chen, L., Tian, F.: Future projection of seasonal drought characteristics using CMIP6 in the Lancang-Mekong River Basin. J. Hydrol. 610, https://doi.org/10.1016/j.jhydrol.2022.127815, 2022.

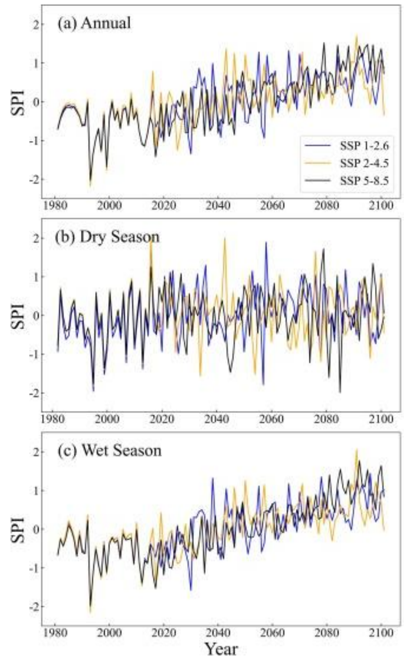

Figure. Dynamics of future annual (a), dry season (b), wet season (c) SPI of the LMR Basin (Dong et al., 2022).

(2) Figure 7: Why do both drought-to-flood and flood-to-drought risks appear to intensify in May? Could this be due to the temporal-spatial trade-off effects of reservoir operation?

Response: Thank you for your question.

As depicted in Figure 7 (Figure 9 in the revised manuscript), under the SSP2-4.5 scenario, reservoir management increased the probability of DFAA in May in the near future. This is mainly because the reservoir successfully mitigates DFAA probabilities during the preceding dry season (December to April), thereby reducing the available reservoir storage for DFAA risk regulation in May. Consequently, this diminishes the reservoir's ability to control DFAA risks in May and, in some scenarios, amplifies the risk.

We provided additional clarifications in lines 568 to 571 of the revised manuscript, as detailed below.

Sometimes, such as the SSP2-4.5 scenario in the near future, reservoirs actually increase the probability of DFAA in May. This happens because helping during the dry season before May reduces the capacity of reservoirs for water regulation in May, making it hard to control DFAA risks that month.

5. **It is recommended to enhance the interpretation of reservoir effects from the perspective of operational processes and mechanisms.**

Response: We sincerely appreciate your valuable comment.

In the prior version of the manuscript, we had provided an explanation of the reservoir's role from the perspectives of operational processes and mechanisms in

Section 4.1. However, we acknowledge that our previous explanation may not have been entirely clear or thorough. To address this, we strengthened our discussion of this section in the revised manuscript. We explained the reasons for the reservoir's differing control capacities over DTF and FTD events and further explored the potential mechanisms underlying the varying mitigation effects of the reservoir on DFAA events of different intensities, as outlined in lines 591 to 613. The revised text is provided below.

Compared with FTD events, reservoirs more effectively control DTF probabilities, significantly lowering DTF risk in both dry and wet seasons (Fig. 7). The reason is that the timing of DTF's water regulation matches the way reservoirs operate. At the start of DTF, reservoirs typically hold water at the storage corresponding to the normal water level, which equates to 0.8 times the maximum storage (Eq. (20)). Hence, reservoirs possess sufficient storage capacity to mitigate the drought conditions. In parallel, the water release during the initial phase of the DTF reduced the water level, thereby meeting the storage needs for sudden floods that occur later in the DTF. As a result, even if DTF events are frequent, reservoirs can manage them well. Reservoirs especially succeed in reducing mild DTF events (Fig. 8). However, they control moderate DTF events less effectively. In intense DTF cases, the rules for operating reservoirs are not enough. For example, if a severe drought at DTF's beginning exceeds reservoir storage, they cannot effectively relieve the extreme drought and thus fail to control such DTF events.

Although FTD is less likely than DTF, reservoirs control FTD less effectively, especially in the dry season (Fig. 7). The problem is that when the FTD event occurs, reservoirs are generally maintained at their target storage for the wet season. The storage corresponds to the flood control water level, which is 1.2 times the minimum storage capacity (Eq. (19)). Consequently, reservoirs, while fully meeting flood control requirements at the start of FTD, struggle to maintain sufficient water storage to satisfy water supply demands for the subsequent drought stage. If FTD happens often, the reservoir's control decreases further. While reservoirs do little for mild FTD, they noticeably reduce moderate FTD (Fig. 8). This means that, for rare but strong FTD events, reservoirs can help by storing water for later droughts. However, if FTD is frequent, current reservoir operations do not help much. This difficulty in regulation is what makes FTD a major challenge. It is encouraging, though, that FTD is expected to become less common in most areas of the LMR Basin in the future (Fig. 5).

These revisions aim to provide a more thorough explanation of the reservoir's operational processes and mechanisms, thereby enhancing the scientific credibility and persuasiveness of the paper. Thank you once again for your insightful review and guidance.

6. **There are issues with notation, such as the use of "j" to represent both iterations and sub-regions. Additionally, please ensure that variables are italicized appropriately.**

Response: Thank you for your valuable comment on the notation and variables.

We have thoroughly examined and implemented the revisions. In the revised version, we introduced ‘*l*’ to represent the number of iterations, as shown in Equations 1 and 2 and lines 159 to 176, while retaining ‘*j*’ to denote sub-basins. Additionally, we have checked the formatting of variables, applying italics to each, as shown in Equations 1 to 40 and the relevant explanations in the revised manuscript. We believe these modifications could improve the paper's clarity and professionalism. Thank you once again for your feedback.