Thanks a lot to Anonymous Referee #1 for your questions and suggestions for our manuscript, which pointed out the shortcomings of our manuscript. These are precisely the parts of the manuscript that we did not consider in depth, but which are very important. These questions and suggestions will be of great help in the revision and improvement of our manuscript.

Firstly, we have summarized the core questions and explained them.

(1) We are very sorry that the information of study area is not clearly described by us, which have brought much trouble to your review. The EDL is a lake with high seasonal change, with the rainy season from May to September and the dry season from December to early March of next year (Liu et al., 2019). Data on lake levels at the outlet of the lake showed that the EDL was around 30–32 m during rainy season and 20–22 m during dry season (Long et al., 2019), with a difference of around 10 m between the highest and lowest water levels. WEDL is surrounded by plains and during the rainy season the lake level was above the groundwater level and groundwater is recharged from lake water; during the dry season the lake level is below the groundwater level and groundwater is discharged to the lake. This was reason why we have chosen to time our study to the dry season (January) in 2019 and 2020 (Sun et al., 2020; HGSI, 2016).

(2) The uneven distribution of sampling points in the field work is a regret of this study. But we have done the best we can with the limited conditions to complete the sampling of the lake water. During the dry season, the width of the exposed lake bed in the WEDL was 0.5–10 km due to the very low water level of the WEDL. The exposed lake bed had no road accessible for vehicles, and field sampling was very difficult as lake water could only be collected by walking slowly to the lake. Sampling sites on the western lakeshore of the WEDL were collected by walking approximately 2–3 km to the nearest lakefront. In fact, we also took samples in the lake center, which we did not state clearly in the method section. The site conditions for the lake center sampling are shown in Fig. R1. The sampling points marked with blue arrows and the sampling points in the blue boxes are located in the lake center. We searched for a small boat at a small fishing pier on the shore, drove it into the lake center and sampled the lake water. Due to the limited range of the small boat, we only collected samples from the lake within 5 km of the small fishing pier. The information on the location of the sampling points (lake shore or lake centre) has been added to

Table S1. The method of collecting samples in the lake center has been added in the section 2.2.

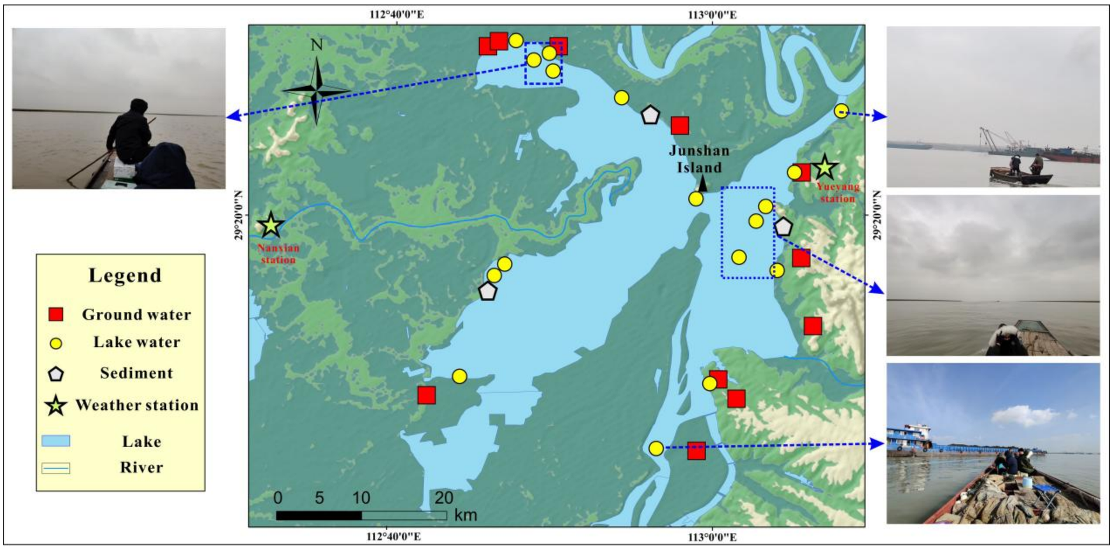

Fig R1. The distributions of sampling sites in EDL. The sampling points marked with blue arrows and the sampling points in the blue boxes are located in the lake center. The photo indicated by the blue arrow was a live view of the sampling in lake center.

(3) The LGD rate calculated by the ^{222}Rn mass balance model in WEDL was doubted. We consider the doubt to be very reasonable. The reasons for the large LGD rate have been thoroughly evaluated. The number of samples may not be large enough, but we believe the sample numbers is still representative (as radon samples were collected from lake shore and lake center). The wind speed was the most important parameter affecting the atmospheric loss of ^{222}Rn and we have updated it. In the original version, we used the daily average wind speed data from one of the weather stations in the region (Yueyang station) (Fig. R1) during the sampling period, but we felt that this accuracy was coarse in both space and time. Therefore, we also obtained wind speed data from another weather station in the region (Nanxian station) (Fig. R1) and calculated the average wind speed of the two stations, which reduced the error in wind speed in space. We selected the hourly average wind speed data from these two weather stations to reduce the error in the temporal wind speed. The calculation of the radon mass balance model gives us a new LGD rate of 71.47 mm/d for WEDL.

Based on the topography of the basin and the groundwater flow field in the plain, we depict the approximate catchment extent of the WEDL (Fig. R2). The catchment size is approximately 8500 km^2, about 49 times the area of the WEDL. Groundwater recharge in the catchment mainly came from infiltration of atmospheric precipitation, infiltration of irrigation water from rice fields and recharge from surface water bodies (rivers and lakes). According to the local geological survey (HGSI, 2016), the average annual precipitation in this catchment area was 1400 mm/yr, and the recharge to groundwater from precipitation in this catchment area was about 18.09 × 10^8 m^3/yr; the area was almost rice fields, and the recharge to groundwater from irrigation water was about 3.45 × 10^8 m^3/yr; the recharge to groundwater from rivers and lakes during the rainy season was about 10.36 × 10^8 m^3/yr; the recharge to groundwater from the external margins of the catchment was approximately 0.45 × 10^8 m^3/yr. The total groundwater recharge was 32.35 × 10^8 m^3/yr with a groundwater recharge rate of approximately 380.57 mm/yr. It was worth noting that groundwater discharge to the lake only occurred in the dry season (December to early March of next year). Assuming that groundwater discharge occurred for approximately 100 days per year, the groundwater discharge flux calculated from the ^{222}Rn mass balance model was 1.24 × 10^7 m^3/d, which meant that the annual groundwater discharge to the WEDL was approximately 12.38 × 10^8 m^3/yr, a value much smaller than the groundwater recharge (32.35 × 10^8 m^3/yr).

In order to verify whether the LGD rate calculated by the ^{222}Rn mass balance model was reasonable, we have validated the WEDL by means of a groundwater balance equation. The groundwater evaporation in this catchment was about 17.22 × 10^8 m^3/yr, the discharge to the river is approximately 0.55 × 10^8 m^3/yr and the artificial extraction was approximately 2.65 × 10^8 m^3/yr, with little change in groundwater reserves on a multi-year average. According to the groundwater balance equation, the groundwater discharge flux to the WEDL was about 11.94 × 10^8 m^3/yr and the groundwater discharge rate was about 68.90 mm/d. This was very close to the groundwater discharge to the lake estimated by the ^{222}Rn mass balance model (12.38 × 10^8 m^3/yr), so we believed the LGD flux was reasonable.

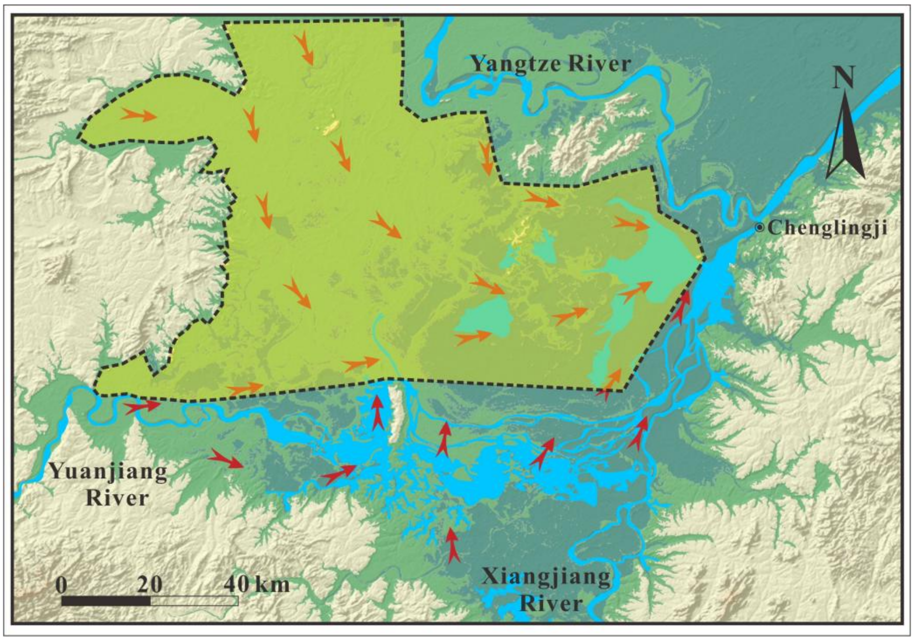

Fig R2. Catchment area and groundwater flow field. The yellow shaded area is the catchment area and the red arrows represent the direction of groundwater flow.

(4) We consider the geological environment to be determined by geological conditions, including surface elements (topography, etc.) and subsurface elements (lake bed permeability, aquifer hydraulic conductivity, hydraulic gradient, etc.). We have listed the parameters of the different elements in the text (Table 2).

Table 2. Differences in relevant parameters between WEDL and EEDL

	WEDL	EEDL
Lake area (km^2)	173.22	88.62
Average depth (m)	0.8	3.9
Lake water retention times (d)	11	5
Topography around the lake	Plain	Mountains and hills
Type of aquifer	Porous aquifer	Fissured aquifer
Hydraulic gradient	0.0002-0.0015	0.004-0.006
Hydraulic conductivity (m d^{-1})	15-100	2-5
Average LGD rate (mm d^{-1})	71.47 ± 52.16	34.76 ± 23.36
Average Si concentrations in groundwater (mg L^{-1})	12.10	12.62
Average NH_4-N concentrations in groundwater (mg L^{-1})	2.61	2.13
Average P concentrations in groundwater (mg L^{-1})	0.34	3.33×10^{-2}
Si input loads originating from LGD (g m^{-2} d^{-1})	0.87	0.44
NH_4-N input loads originating from LGD (g m^{-2} d^{-1})	0.19	7.42×10^{-2}
P input loads originating from LGD (g m^{-2} d^{-1})	2.40×10^{-2}	1.16×10^{-3}

Next, below are our responses to the anonymous Referee #1' comments.

-About the comment (1): Please report water retention times in WEDL and EEDL.

-Response: Thanks for your good suggestion. After understanding your comments, we also believed that water retention time was important. As the rivers flowing into the WEDL were cut off during the dry season, it was assumed that all water in the lake came from groundwater. We referred to for a conservative estimate of the lake water retention time at WEDL the lake volume divided by the groundwater discharge flux (Quinn, 1992; Petermann et al., 2018; Yang et al., 2020). We were able to make an estimate of the WEDL water retention time of approximately 11 days. The flow rate of the EEDL was approximately 0.1–0.15 m s^{-1} and the water retention time was approximately 5 days. These have been added to the section 4.4.

Here is the revision for addressing this comment.

"The groundwater retention time for WEDL was conservatively estimated by dividing the lake volume by the LGD flux (Quinn, 1992; Petermann et al., 2018; Yang et al., 2020) and was approximately 11 days. The flow rate of the EEDL was approximately 0.1–0.15 m s^{-1} and the water retention time was approximately 5 days."

Reference:

Quinn, F. H.: Hydraulic residence times for the Laurentian Great Lakes, J Great Lakes Res., 18, 22–28. https://doi.org/10.1016/S0380-1330(92)71271-4, 1992.

Petermann, E., Gibson, J.J., Knoeller, K., Pannier, T., Weiss, H., and Schubert, M.: Determination of groundwater discharge rates and water residence time of groundwater-fed lakes by stable isotopes of water (^{18}O, ^{2}H) and radon (^{222}Rn) mass balances, Hydrol. Process., 32(6), 805–816, https://doi.org/10.1002/hyp.11456, 2018.

Yang, J., Yu, Z., Yi, P., Frape, S.K., Gong, M., and Zhang, Y.: Evaluation of surface water and groundwater interactions in the upstream of Kui river and Yunlong lake, Xuzhou, China, J. Hydrol., 583, 124549, https://doi.org/10.1016/j.jhydrol.2020.124549, 2020.

-About the comment (2): L141ff: I disagree. You state that there is flow parallel to the shore line. This is only possible if there is a completely sealed lakebed with no hydraulic conductivity at all. In a lake there is typically no gradient of the surface water level, i. e. the water level is spatially constant. For groundwater flow parallel to the shore line you need some kind of water level gradient in the aquifer. That gradient and the constant lake level will result in a gradient between lake and groundwater at most locations along the flow path. Thus, flow parallel to the lake won't occur.

-Response: Thanks for your reminder. The conclusion that the direction of groundwater flow in this area (the yellow area in the figure below) was approximately parallel to the lake shoreline comes from an interpretation of the groundwater flow field map (Fig. R3). The EDL is a lake that is highly variable due to seasonal precipitation, with the rainy season (summer) from May to September and the dry season from December to March in next year (winter). Data on lake levels at the outlet of the lake showed that the EDL was around 30–32 m during rainy season and 20–22 m during dry season, with a difference of around 10 m between the highest and lowest water levels. The yellow boxed area (Fig. R3) is less than 26 m above sea level and is completely flooded during the rainy season and exposed during the dry season. Compared to other areas of the lake, groundwater levels here responded more rapidly to lake levels as the sediment lithology in this area was largely medium and fine sands with better permeability. From the rainy season to the dry season, the groundwater level here dropped in near synchrony with the lake level, which can result in a small gradient between groundwater and lake water. This was probably the reason why the direction of groundwater flow in this area was approximately parallel to the lake shoreline in the groundwater flow field map. We still believe that some localized lateral flow of groundwater to the lake will exist in the area, but it should be very small. In addition, we have no access to enter this area, resulting in the inability to collect samples. As a result, the very small groundwater discharge here was ignored.

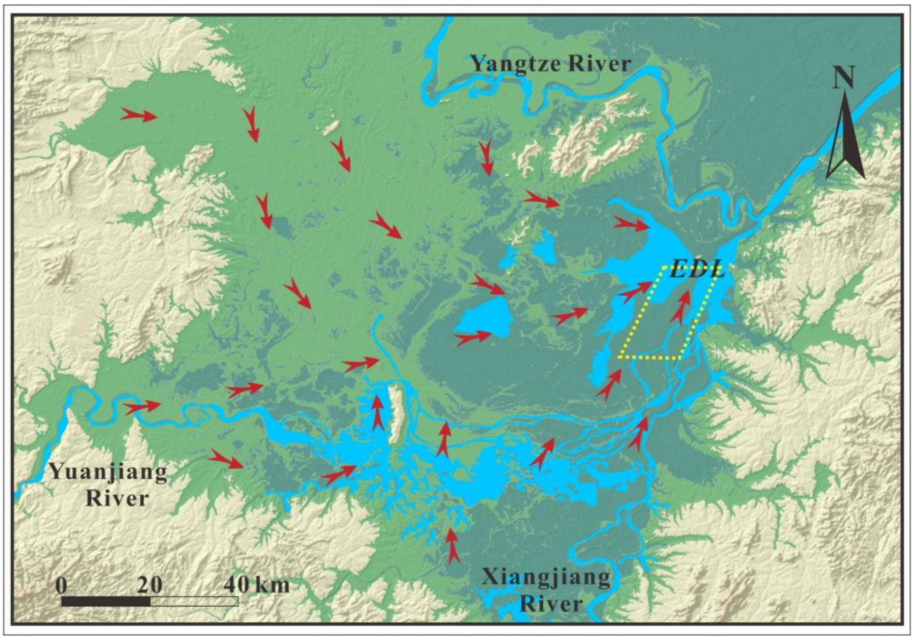

Fig R3. Map of groundwater flow direction. The yellow dashed box shows the area where the groundwater flow is approximately parallel to the lake shore.

-About the comment (3): L152ff: As far as I understand there were only two field

campaigns in January 2019 and January 2020 with a total of 32 samples, thereof 12 groundwater samples and 17 lake water samples. It is not mentioned which samples were collected in 2019 and which were collected in 2020 or if some locations were sampled in both years. The numbers are quite small for reliable results considering the spatial heterogeneity of the aquifer, of the sediment, of the lake and the size of the investigated system. Furthermore, it is mentioned that samples were collected from local wells with depths of 5–30 m and by push points from 1 m depth. The sampling depth might impact on the results. Unfortunately, it is not mentioned which samples were collected from which aquifer depth and if both depths were used at both sites.

-Response: Thanks for your good suggestion. In fact, the sampling in 2020 was conducted based on the sampling in 2019. We found a pattern of differences between lake water ^{222}Rn concentrations and groundwater ^{222}Rn concentrations based on the results of the January 2019 (dry period). To further the study, we carried out sampling of the East Dongting Lake in January 2020 (during the dry season). Due to some small differences in the location of the lake shoreline in January 2019 and January 2020, there was no guarantee that all sampling points will be identical in 2019 and 2020. However, we chose the closest location (S10) to compare ^{222}Rn concentrations in the lake water in January 2019 with those in January 2020. The results showed little difference between the radon concentration in 2019 (180.56 Bq m^{-3}) and 2020 (189.78 Bq m^{-3}). We therefore assumed that the difference in LGD rates between January 2019 and January 2020 was not significant and that the ^{222}Rn sample test results from both periods can be used together for the LGD calculation. The samples were collected from local wells with depths of 5–30 m were G1, G2, G3, G5, G6, G8, G9, G10 and G11; the samples were collected from push points from 1 m depth were G4, G7, and G12. The samples collected from local wells with depths of 5-30 m and by push points from 1 m depth were labeled in Table S1.

Table S1 The field parameters and 222Rn concentrations of the lake water and groundwater samples.

Number	Tw (°C)	pH	Eh (mV)	EC (μS cm^{-1})	DO (mg L^{-1})	^{222}Rn (Bq m^{-3})	Sampling date	Site
S1	5.2	8.14	84.1	565	11.42	229.25 ± 104.58	2019	Lake shore
S2	5.3	7.74	167.3	359	11.54	226.12 ± 92.84	2020	Lake shore
S3	6.9	8.06	73.9	777	11.7	684.71 ± 152.04	2019	Lake shore
S4	6.5	7.88	152.5	557	11.33	700.72 ± 294.53	2019	Lake shore
S5	8.6	8.17	191.6	433	11.62	109.80 ± 69.30	2020	Lake shore
S6	5.5	7.86	115.2	449	10.32	257.42 ± 119.71	2019	Lake shore
S7	5.3	7.95	169.7	443	11.59	215.88 ± 112.28	2020	Lake center
S8	4.0	8.18	166.5	327	13.42	180.33 ± 101.77	2020	Lake center
S9	5.4	8.0	182.1	487	10.82	324.01 ± 78.55	2020	Lake center
S10	7.6	7.60	57.9	313	11.14	180.56 ± 128.61	2019	Lake center

S11	6.8	7.42	109.9	264	11.01	149.18 ± 105.22	2019	Lake shore
S12	5.3	7.71	75.1	278	11.31	148.32 ± 106.58	2019	Lake shore
S13	6.5	7.37	87.2	273	11.25	288.57 ± 116.59	2019	Lake shore
S14	9.0	8.01	188.5	298	10.82	149.27 ± 73.05	2020	Lake center
S15	8.9	8.18	237.7	313	11.22	110.05 ± 88.99	2020	Lake center
S16	8.8	8.12	280.0	300	11.15	99.44 ± 73.02	2020	Lake center
S17	10.2	8.00	154.3	295	10.98	113.02 ± 112.34	2020	Lake center
G1	15.3	6.96	-77.9	376	6.88	5191.34 ± 788.23	2019	
G2	/	7.89	-77.8	685	1.59	3234.86 ± 825.42	2020	
G3	/	7.71	-77.4	501	1.22	3598.82 ± 668.31	2020	
G4 (P)	16.8	7.13	-71.9	588	4.66	2149.87 ± 599.89	2019	
G5	14.0	7.01	-80.2	1182	1.64	2037.83 ± 650.34	2020	
G6	16.3	8.37	4	650	/	/	2019	
G7 (P)	/	/	/	/	/	6868.35 ± 1960.93	2019	
G8	15.6	7.19	201.1	553	4.07	12309.11 ± 1165.37	2020	
G9	16.0	6.98	201.2	282	5.92	2493.26 ± 365.45	2020	
G10	15.5	6.08	140.8	133	5.74	9337.33 ± 855.36	2019	
G11	/	/	/	/	/	5958.70 ± 3020.29	2019	
G12 (P)	16.4	7.04	-149.3	734	1.96	19821.17 ± 1587.35	2020	

*The dot beginning with "S" is surface water and the dot beginning with "G" is groundwater, the “(P)” means piezometer water.

-About the comment (4): Even though radon in surface water originates from groundwater it will depend very much on the distance of the sampling location to the shore and on the water depth which radon concentrations occur. However, shore distances aren’t reported in the manuscript. Furthermore, weather conditions (especially wind) will affect the loss of radon to the atmosphere. Weather conditions aren’t reported in the manuscript in sufficient detail. The dependency on weather conditions results in a severe need of replicates which weren’t taken in the present study. Repetitions are required for reliable results. L174ff: I am also missing information about the detection limit of the radon measurements (Rad7, Rad H2O).

-Response: Thanks for your good suggestion. The information was not clearly written in the method section in original version. Following your suggestion, we have added information on the distance from the sampling point to the shore in Table S1. There were two types of locations for collecting lake water samples, one was obtained directly from the lake shore with a water collector and the other was obtained in the lake center with a boat. Samples from the lake shore were 1–3 m from the shore; samples from the lake center were approximately 500–2500 m from the shore.

As you proposed, the repetition of weather conditions at different times was very important. We have therefore compared the wind speeds during two different study periods. The hourly average wind speed was 2.32 m s^{-1} from 10 January 2019 to 22 January 2019 and 2.13 m s^{-1} from 4 January 2020–13 January 2020. The average wind speed value for the 2020 study period was quite similar to the average wind speed value for the 2019 study period. Even though the wind speeds were very close, we took the wind speed error as a parameter error and thus assessed the error in the LGD rate. In the original line 174 we added information on the detection limit of RAD 7, RAD H_2O (4–400000 Bq m^{-3}). These have been added to section 4.2 and 2.1.

Here is the revision for addressing this comment.

"The wind speeds during two different study periods was compared. The hourly average wind speed was 2.32 m s^{-1} from 10 January 2019 to 22 January 2019 and 2.12 m s^{-1} from 4 January 2020 to 13 January 2020. The average wind speed value for the study period in January 2020 was quite similar to the average wind speed value for the study period in January 2019. Due to the small difference of wind speed in two study periods, we believe that the difference in atmospheric loss fluxes of ^{222}Rn between the two periods of sampling work is allowable."

"(Durridge Company, USA, measurement limits of 4 – 40,000)."

-About the comment (5): L167ff: The manuscript is according to the paper title about nutrients but I could not find any information about phosphate measurements in the method section.

-Response: Thanks for your good suggestion. The P concentration was determined using an inductively coupled plasma optical emission spectrometer (ICP-OES) (iCAP 6000 series, Thermo Fisher Scientific, USA). The relevant information is presented in section 2.2.

Here is the revision for addressing this comment.

"Inductively coupled plasma optical emission spectrometry (ICP-AES) (iCAP 6000 series, Thermo Fisher Scientific, USA, detection limits: 0.001 mg/L) was used to analyze the concentration of cations. Total P concentration was also determined with ICP-AES."

-About the comment (6): L291f: I don't see any similarity in ^{222}Rn concentration between lake water and groundwater. Can you explain this a little bit more?

-Response: Thanks for your good suggestion. It was our fault that we did not make this part clear. The smaller the value of groundwater ^{222}Rn concentration minus lake water ^{222}Rn concentration, the closer the lake water ^{222}Rn concentration was to the groundwater ^{222}Rn concentration, which can roughly reflect that the lake water was more strongly influenced by groundwater. The values of groundwater ^{222}Rn

concentration minus lake water ^{222}Rn concentration in WEDL were significantly smaller than in EEDL, so we roughly consider that lake water in WEDL was more strongly influenced by LGD.

Here is the revision for addressing this comment.

"Therefore, the smaller difference in ^{222}Rn concentration between groundwater and lake water indicates that lake water is more strongly affected by groundwater."

-About the comment (7): L305ff & Fig. 5: I don't see any use in flow profiles in WEDL and EEDL. As mentioned before, the water retention times in the lake basins aren't reported in the present study. However, due to the short half live of radon and the intense atmospheric loss a focus on radon along flow paths in the lake would only be useful if the water retention times in lakes are in the range of less than a week. Even though that information is missing I doubt that there is such a fast water exchange. I think the radon profile is more impacted by the distance to the shore, the current wind direction and the weather conditions. Furthermore, in Fig. 5 error bars are missing for radon measurements. Radon measurements should have been repeated at several time points in the course of a year. The conclusion that ^{222}Rn originates from groundwater discharge is unclear. Actually, this is a prerequisite of the method and not a conclusion.

-Response: Thanks for your good question. We believe that your arguments are very good and have greatly benefited us. Our current discussion may be hardly convincing due to the long retention time of the water bodies. Based on your suggestion, we have finally decided to remove this section.

-About the comment (8): L310ff & Fig. 5: In Fig. 5 error bars are also missing for stable isotope measurements. The measurements of stable water isotopes should have been repeated at least 5 times under different weather conditions. As you state the ^{18}O value increases due to evaporation from the lake surface. It would have been good to get at least a rough estimation of the water retention time along the flow path and the amount of evaporation to be able to understand if any gradient of stable water isotopes along the flow path is possible. I doubt that your explanation is useful. Usually, in most lakes lateral mixing processes are so important that the stable water isotope composition is more or less identical in the entire lake. This is usually also true for stable water isotopes originating from groundwater discharge. The difference

in the stable water isotope composition of exfiltrating groundwater and lake water is so small that it is hardly detectable since the proportion of groundwater is relatively small. The major difference between stable water isotopes and radon and why radon is a suitable groundwater discharge tracer whereas stable water isotopes aren't is that the radon concentrations in groundwater are several orders of magnitude larger than in lake water whereas stable water isotopes deviate only slightly between lake water and groundwater. Looking at the groundwater concentrations reported in Fig. 5 reveals this problem clearly.

-Response: Thanks for your good question. We found your comments to be very sensible and very helpful. Based on your suggestion, we have finally decided to remove this section.

-About the comment (9): L326ff and Fig. 6: I have not seen a distribution of EC in groundwater in the catchment of EDL. However, without such data this interpretation is quite vague. Also, the correlation presented in Fig. 6a is mainly based on one single data point.

-Response: Thanks for your good suggestion. The map of the spatial distribution of groundwater and lake water EC in the EDL were produced. As can be seen from the map, the WEDL groundwater EC is higher than that in the EEDL, and the WEDL lake EC is also higher than that in the EEDL. Based on the responses to comment (4), every effort has been made to make the data measured at the sampling sites representative of the actual lake state. Even though the correlations in Fig. 6 are mainly based on a single data point, they are still able to represent the actual lake conditions to the greatest extent possible.

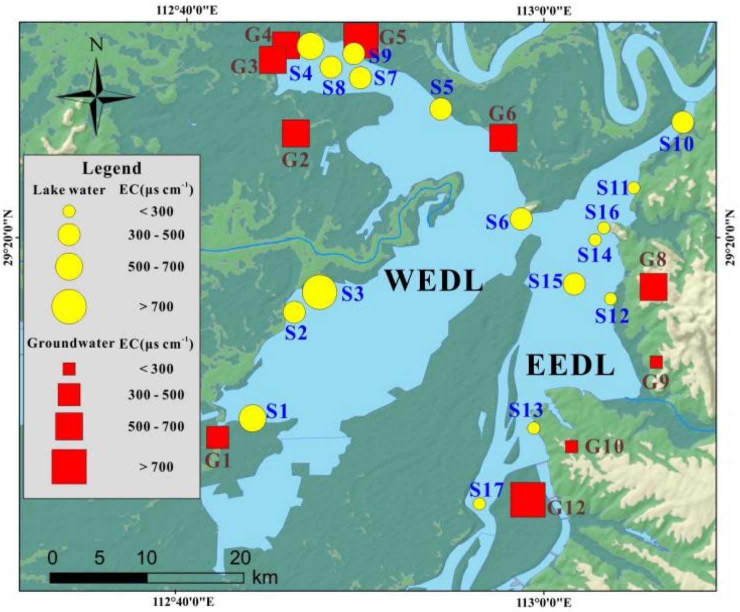

Figure R4. The distribution of EC value in lake water and groundwater of East Dongting Lake (EDL). The lake water sampling points are represented by yellow solid circles where the circle size represents EC value. The groundwater sampling points are represented by red solid squares where square size represents EC value. The topographical information is from Geospatial data cloud (http://www.gscloud.cn/sources/index?pid=302).

-*About the comment (10):* L339f: Is this about surface inflows or groundwater inflow or both? On which data is this statement based. According to the method description you conducted only investigations in Jan. 2019 and Jan. 2020.

-Response: Thanks for your reminder. We are very sorry for the information not been expressed clearly in the study area. This is about surface water inflow. Our data is based on monitoring data from local hydrological stations. Because groundwater discharge occurs in the WEDL only during the dry season, we chose to conduct field sampling in January. The rivers that flow into the WEDL originate from the Yangtze River. As the water level of the Yangtze River drops during the dry season, the flow of the Yangtze River into these rivers is drastically reduced, causing these rivers to cut off their flow. The contribution of these surface rivers to radon in the WEDL during the dry season is therefore ignored. The information will be presented in the section 2.1.

Here is the revision for addressing this comment.

"The three smaller rivers have little flow due to the drastic reduction of the discharge of the Yangtze River during the dry season."

-About the comment (11): L351f: Are two sediment samples sufficient for a lake of this size. Is anything know about sediment heterogeneity?

-Response: Thanks for your question. The number of sediment samples in the EDL was three, which did seem a little small for a lake of this size, but the sediment sampling points were relatively evenly distributed. There were two sediment samples in the WEDL, in the western and northern parts of the WEDL. The porosity of sediment was 0.42 on the west and 0.47 on the north in WEDL. The ^{222}Rn diffusion flux from the sediment was 8.13 Bq m^{-2} d^{-1} in the west and 10.96 Bq m^{-2} d^{-1} in the north side, which were not significantly different. One sediment sampling site was in the east of the EEDL, with a porosity of 0.51 and the ^{222}Rn diffusion flux from the sediment was 20.56 Bq m^{-2} d^{-1}. In contrast, the sediment diffusion flux at EEDL was approximately 2.2 times higher than that at WEDL, which was very similar to the difference in groundwater radon concentrations (groundwater ^{222}Rn concentration in EEDL was 2.98 times higher than that in WEDL). However, the ^{222}Rn diffusion flux from the sediment represents a very small proportion of the source term in the ^{222}Rn mass balance model (3.96% for WEDL and 3.67% for EEDL), so they were not discussed in depth in this manuscript.

-About the comment (12): L347ff: I doubt that the numbers calculated by you for groundwater discharge are possible. WEDL has an area of 173 km^2, i.e. is a quite large lake. According to your calculation the average groundwater discharge is 93 L/m^2/d which is a quite large number compared to other lakes especially when considering the size of the lake. Usually, average LGD rates decrease drastically with increasing lake area. Furthermore, most lakes exhibit an exponential decrease of LGD rates with increasing shore distance, i.e. LGD rates close to the would be several orders of magnitude higher close to the shore and more or less zero in the lake center. This is especially true in shallow lakes because a thick mud layer in the lake center will intensify the focusing to the lake shore. I doubt that 93 L/m^2/d as average rate is possible. In addition: Do you know the size of the catchment and the groundwater recharge rate in the catchment? Assuming an extremely high groundwater recharge rate of 500 mm/yr and the complete absence of any groundwater-fed streams or surface water bodies in the catchment would require a catchment size of 66 time the lake area to deliver a sufficient amount of groundwater to feed the lake with 93 L/m^2/d. Unfortunately, the size of the catchment and the

groundwater recharge rate in the region aren't reported in the manuscript. Probably, the number of radon samples is too small and not representative for the entire lake.

-Response: Thanks for your good question. We consider the doubt to be very reasonable. This had led to a comprehensive assessment of the reasons for the high LGD rate for us. The number of samples may not be large enough, but we believe the sample number is still representative (as radon samples were collected from lake shore and lake center). The wind speed was the most important parameter affecting the atmospheric loss of ^{222}Rn and we have updated it. In the original version, we used the daily average wind speed data from one of the weather stations in the region (Yueyang station) during the sampling period, but we felt that this accuracy was coarse in both space and time. Therefore, we also obtained wind speed data from another weather station in the region (Nanxian station) and calculated the average wind speed of the two stations, which reduced the error in wind speed in space. We selected the hourly average wind speed data from these two weather stations to reduce the error in the temporal wind speed. The calculation of the radon mass balance model gives us a new LGD rate of 71.47 ± 52.15 mm/d for WEDL.

Based on the topography of the basin and the groundwater flow field in the plain, we depict the approximate catchment extent of the WEDL (Fig. R2). The catchment area is approximately 8500 km^2, about 49 times the size of the WEDL. Groundwater recharge in the catchment mainly came from infiltration of atmospheric precipitation, infiltration of irrigation water from rice fields and recharge from surface water bodies (rivers and lakes). According to the local geological survey (HGSI, 2016), the average annual precipitation in this catchment area was 1400 mm/yr, and the recharge to groundwater from precipitation in this catchment area was about 18.09×10^8 m^3/yr; the area was almost rice fields, and the recharge to groundwater from irrigation water was about 3.45×10^8 m^3/yr; the recharge to groundwater from rivers and lakes during the rainy season was about 10.36×10^8 m^3/yr; the recharge to groundwater from the external margins of the catchment was approximately 0.45×10^8 m^3/yr. The total groundwater recharge was 32.35×10^8 m^3/yr with a groundwater recharge rate of approximately 380.57 mm/yr. It was worth noting that groundwater discharge to the lake only occurred in the dry season (December to early March of the next year). Assuming that groundwater discharge occurred for approximately 100 days per year, the groundwater discharge flux calculated from the ^{222}Rn mass balance model was 1.24×10^7 m^3/d, which meant that the annual groundwater discharge to the WEDL was approximately 12.38 × 10^8 m^3/yr, a value much smaller than the groundwater recharge (32.35 × 10^8 m^3/yr).

In order to verify whether the LGD rates calculated by the ^{222}Rn mass balance model was reasonable, we have validated the WEDL by means of a groundwater balance equation. The groundwater evaporation in this catchment was about 17.22 × 10^8 m^3/yr, the discharge to the river is approximately 0.55 × 10^8 m^3/yr and the artificial extraction was approximately 2.65 × 10^8 m^3/yr, with little change in groundwater reserves on a multi-year average. According to the groundwater balance equation, the groundwater discharge to the WEDL was about 11.94 × 10^8 m^3/yr and the groundwater discharge rate was about 68.90 mm/d. This was very close to the groundwater discharge to the lake estimated by the ^{222}Rn mass balance model (12.38 × 10^8 m^3/yr), so we believed the LGD flux was reasonable.

In addition, we also made the calculation in the WEDL used Darcy's law and obtained an average LGD rate of ~ 53.13 mm/d for the WEDL and a groundwater discharge flux to the WEDL of 9.20 × 10^8 m^3/yr. The differences among the calculations of the three methods can be comparable and therefore the LGD results quantified by the radon mass balance model were acceptable.

Here is the revision for addressing this comment.

"In order to verify whether the LGD rate calculated by the ^{222}Rn mass balance model was reasonable, we used a groundwater balance equation. The catchment area is approximately 8500 km^2, about 49 times the size of the WEDL. Groundwater recharge in the catchment mainly came from infiltration of atmospheric precipitation, infiltration of irrigation water from rice fields and recharge from surface water bodies (rivers and lakes). According to the local geological survey (HGSI, 2016), the groundwater was recharged from precipitation (~18.09 × 10^8 m^3/yr), irrigation of rice fields (~3.45 × 10^8 m^3/yr), rivers lakes during the rainy season (10.36 × 10^8 m^3/yr) and external margins of the catchment (~0.45 × 10^8 m^3/yr). The total groundwater recharge was ~32.35 × 10^8 m^3/yr with a groundwater recharge rate of approximately ~380.57 mm/yr. The groundwater is discharged from evaporation (~17.22 × 10^8 m^3/yr), discharge to the river (~0.55 × 10^8 m^3/yr) and artificial extraction (~2.65 × 10^8 m^3/yr), with little change in groundwater reserves on a multi-year average. According to the groundwater balance equation, groundwater discharge to the WEDL was about 11.94 × 10^8 m^3/yr and the groundwater discharge rate was about 68.90 mm/d (assuming that groundwater discharge occurred for approximately 100 days per year).

This was very close to the groundwater discharge to the lake estimated by the ^{222}Rn mass balance model (12.38 × 10^8 m^3/yr). In addition, we also made the calculation in the WEDL used Darcy's law and obtained an average LGD rate of ~ 53.13 mm/d and a groundwater discharge flux of 9.20 × 10^8 m^3/yr (K is ~ 15–100 m/d; I is ~ 0.0002–0.0015). The differences among the calculations of the three methods can be comparable and therefore the LGD results quantified by the radon mass balance model were acceptable.”

-About the comment (13): L398ff: Since the calculations of nutrient loads are based on the erroneous calculation of LGD rates these calculations are not useful at all. The same problem applies to the contrasting spatial patters of LGD and associated nutrient loads and the conclusion.

-Response: Thanks for your reminder. We have re-estimated the loads and flux of LGD-derived nutrients based on the new LGD rates. This section is revised as follows:

“The loads and fluxes of nutrients input originating from LGD to the WEDL was in the order of Si > NH_4-N > P (Table 2). The loads and fluxes of Si input associated with LGD were 0.87 g m^{-2} d^{-1} and 1.50×10^8 g d^{-1}, respectively, while those of NH_4-N were 0.19 g m^{-2} d^{-1} and 3.22×10^7 g d^{-1}, respectively, and those of P were 2.40×10^{-2} g m^{-2} d^{-1} and 4.16 × 10^6 g d^{-1}, respectively. The loads and fluxes of nutrients input originating from LGD to the EEDL was also Si > NH_4-N > P (Table 2). The loads and fluxes of Si input associated with LGD were 0.44 g m^{-2} d^{-1} and 3.89 × 10^7 g d^{-1}, respectively, while those of NH_4-N were 7.40 × 10^{-2} g m^{-2} d^{-1} and 6.56 × 10^6 g d^{-1}, respectively, and those of P were 1.16 × 10^{-3} g m^{-2} d^{-1} and 1.03 × 10^5 g d^{-1}, respectively.”

-About the comment (14): Technical corrections (Please note that I am no native speaker and my suggestions might be wrong):

1) *L11: has not been*
2) *L12: loads at two sites*
3) *L34: groundwater can be an important component of lake water budgets*
4) *L37: delete “globally”*
5) *L38: impacts on lake water*
6) *L44: geomorphology*

7) L54: has not been

8) L64: and it also has

9) L72: has not yet been studied.

10) L117, L119: originating

11) L184: Schmidt et al.

-Uniform response 1)-11): Thanks for your good suggestion. These technical corrections have been corrected word by word.

12) L238-240: Are you referring here to lake water levels of EDL. A variation of 1.2 meters is quite a lot. Is this a temporal variation or a spatial variation? An if this is a temporal variation are these data from the two measurement campaigns in January 2019 and January 2020 or from different dates?

-Response 12): Thanks for your reminder. This refers to water levels in space. The spatial distribution of groundwater levels and lake levels was shown as follows:

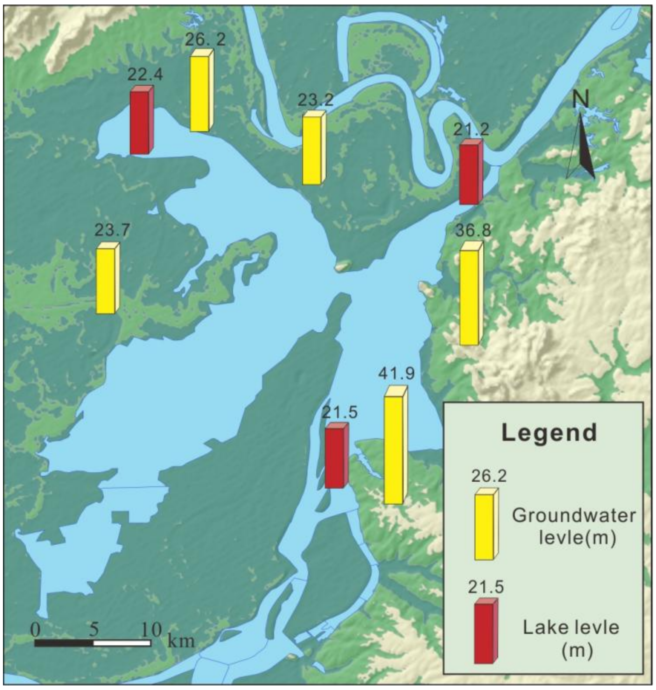

Figure R5. Comparison of groundwater levels and lake levels. The yellow bar represents the groundwater level, the red bar represents the lake level, the height of the bar indicates the water level, and the number is the water level elevation. The topographical information is from Geospatial data cloud (http://www.gscloud.cn/sources/index?pid=302).

13) L246: How does the range of groundwater levels and lake levels reported as 15.6 to 20.4 m fit to the groundwater levels around EDG ranging from 23.2 to 41.9 m *(reported in line 239).*

-Response 13): We are very sorry for some language expression and wording problems in the manuscript, which have brought much trouble to your review. We have rewritten the content here.

"The difference between groundwater levels and lake levels is much greater in EEDL (15.6 to 20.4 m) than that in WEDL (0.8 to 3.8 m)."

14) L246-257: I do not really understand the purpose of the lake water quality parameters such as dissolved oxygen, pH, redox, temperature etc. in the context of the present paper and reported here in much detail.

-Response: Thanks for your question. These parameters are considered by us to be basic indicators of the water samples and can be used as a background to the quality of groundwater and lake water in the study area. The collected groundwater was tested twice for water quality parameters and when the difference between the two results was little, we considered the subsequent pumped groundwater to be fresh groundwater, at which additional samples were taken. Lake water samples were used in an attempt to analyze the relationship between these parameters and those in groundwater, and in this study the analysis was only found to correlate electrical conductivity with radon concentration.