Response to Referee #2 (Ruud van der Ent):

General comments: The authors analyzed the moisture sources of the Tibetan Plateau using 3 different reanalysis products, a widely used moisture tracking method WAM2layers and additional stable isotope data.

English editing of the paper is absolutely necessary as there are many small mistakes, but this can easily be solved using and English editing service.

Scientifically, the paper is clear, but the whole analysis can also be considered rather straightforward meaning that the novelty is somewhat minor. Obviously not all papers have to be major breakthroughs, but it would be nice if the authors could indicate a bit more specific what we now know that we did not know before from other studies that analyzed the moisture sources of the Tibetan Plateau.

My major comment regards the analysis in subsection 3.3 and the conclusion that a decrease in oceanic moisture contribution resulted in reduced TP precipitation. I have strong reservations with this conclusion since as far as I can see the cause and effect could very well be the other way around. This needs more detailed investigation and possibly less strong conclusions.

I attach more specific comments as a supplement.

Response: We are very grateful for your thorough review and comments, which help improve our manuscript and provide guidance for our future research.

1. We regret that there were problems with English writing. The paper will be carefully revised by all authors to improve the grammar and readability. The English editing service will be considered in our revision.

2. For the novelty of this work, in the revision, we will more clearly point out the unique contributions of this paper by (1) summarizing knowledge gaps and (2) thoroughly comparing this study with existing moisture tracking studies in the TP (see Table AC1). Please see our detailed response to specific comment #5.

3. For the analyses of oceanic moisture contribution and precipitation change over the TP in Section 3.3, we will thoroughly revise this section according to your specific comments #15, #16, #19, and #22. Please see our detailed response to specific comment #15.

Please see our responses to your specific comments below.

Specific comments:

1. In line 1 (*Title*).

Comments: In this way the title is 'imperative' which probably is not really intended.

Response: Thanks for pointing this out. Considering both reviewers' comments, we will change the title to "Spatial Distribution of Oceanic Moisture Contributions to the Tibetan Plateau". This title emphasizes the 'Spatial Distribution' which is the core novelty in comparison with previous studies in the TP (please see our detailed response to specific comment #5).

2. In line 11 (*Although recent accelerated global hydrological cycle*).

Comments: Incorrect English: probably meant: 'although the global hydrological cycle recently accelerated'. Contentwise: what does recently exactly mean?

Response: Thanks for pointing this out. We will correct grammatically issues in our revision. Specifically, this sentence will be revised to "Although the accelerated global hydrological cycle, the altered sea-land thermal contrast, and the amplified warming rate over the TP during the past several decades are known to have profound effects on the regional water balance, the contribution of oceanic evaporation, in particular its spatial variability over the vast TP, remains unclear."

3. In lines 25–26 (*Van der Ent et al., 2010; Trenberth et al., 2011*).

Comments: Aren't there more recent estimates?

Response: Thanks for reminding. For the description 'evaporation from oceans constitutes more than 80% of the global surface evaporation', the value '80%' was from the *Trenberth et al.* (2011) which quantified the global oceanic evaporation and terrestrial evapotranspiration using six reanalysis products (NCEP-NCAR R1/R2, CFSR, C20r, ERA-40, ERA-Interim, JRA-25, and MERRA). We considered this estimate robust and trustworthy.

For the description 'evaporation from oceans contributes to about 60% of terrestrial precipitation', the value '60%' was from *Van der Ent et al.* (2010) (one of the earliest studies). Later on, this estimate was mentioned by *Van der Ent and Savenije* (2013). More recently, *Link et al.* (2020) released a dataset on the fate of land evaporation where the information on the sources of precipitation can be extracted. In the revision, we will add these two extra sources (*Van der Ent and Savenije* (2013) and *Link et al.* (2020)) here.

4. In line 28.

Comments: Insert "the".

Response: Thanks. We will correct this in the revision.

5. In lines 56–57 (*However, the spatial variation of the oceanic moisture contribution from the Himalayas to the inner TP and their historical changes have not been examined yet*).

Comments: It's unclear to me why the authors specifically highlight the oceanic moisture contribution here. In principle there have been several recent studies about the moisture sources of the TP (including the oceanic ones) that have been overlooked here:

Guo, L., van der Ent, R. J., Klingaman, N. P., Demory, M.-E., Vidale, P. L., Turner, A. G., Stephan, C. C., and Chevuturi, A.: Moisture Sources for East Asian Precipitation: Mean Seasonal Cycle and Interannual Variability, 20, 657–672, https://doi.org/10.1175/JHM-D-18-0188.1, 2019.

Zhang, C., Tang, Q., Chen, D., van der Ent, R. J., Liu, X., Li, W., and Haile, G. G.: Moisture Source Changes Contributed to Different Precipitation Changes over the Northern and Southern Tibetan Plateau, J. Hydrometeorol., 20, 217–229, https://doi.org/10.1175/JHM-D-18-0094.1, 2019.

Not only would a citation to these works be appropriate, but also: 1) How does this paper add to what we already know from the aforementioned papers? 2) How do the results from this paper compared to the findings of the aforementioned papers?

Response: Thanks for the comments. We would like to address your concern from the following two aspects.

(1) The pressing need to study the oceanic moisture contribution to the TP?

Firstly, the TP has been considered as a thermal "air pump" that attracts low-latitude oceanic evaporation to the region, particularly under recently altered land-sea thermal gradient between the TP and global oceans (meteorological records revealed that the atmospheric warming rate over the TP was twice that of the global mean). A quantitative, spatial and temporal evaluation of the oceanic moisture contribution to the TP could help better understand the changing hydrological cycle over the TP and its underlying mechanisms.

Secondly, the interpretations of paleoclimate records in the TP, particularly the δ^{18}O and δD in the precipitation and ice-cores, largely rely on the understanding of different moisture sources for the TP. For example, the δ^{18}O and δD evaporated from oceans are relatively enriched in comparison with the other sources. Different oceanic contributions may link to different isotope values in different climate regions of the TP, which has not been thoroughly explored.

More specifically, we distinguished the moisture contribution of the Indian Ocean (IO) from that of the Western Oceans (WO) in our analyses. These two regions represent the source areas of the Indian summer monsoon and the mid-latitude westerlies (the two core circulation systems dominate the TP's climate), respectively. For example, by using numerous δ^{18}O measurements from precipitation and ice-core on the TP, Tian et al. (2007), Yao et al. (2013), and numerous isotope-related studies (Tian et al., 2001; Yu et al., 2008; Hren et al., 2009; Zhao et al., 2012; Joswiak et al., 2013; Ren et al., 2021) empirically identified a line around the 34°–35°N to represent the northward extension of the Indian summer monsoon. In this context, we intend to provide a quantitative view of the region influenced by the Indian monsoon, from the perspective of moisture contributions.

(2) The novelty of this study as compared with previous moisture tracking studies in the TP.

In comparison with the traditional synoptic and climatological analyses, the numerical moisture tracking method could quantitatively diagnose the moisture contribution to a target region. In Table AC1 below, we summarize existing studies using numerical moisture tracking in the TP published during the past two decades. Although these studies have quantified the oceanic moisture contribution to different parts of the TP in different seasons after the 1960s, nearly all of them only considered *regional averages* for specific target areas in the TP ('Study area' in Table AC1) with *backward* moisture tracking. The *spatial distribution* of oceanic moisture contribution to the vast TP, e.g., the transition gradient of the moisture transported from the Indian Ocean, is hitherto unclear. To fill this knowledge gap, in this study we leveraged a *forward* moisture tracking method and studied the *spatial distribution* of oceanic moisture contribution over the TP.

Table AC1. Studies of numerical moisture tracking in the TP region.

Reference	Study area	Time period	Model	Data	Main conclusions
Chen et al. (2012)	TP	2005–2009 (summer)	FLEXPART	NCEP/GFS	The ocean source could extend from the Arabian Sea to the Southern Hemisphere.
Sun and Wang (2014)	Grassland on eastern TP	2000–2009	FLEXPART	NCEP-CFSR	During the warm (cold) season, oceanic moisture is mainly from the Arabian Sea and Bay of Bengal (areas surrounding the Arabian Peninsula).
Zhang et al. (2017)	Central-western TP	1979–2013	WAM	ERA-I, NCEP-2	More than 21% of the moisture comes from oceans.
Huang et al. (2018)	Southeastern TP	1979–2016 (winter extreme precipitation)	LAGRANTO	ERA-I	About 18% of the moisture comes from oceans.
Pan et al. (2018)	Southern/northern TP	1982–2014	CAM	MERRA	During summer, the Indian Ocean supplies about 28.5% of the moisture to the southern TP.
Chen et al. (2019)	Four areas in TP	1980–2016 (May–August)	FLEXPART	ERA-I	The northwestern TP and northeastern TP are less affected by the Indian monsoon moisture.
Guo et al. (2019)	TP	1979–2015	WAM-2layers	ERA-I	Indian Ocean and Pacific Ocean account for 24% and 2% of the moisture contribution, respectively.
Li et al. (2019)	Endorheic TP	1979–2015	WAM-2layers	ERA-I, MERRA-2, JRA-55	24%–30% of the moisture comes from oceans.
Qiu et al. (2019)	Three areas in TP	1979–2016 (winter extreme precipitation)	LAGRANTO	ERA-I	Moisture contributions of the Arabian Sea to the intense precipitation in the western, south-central, and southeastern TP are 9.2%, 6.9%, and 1.1%, respectively.
Xu and Gao (2019)	Southeastern TP	1982–2011 (April–September)	QIBT	ERA-I	Only 2% of the moisture originates from the oceanic source.
Zhang et al. (2019a)	Southern/northern TP	1979–2016	WAM-2layers	ERA-I	Northwestern (southeastern) source contributes ~39% (~51%) of the moisture in the northern (southern) TP.
Zhang et al. (2019b)	Sanjiangyuan Region	1960–2017 (June–September)	HYSPLIT, HDBSCAN	NNR1	About 51% (54%) of the medium to heavy precipitation is influenced by the northwestern (southern) source.
Liu et al. (2020)	Western TP	1979–2018 (winter)	HYSPLIT	ERA-I	About 57% of the moisture comes from the Arabian Sea, Arabian Peninsula, and northern Indian Ocean.
Ma et al. (2020)	Seven areas in TP	1961–2015 (summer extreme event)	HYSPLIT	NCEP/NCAR	About 75% of the moisture for extreme precipitation in the southeastern TP comes from the Bay of Bengal.
Yang et al. (2020)	Southeastern TP	1980–2016 (June–September)	FLEXPART	ERA-I	30% of the moisture comes from oceans.
Zhang (2020)	TP	1998–2018	WAM-2layers	ERA-I, TRMM	The southeastern source from the TP to the western Indian Ocean accounts for 32% of the moisture contribution.

LI et al. (2022)	Seven basins in TP	1979–2015	WAM-2layers	ERA-I, MERRA-2, JRA-55	Oceanic moisture accounts for 24%–30% of the moisture in different basins of the TP.

6. In line 72.
Comments: Insert "the".
Response: Thanks. We will correct this in the revision.

7. In lines 82–84 (*and in comparison with Lagrangian models (e.g., FLEXible PARTicle (FLEXPART) dispersion model and the Hybrid SingleParticle Lagrangian Integrated Trajectory (HYSPLIT) model), the Eulerian grids enable the model to excel in computation speed and to consider moisture budget from precipitation and evaporation separately(Van der Ent et al., 2013; Van der Ent, 2014)*).
Comments: This depends very much on what types of tracking runs are being done. Without going in depth in investigating this I would remove these claims entirely.
Response: Thank you for the suggestion. We will remove this inappropriate statement in the revision.

8. In line 86 (*Equation 1*).
Comments: There was an sign error in Van der Ent, 2014, better to write the equations as in Findell et al. (2019)

Findell, K. L., Keys, P. W., van der Ent, R. J., Lintner, B. R., Berg, A., and Krasting, J. P.: Rising Temperatures Increase Importance of Oceanic Evaporation as a Source for Continental Precipitation, J. Clim., 32, 7713–7726, https://doi.org/10.1175/JCLI-D-19-0145.1, 2019.

Response: Thanks for your reminder. The Equation (1) will be corrected to $\frac{\partial \mathrm{S_{g,lower}}}{\partial \mathrm{t}} = -\frac{\partial(\mathrm{S_{g,lower}u})}{\partial \mathrm{x}} - \frac{\partial(\mathrm{S_{g,lower}v})}{\partial \mathrm{y}} + \mathrm{E_g} - \mathrm{P_g} \pm \mathrm{F_{v,g}}$ for forward moisture tracking in WAM-2layers in the lower layer. Accordingly, all the text description about the Equation will be revised in our further revision.

9. In lines 91–92 (*Due the existence of residual ξ_k, the closure of the model is defined by a ratio of residuals between the two layers, i.e., $\xi_{top}/S_{top} = \xi_{bottom}/S_{bottom}$*).
Comments: That is not the definition of closure, but an assumption that is used in order to calculate the vertical flux (see: van der Ent et al., (2014), appendix B).

van der Ent, R. J., Wang-Erlandsson, L., Keys, P. W., and Savenije, H. H. G.: Contrasting roles of interception and transpiration in the hydrological cycle - Part 2: Moisture recycling, 5, 471–489, https://doi.org/10.5194/esd-5-471-2014, 2014.

Response: Thanks for pointing this out. We will thoroughly inspect all the incorrect or improper descriptions in the method section. Due to the modification of the water balance equation in forward moisture tracking (Equation 1), and according to the relevant descriptions in Van der Ent et al. (2013), van der Ent et al. (2014), and Findell et al. (2019), we revised this part to: "The 'well-mixed' assumption is applied to this model, which means the precipitation is assumed to be immediately removed from the atmosphere in the tracking process (i.e., $P_g/P = S_g/S$, where subscript g denotes the targeted moisture, and P and S are total precipitation and total column atmospheric moisture storage, respectively). To better capture the vertical exchanges due to convection, turbulence, and re-evaporation and minimize the water balance losses between the two layers, the gross vertical flow is set to 4 times the vertical flow in the net flow direction and 3 times the vertical flow in the opposite direction. Although this is a simplification of the turbulent moisture exchange, physically reasonable results have been obtained, and the general tracking has been validated against an online 3D tracking model (Van der Ent et al., 2013; van der Ent et al., 2014; Findell et al., 2019)."

10. In line 94 (*1°×1°, and the time step is set as 0.25 h*).

Comments: This is at a higher resolution than Van der Ent et al. (2014), who used a 1.5 arcdegree resolution. Yet, the authors have chosen the same time step. This may lead to instable and spurious results at high latitudes or at least internal model corrections to maintain stability.

Response: Thanks for this comment. We have tested the sensitivity of our results to the selection of different time steps. Below is an example, which compares the results using a 15-min time step (0.25 h) and a 10-min time step. As suggested in Figure AC1a and b, visually the results of mean annual oceanic moisture contribution to the TP with different time steps are nearly identical. This is also confirmed by the differences of these two runs, as shown in Figure AC1c and d. Discrepancies in moisture tracking results induced by different time step mainly appear in the western TP (Figure AC1c), although very minor (~1 mm on annual scale). The relative differences are below 1% in the TP on annual scale (Figure AC1d). This suggests the stability of using different time steps in the study area.

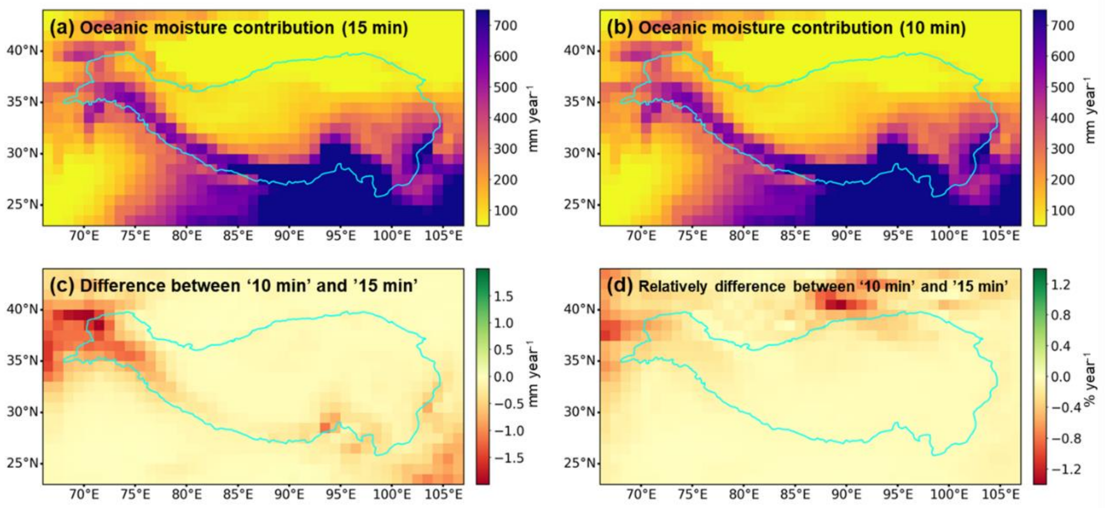

Figure AC1. Simulations of mean annual oceanic moisture contribution to the TP with 0.25-h (15-min) time step (a) and 10-min time step (b). (c) is the difference (mm year^{-1}) between the two simulations. (d) is the relative difference (% year^{-1}) between the two simulations.

Please note that as limited by our response deadline, we only performed annual-scale sensitivity analysis with ERA-I at the current stage. Other comparisons will be done in our revision. In our revised manuscript, we will add a part to evaluate the potential numerical instability that may be triggered by different time-steps.

11. In line 95 (*as around 812 hPa*).
Comments: But varying with surface pressure?! This is a very important detail.
Response: We will revise this sentence as: "The vertical separation between the two layers is prescribed as around 812 hPa at the normal atmospheric pressure. Note that the atmospheric pressure of the vertical separation varies with surface pressure, e.g., the "half-level" pressure in the model is defined as $\mathrm{P}_{\mathrm{k}-1/2} = \mathrm{A}_{\mathrm{K}-1/2} + \mathrm{B}_{\mathrm{k}-1/2}\mathrm{P}_{\mathrm{s}}$ where P_{s} is surface pressure, k represents different model levels in different reanalysis products, and the values of $\mathrm{A}_{\mathrm{K}-1/2}$ and $\mathrm{B}_{\mathrm{k}-1/2}$ are independently defined by different reanalysis products.

12. In lines 102–103 (*The ocean and land distributions were defined according to the 1°×1° gridded land-sea mask from ERA-Interim*).
Comments: The land-sea mask of ERA-Interim considers lakes to be 'sea', but it does not makes sense to consider them 'ocean' in this tracking study in my opinion.
Response: Thanks for pointing this out. In our simulation, we removed all inland large lakes (considered 'sea' in land-sea mask in ERA-I), for example, the Caspian Sea and the Black Sea. The final land-sea mask with the 1°×1° spatial resolution used in this work is shown in Figure AC2. In addition, our intention to use this land-sea mask was that it is more suitable for the precipitation isotope studies over the TP. In the revision, we will add Figure AC2 in Supplementary.

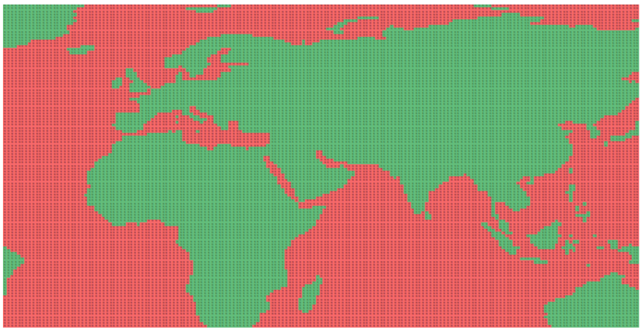

Figure AC2. The land-sea mask used in our manuscript with 1°×1° spatial resolution (the red covered area represents the ocean area).

13. In line 109 (*6h, 17 layers*).
Comments: What kind of layers?
Response: Table AC2 summarizes model layers in the three reanalysis products we used in this study. This table will be added to the Supplementary in our revision.

Table AC2. The selected 17 model layers in three reanalysis products.

	Model layers (from surface to upper atmosphere)		
	ERA-Interim	MERRA2	JRA55
1	60	72	1
2	59	71	2
3	58	70	3
4	57	69	4
5	56	68	5
6	55	67	6
7	54	66	7
8	51	65	9
9	48	61	12
10	47	59	14
11	44	55	17
12	41	52	20
13	38	49	23
14	35	46	26
15	32	44	29
16	27	40	34
17	17	28	44

14. In line 123 (*in mm and %*).
Comments: mm per what? precipitation is a flux with dimension of length x Time-1, where x is 1,2 or 3; percent of what? of the total local evaporation or of the total sink precipitation or something else?
Response: Sorry for the confusion. All these ambiguous units will be corrected in our revision. In Figures 1, 3, and 4, "mm" will be corrected to "mm year^{-1}". In Figure 2, "mm" will be corrected to "mm month^{-1}". In Figure 5, "mm yr^{-1}" will be corrected to "mm year^{-2}". Figures in the Supplementary will also be revised accordingly. The unit % represents the percentage of the total sink precipitation, which will be mentioned in the revised method Section.

15. In line 187 (*Section 3.3*).
Comments: This seems to be one of the core results yet cause and effect could be entirely reversed, meaning precipitation on TP declines and as a consequence the oceanic contribution also drops, possibly keeping exactly the same ratio. However, it may also be that the evaporation of the ocean has dropped or that the source area has changed. Simply looking at similarities in Figure 5 is insufficient proof in my opinion. Moreover, this subsection discusses many results in the supplement, but if they are discussed at length they should be in the main text instead.
Response: Per your comments, we performed additional analyses and concluded that the decreased oceanic contribution is mainly induced by precipitation decrease over TP. We will thoroughly revise the Section 3.3 to improve the clarity following the structure below:

a. Analyze the long-term trends of oceanic moisture contribution to the TP (Figure

AC3), and raise the question that decreased oceanic moisture contribution was found mainly around the southeastern TP (i.e., the Brahmaputra Canyon region, which has long been considered the most important moisture transport channel of the TP (*Hren et al.*, 2009)). More specifically, this decreased oceanic moisture contribution was found to originate from both the monsoon-dominated Indian Ocean (IO) and the westerlies-dominated Western Oceans (WO) (Figure AC4).

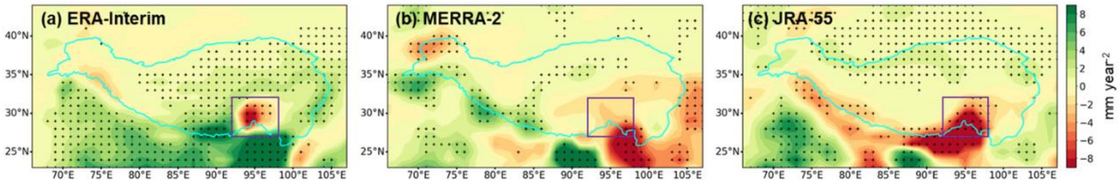

Figure AC3. Trends of oceanic moisture contribution to the TP region with ERA-Interim (1979–2015), MERRA-2 (1980–2015), and JRA-55 (1979–2015).

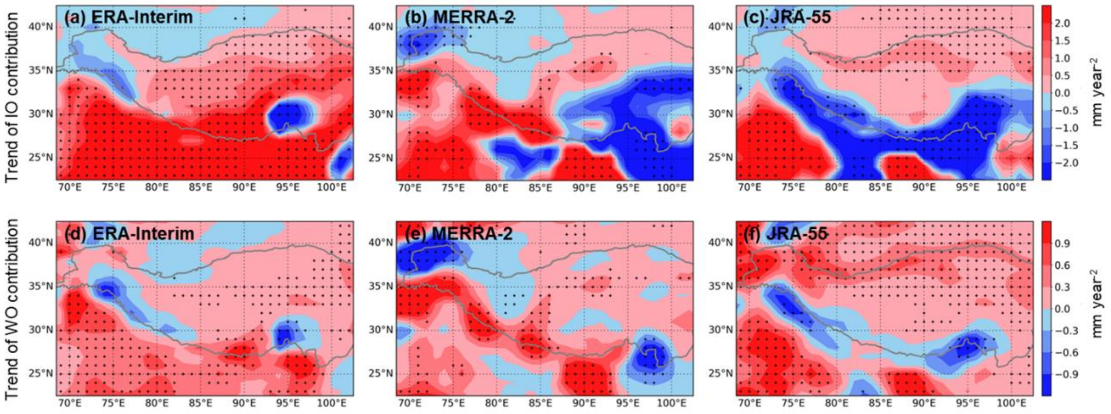

Figure AC4. Trends of oceanic moisture contribution to the TP region from the Indian Ocean (IO, a–c) and the western oceans (WO, d–f) with ERA-Interim (1979–2015), MERRA-2 (1980–2015), and JRA-55 (1979–2015).

b. Explain the trends of oceanic moisture contribution by detecting the changes of oceanic evaporation, precipitation, the horizontal wind fields, and the updraft around the TP region. According to the reviewer's suggestion, we calculated the inter-annual trends of global evaporation and precipitation during 1979–2015 (Figure AC5). Most of the oceanic sources exhibit *enhanced* evaporation. However, the moisture may lose significantly due to precipitation along the transport pathway, particularly when the moisture transport across the Indian Subcontinent (Figure AC5b). In addition, the inter-annual trends of zonal (u) and meridional (v) wind in 700 hPa and 300 hPa and vertical velocity in 300 hPa are also analyzed (Figure AC6). Significantly weakened eastward and northward winds in the lower atmosphere (700 hPa) are found around the southeastern TP (the changes of horizontal wind fields in the 300 hPa are not significant in the region). This may indicate decreased moisture convergence in the region from the lower atmospheric transport. At the same time, significantly decreased upward motion (negative values of vertical velocity indicate upward motion) in the higher atmosphere (300 hPa, Figure AC6e) was found in the southeastern TP. This further verifies that less moisture is condensed as precipitation in this region.

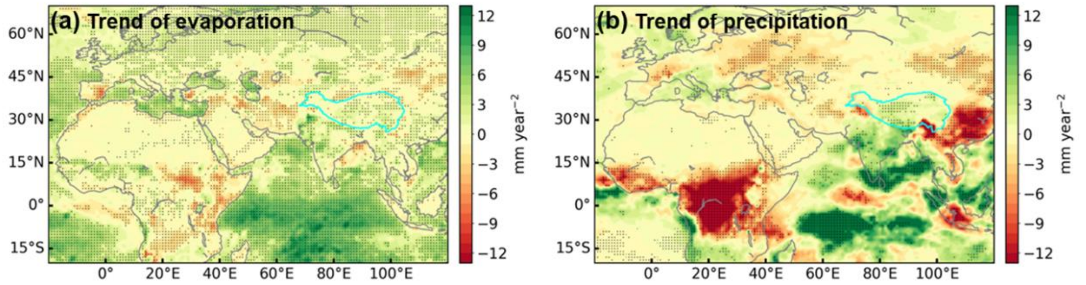

Figure AC5. Trends of global evaporation (a), precipitation (b), during 1979–2015. Stippling indicates regions with statistically significant trends ($p < 0.05$)

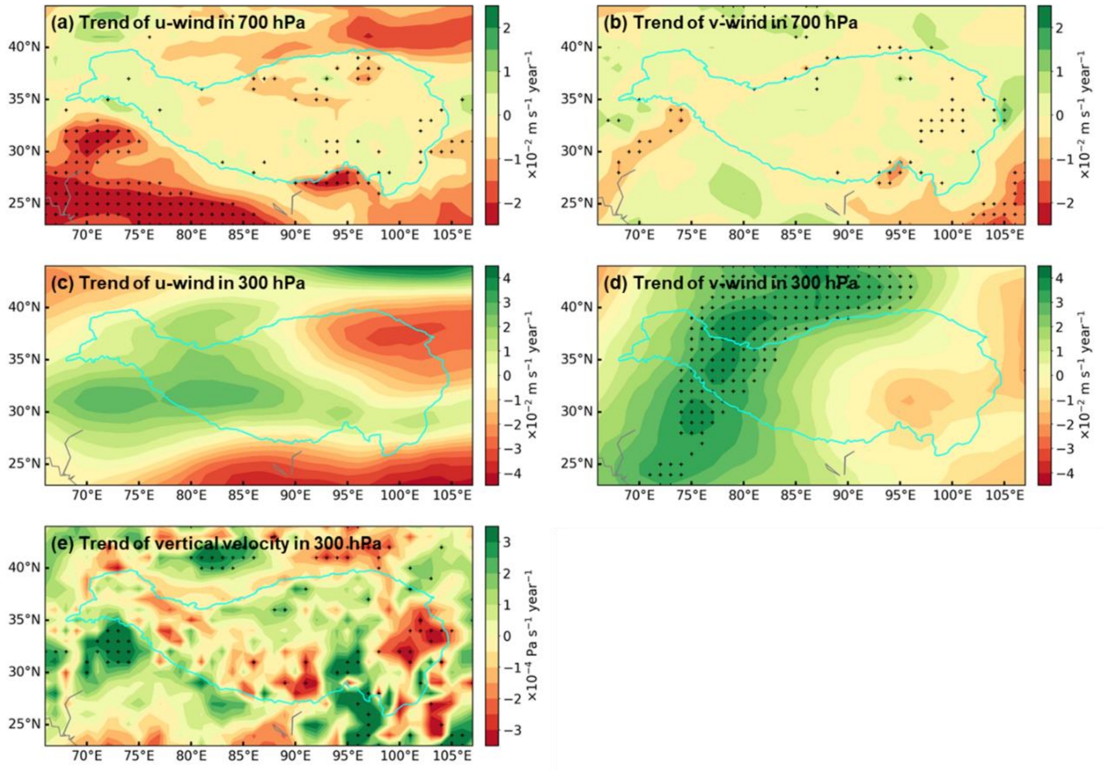

Figure AC6. Trends of u-wind at 700 hPa (a), v-wind at 700 hPa (b), u-wind at 300 hPa (c), v-wind at 300 hPa (d), and vertical velocity at 300 hPa (e) around the TP region during 1979–2015. Stippling indicates regions with statistically significant trends ($p < 0.05$).

c. When studying the inter-annual trends of precipitation over the TP (Figure AC5b), a similar spatial pattern (significantly decreased precipitation over the southeastern TP) was found in comparison with the trends of oceanic moisture contribution to the TP region (Figure AC3). To detect whether the oceanic moisture contribution is connected to the spatial pattern of precipitation change over the TP, we carried out additional backward moisture tracking over the southeastern TP (Figure AC7a). The southeastern TP (SETP) was defined as the purple rectangle in Figure AC3 where the oceanic moisture contribution and the precipitation both show a decreasing trend during 1979–2015. The spatial distribution of the trends of moisture source contributions to the SETP during the period is also shown in Figure AC7b.

As shown in Figure AC7b, the decreased moisture contributions to precipitation over the SETP are found for both the westerlies-dominated western sources and the monsoon-dominated southern sources. Meanwhile, only the southwestern slope of the Himalayas and the southwestern corner of the TP show increased moisture contribution to the SETP (Figure AC7b). Overall, the decreased oceanic moisture contribution does not dominate the precipitation change over the SETP, although they happen to have similar spatial patterns.

Per the reviewer's suggestion, we will move some figures that show key results from supplementary to the main text in our revision.

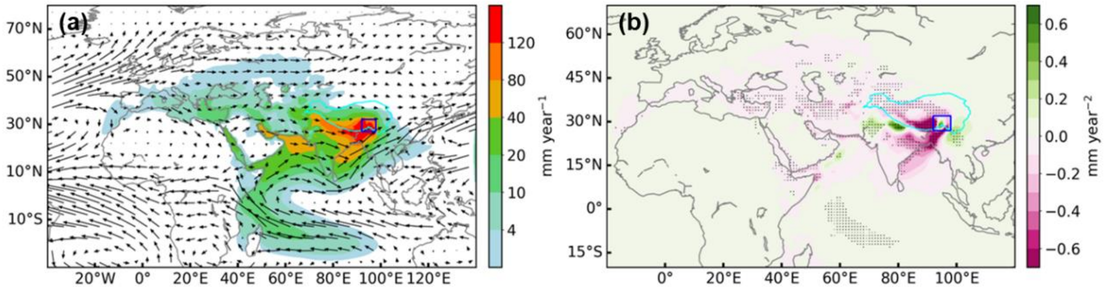

Figure AC7. (a) Long-term mean moisture source to precipitation in the SETP and (b) the relevant trends of moisture source contributions during 1979–2015, by using WAM-2layers forced with ERA-Interim. The blue rectangles represent the SETP. Stippling indicates regions with statistically significant trends ($p < 0.05$).

16. In line 212–213 (*Here we further reveal that this dipole pattern is driven by the changes in oceanic moisture contribution (particularly from IO)*).

Comments: As said before cause and effect may not be so easy to separate. Moreover, the authors should give an explanation of why the oceanic moisture contribution drops: which can be: less TP precipitation overall, less oceanic evaporation, changing pattern, ...

Response: Thanks for the comment. Based on our new analysis above, we concluded that decreased oceanic contribution is mainly induced by precipitation decrease over TP. This will be reflected in our thoroughly revised Section 3.3 in the revision. Please see our detailed response to comment #15 for details.

17. In line 222 (*The strongest relationship is found between precipitation δ18O and relative oceanic moisture contribution from IO (Figure 6)*).

Comments: These are interesting plots, but these relationships should be quantified with at least a correlation metric.

Response: Thanks. Per your comments, we calculated the correlation coefficients between the precipitation $\delta^{18}O$ and the relative oceanic moisture contribution from IO in the 19 stations on the TP (Table AC3). Note that some of the stations contain isotope data less than 10 months (the short time-span may lead the correlation analyses less significance), thus, we only calculated the correlation coefficients with more than 10-month isotope data. In Table AC3, nearly all the precipitation δ^{18}O exhibit opposite correlations with the relative oceanic moisture contributions from IO, particularly in the westerlies-domain stations where all the correlations are significant ($p < 0.05$). These conclusions are consistent with our description in Section 3.4. We will add these quantitative results to Section 3.4 in the revision.

Table AC3. The correlation coefficients of seasonal changes in the 19 stations between the precipitation δ^{18}O and the relative oceanic moisture contribution from IO (derived from ERA-Interim, MERRA-2, and JRA-55, respectively). '*' represents statistically significant correlation coefficients ($p < 0.05$).

		Model layers (from surface to upper atmosphere)		
		ERA-I	MERRA-2	JRA-55
Monsoon domain	1.Nyalam	–0.65*	–0.18	–0.51
	2.Zhangmu	-	-	-
	3.Dingri	-	-	-
	4.Larzi	-	-	-
	5.Baidi	–0.37	–0.42	–0.41
	6.Wengguo	-	-	-
	7.Dui	–0.38	–0.49	–0.33
	8.Lhasa	–0.62*	–0.44	–0.52
	9.Yangcun	-	-	-
	10.Nagqu	–0.39	–0.18	–0.05
	11.Lulang	–0.44	–0.12	–0.29
	12.Nuxia	-	-	-
	13.Bomi	–0.05	0.30	0.16
Transition domain	14.Shiquanhe	-	-	-
	15.Gaize	–0.73*	–0.52*	–0.36
	16.Tuotuohe	–0.80*	–0.63*	–0.36
	17.Yushu	–0.06*	0.04	0.32
Westerlies domain	18.Taxkorgen	–0.87*	–0.87*	–0.84*
	19.Delingha	–0.84*	–0.84*	–0.75*

18. In line 228–231 (*Note the mismatches between summer peaks of relative moisture from IO and low δ^{18}O values in autumn at Lulang, Nuxia, and Bomi near the Brahmaputra Canyon, which is likely attributable to the impact of moisture transported from southeast Asia or the Pacific Ocean driven by the trough embedded in the southern branch of the westerlies(Cai and Tian, 2020)*).

Comments: These could be investigated in more detail with moisture tracking rather than simply relying on the Cai and Tian (2020) study.

Response: Thanks. Per your suggestion, we conducted additional moisture tracking for monthly moisture sources of the SETP (blue rectangle in Figure AC8, which contains Lulang, Nuxia, and Bomi stations) near the Brahmaputra Canyon in Figure AC8. From

June to September, moisture sources gradually extend to the southeast Asia and the western Pacific Ocean. This is in line with the finding in *Cai and Tian* (2020). We will add this figure in Supplementary in our revised manuscript.

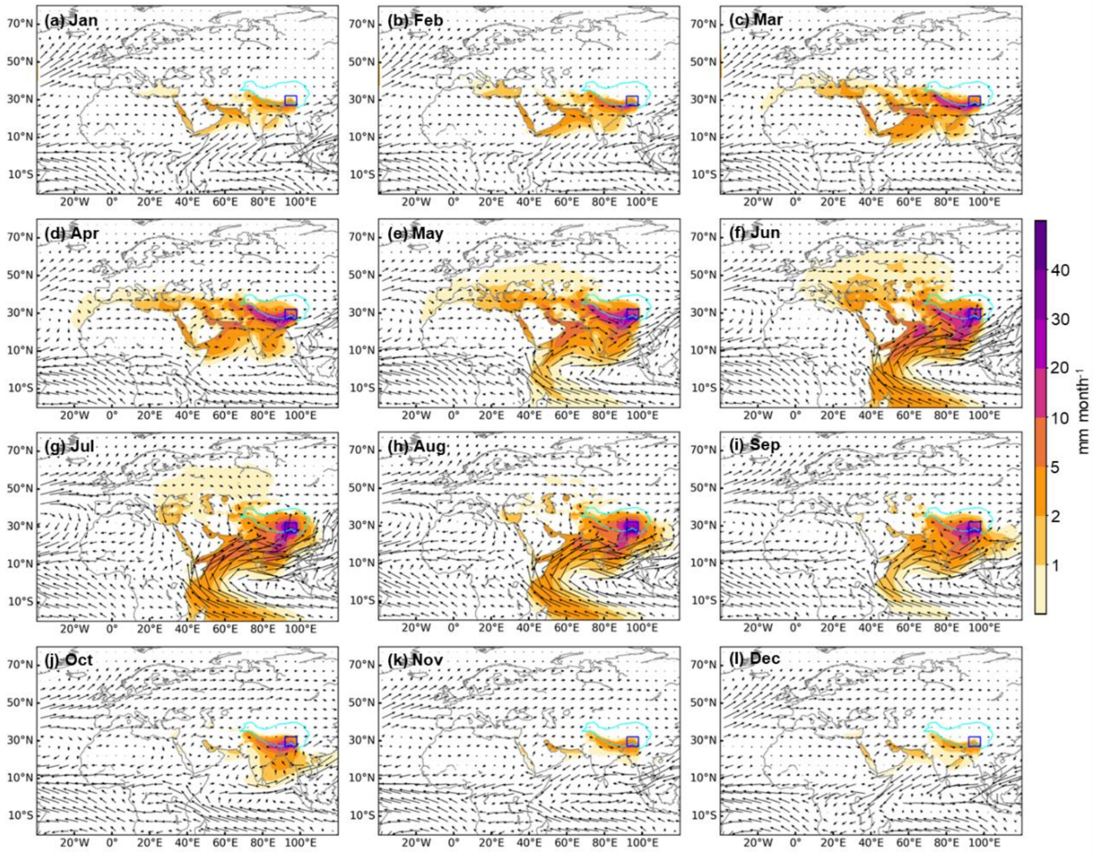

Figure AC8. Mean monthly moisture source contributions to precipitation in the SETP, by using WAM-2layers forced with ERA-Interim (1979–2015). The blue rectangles represent the SETP.

19. In line 254 (*is more consistent with precipitation patterns*).

Comments: than what?

Response: Sorry for the confusion. We will revise this part based on the thoroughly revised Section 3.3. Please see our response to comment #15 above.

20. In line 266 (*Data availability*).

Comments: In my understanding the authors should here nowadays provide links to where their data (to reproduce their figures) can be found.

The availability of the forcing data can be described in methods, acknowledgements and/or references.

Code availability of the original and adapted WAM2layers model is entirely missing.

Response: Thanks for the comments. We plan to upload our raw data that can be used to reproduce Figures 1–5. Moreover, the datasets and code of WAM-2layers used in this work will be detailed in the references as following:

European Centre for Medium-Range Weather Forecast (ECMWF): The ERA-Interim reanalysis dataset, available at: https://apps.ecmwf.int/datasets/data/interim-full-daily/, last access: 16 May 2017.

NASA Goddard Earth Sciences Data and Information Services Center (GES DISC): Modern-Era Retrospective analysis for Research and Applications, Version 2, available at: https://disc.gsfc.nasa.gov/datasets?project=MERRA-2, last access: 19 June 2018.

Japan Meteorological Agency: JRA-55: Japanese 55-year Reanalysis, Daily 3-Hourly and 6-Hourly Data, Archived at the National Center for Atmospheric Research, Computational and Information Systems Laboratory, available at: https://rda.ucar.edu/datasets/ds628.0/, last access: 19 July 2018.

Global Precipitation Climatology Centre (GPCC): GPCC Full Data Monthly Product Version 2018 at 1.0°: Monthly Land-Surface Precipitation from Rain-Gauges built on GTS-based and Historical Data, available at: https://www.dwd.de/EN/ourservices/gpcc/gpcc.html, last access: 26 August 2018.

National Tibetan Plateau Data Center: Data set of δ^{18}O stable Isotopes in Precipitation from Tibetan Network for Isotopes (1991–2008), available at: http://data.tpdc.ac.cn/en/, last access: 5 August 2022.

van der Ent, R. J. (15 July 2016): WAM-2layers v2.4.08, available at: https://github.com/ruudvdent/WAM2layersPython, last access: 5 August 2022.

21. In line 426 (*Figure 2*).

Comments: mm/month. if the x-axis represents month than write the abbreviations of the months instead of 1 – 12

Response: Thanks, we will correct this in our revised manuscript.

22. In line 447 (*Figure 5*).

Comments: It would be (more) relevant to look at trends in oceanic moisture contribution with respect to precipitation within the same reanalysis. I now think you're essentially comparing the different precipitation datasets, meaning these plots would have looked the same for total precipitation without any moisture tracking.

Response: Thanks. Per your comments #15, #16, #19, and #22, we will thoroughly revise Section 3.3, which also include the trends in oceanic moisture contribution and precipitation over the TP. Please see our detailed response to your comment #15 above.

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Temperatures Increase Importance of Oceanic Evaporation as a Source for Continental Precipitation, J. Climate, 32(22), 7713-7726, https://doi.org/:10.1175/jcli-d-19-0145.1, 2019.

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