Referee #2 (K. Rozanski)

The authors discuss the results of a case study focusing on deciphering dynamics of water flow in Koycegiz-Dalyan lagoon located in the southwest of Turkey on the Mediterranean Sea coast using environmental tracers (heavy isotopes of water: oxygen-18 and deuterium) and water chemistry. The study demonstrates usefulness of environmental tracers in obtaining better understanding of coastal ecosystems functioning, with emphasis on lagoon-type environment. Such ecosystems are often home to rare species and need proper management. The discussed study is a valuable contribution to the available literature on the subject and deserves publishing in HESS journal.

➔ We thank K. Rozanski for the detailed comments on the manuscript which we appreciated. We followed the suggestions and answered accordingly below.

The conceptual model of the studied system is missing. It should be presented in the introductory part of the manuscript (possibly at the end of section 2.1.), accompanied by the hypothesis(es) being tested in the framework of the presented study. In fact, from the presented material it appears that it should be two separate conceptual models, one for the dry and one for wet period. Presentation of such conceptual model(s) in the introductory part of the manuscript would put the experimental data subsequently presented and discussed in a proper perspective and would facilitate the reading.

➔ We added a new chapter after section 2.1 which is called "2.2 Conceptual Model". Here, we present the conceptual models of our studied system for the dry and wet season, which is in accordance to the detailed referee suggestions below. Further, we also present the hypothesis. Having this new chapter including the new Figure 1S will certainly help to facilitate the reading and following our thoughts. Please note, that we actually found that there is little/negligible input of groundwater in the dry season which is different to the initial conceptual model, which is thoroughly discussed in the new and previous version of the manuscript.

Modified sections

"…2.2 Conceptual Model

Identifying different water sources in the lagoon we set up a conceptual model distinguishing between dry (Figure 1Sa) and wet season (Figure 1Sb). For the dry season our hypothesis was that evaporation results in low water tables in the lagoon favoring both fluxes from Köycegiz lake and the Sea into the lagoon. However, higher water levels maintain in the main Dalyan channel with freshwater flow from Köycegiz lake to the Sea. Thus, we expected a density driven layering in the lagoon with freshwater input from the lake in the top layer which is influenced by evaporation and saltwater input in the bottom layer mixed with groundwater (Figure 1Sa). We further expected that the seawater influence decreases with distance to the coastline. For the wet season our hypothesis was that freshwater input, mainly from groundwater and lake during baseflow conditions and additionally from precipitation during events, results in high water tables in the lagoon favoring freshwater flow from the lake through the lagoon into the Sea. We expected the lagoon water to be well mixed without distinct density driven layering (Figure 1Sb). For both season, we excluded any direct influence of the geothermal Sultaniye spring to the lagoon, because the spring's influence was found only for the bottom layers of the Köycegiz lake (Bayari et al. 1995) not outflowing into the shallow Dalyan channel and the lagoon but discharging northwards. Still, other unknown geothermal springs in the lagoon cannot be excluded. "

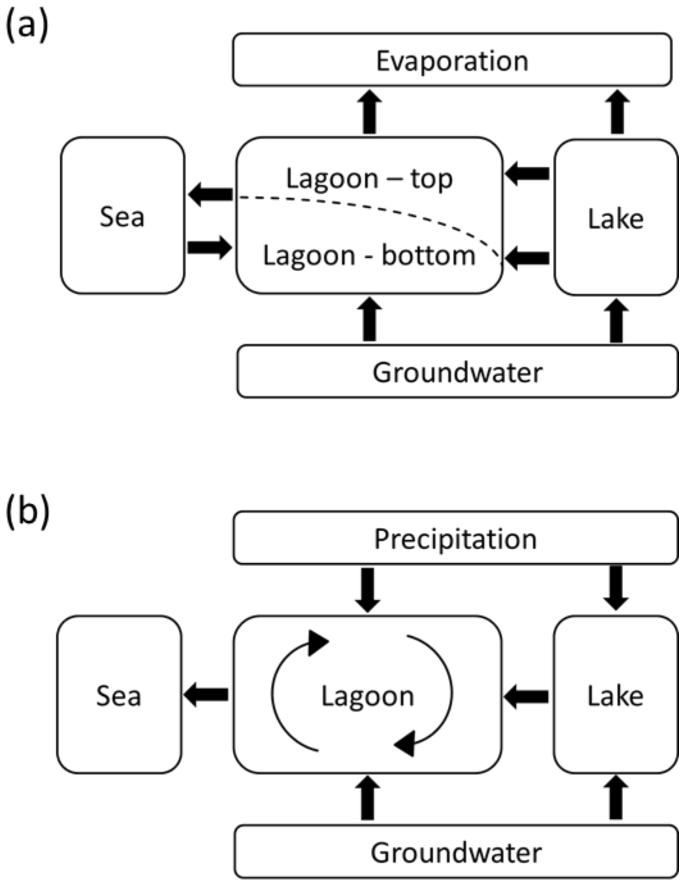

Figure S1: Conceptual model of flow connections between the lagoon and surrounding water bodies for the dry (a) and wet (b) season.

I would encourage the authors to get more out of the experimental data they are presenting (see discussion below). Also, I cannot see in their data any definitive proof that groundwater component is indeed making discernible contribution to the water balance of the studied lagoon system.

- ➔ We will answer to this question in detail in the specific comments given below

Specific comments:

1. p7231, line 21 - in the coastal context 'increased marine water influence' is the most frequent but not unique response to the enhanced withdrawal of groundwater. Also, deeper lying groundwater of non-marine origin can be mobilized in such cases.

- ➔ We agree and added this important point to the manuscript: "For example, pumping of groundwater can influence the quality of the withdrawn drinking/irrigation water due to increased marine water influence or due to the mobilization of groundwater from deeper layers."

2. p7233, line 7 - it is not obvious which watershed the authors refer to. Only much later in the text it becomes clear that this is the watershed of Köycegiz lake.

- ➔ We changed the text accordingly: "The total area of the watershed of Köycegiz Lake is approximately 830 km^2 and of the lagoon is 130 km^2.

3. p7233, lines 11-14 - please give numbers for water level fluctuations in Köycegiz lake. Are there any data for the flow rates of water in the Dalyan channel during wet and dry period?

➔ We refer to some long-term observations given in Bayari et al. (2001) as we have not measured water levels in the present study. We changed the text accordingly: "The upstream located Köycegiz Lake (2 m asl) is directly connected through surface water with the lagoon and further to the Mediterranean Sea by the lagoon and its various branches (Figure 1b). Due to seasonal changes in water levels, hydraulic gradients change considerably over time. During winter, most of the branches in the wetland areas in the lagoon are connected and the discharge from the lake into the lagoon is highest (up to 110 m^3/s; Bayari et al. 2001)). In summer, Köycegiz Lake water level decreases up to 1 m (Bayari et al. 2001). In the lagoon, water levels decrease even more drastically disconnecting some of the side branches from the main Dalyan Channel (personal communication). The discharge from the lake to the lagoon is strongly reduced. On average, the discharge from the lake into the lagoon is about 33 m^3/s and the depth of the main Dalyan channel decreases from 5 m upstream near the lake to about 1 m downstream near the Sea."

4. p7234, lines 2-5 - is would be beneficial to provide a picture summarizing basic climatology of the study area from near-by meteorological station (monthly means of surface air temperature and rainfall amount). Skip the sentence starting from 'Although the region is controlled......" It is too vague and out of the scope of the manuscript.

➔ We deleted the mentioned sentence and included a Figure giving monthly air temperatures, rainfall amount from the study site and also isotopic composition of precipitation from the data provided by the IAEA (i.e. Antalya)

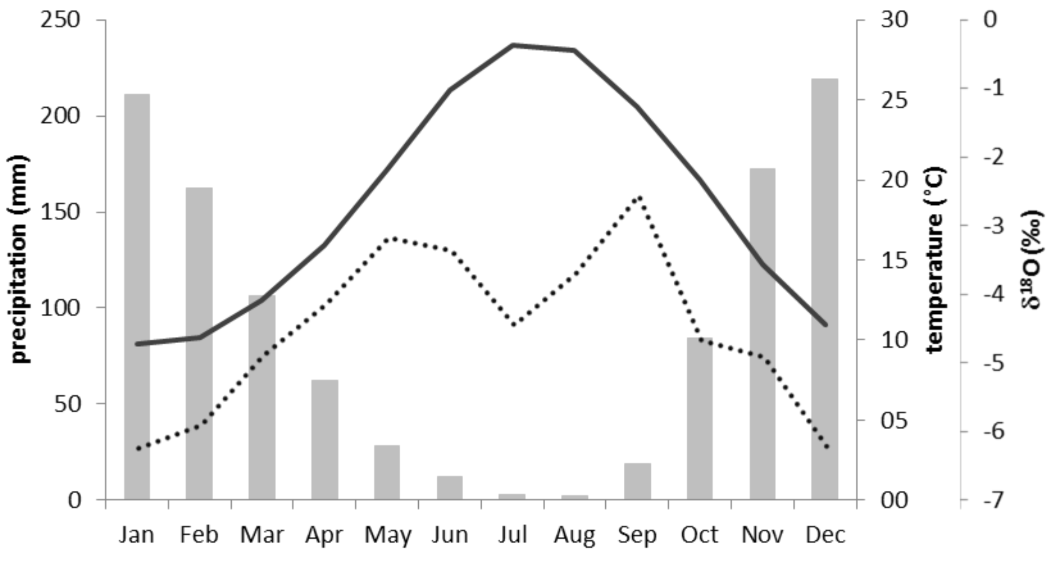

Figure S2: Long-term monthly data of average precipitation (grey bars) and air temperature (solid line) from Köycegiz meteorology station (1976-2010) and isotopic composition of precipitation in Antalya (dashed line). Data from Antalya are available at the IAEA database WISER (http://www-naweb.iaea.org/napc/ih/index.html; accessed 19.05.2014).

5. p7234, lines 6-17 - it would be beneficial to enlarge the area shown in Fig. 1b to include entire Köycegiz lake with its Sultaniye basin.

- ➔ As the lake is quite large, we decided to keep the Figure as is. Otherwise, the sampling points will be difficult to distinguish in a wider resolution. Further, we refer to Figures presented in Bayari et al. (1995, 2001) for further details of the study area, and we clearly indicated in the text, that the water from the deeper Sultaniye basin drains northwards, i.e. not into the lagoon (see modified section on conceptual model presented earlier).

6. p7235, lines 11-17 - I would strongly recommend to give additional table showing the long-term monthly isotope and precipitation data for the Antalya station. Are the reported annual averages of delta(H-2) and delta(O-18)weighed or arithmetic means?

- ➔ We included the monthly data in the new Figure S2 (see above). All given isotope precipitation data are weighed means which emphasized in the revised manuscript.

  Modified sections in the text:
  "The results of the stable water isotope analysis from the observation area were compared to public available isotope contents in precipitation accessible through the IAEA (International Atomic Energy Agency) web database WISER (http://www-naweb.iaea.org/napc/ih/index.html; accessed 19.05.2014). Here, Antalya is the closest location of the Global Network of Isotopes in Precipitation (GNIP) having long-term isotope records in precipitation, which is 200 km east of the studied lagoon and 49 m asl.. Based on these data, the Local Meteoric Water Line (LMWL; $\delta^2H=8\delta^{18}O+14.3$) and the annual weighted average isotope contents in precipitation ($\delta^{18}O$=-4.9‰; δ^2H =-24.9‰) were calculated; monthly long-term weighed averages are shown in Figure S2."

7. p7235, lines 18-22 - uncertainties of chloride and salinity measurements should be reported as well.

- ➔ We give the uncertainties of chloride and salinity measurements in the text: "Chloride concentrations (±0.22 mg/l) were measured by using Merck test kits (catalog number 1.14897.0001). NaCl stock solution, which has 1 mg Cl^- in 1 mL, was used in order to prepare standard solutions for controlling the reliability of chloride measurements carried out with Merck test kits. Salinity measurements (±0.1 mg/l) were conducted in-situ with YSI 6600V2 Multiparameter Water Quality Sonde."

8. p7235, lines 24-26 - my favorite end-members would be slightly different – see comment No.14.

- ➔ see detailed answer below

9. p7237, lines 1-2 - please give the elevation range of possible recharge area(s) for groundwater being exploited by the sampled wells. More detailed discussion of the apparent difference between the isotopic composition of groundwater and local (Antalya) precipitation would be in place here. I disagree with the general statement that the differences between dry and wet season at not significant. They are significant for some wells: GW11 (7.3 ‰ difference in delta(H-2)), GW18 (0.40‰ difference in delta(O-18)), GW20 (0.83 ‰ difference in delta(O-18)). The question of course arises what do they mean. If real, they would point to rather short residence time of water. But they could also indicate some problems in well construction. This has to be sorted out in the text.

- ➔ The elevation of the nearby surrounding mountains is up to 565 m asl, which is given in the text now (chapter about study site: "Groundwater is used as irrigation and drinking water in the area. We expect that the groundwater is mainly recharged locally from the surrounding forested mountains (up to 565 m asl.; Figure 1) of the karstic areas."). We also give the elevation of the Antalya station (49 m asl.; see answer comment 5). Assuming an average differences in elevation between Antalya and the mountain range of about 400 m (plateau like structure) and an average difference in isotope content of about 1.16‰ $\delta^{18}O$ (10.0‰ $\delta^{2}H$) results in an altitude gradient of 0.29‰/100m for $\delta^{18}O$ (2.5‰/100m for $\delta^{2}H$). These gradients are in accordance with values reported for Southern Adriatic region (0.24‰/100m; Vreca et a. 2006), the global and Italian gradients (0.2‰/100m; Bowen and Wilkison 2002, Longinelli and Selmo 2003) and simulated values for the Mediterranean Sea region (Lykoudis and Argiriou 2007). We included this discussion into the text. Additionally, we calculated a Local Evaporation Line and compared it to other studies (see detailed answer to comment 14)

Further, we removed our general statement about uncertainties and added some points of discussion about short residence times and issues associated with well constructions.

Modified sections in the text:
"Groundwater samples were the most depleted samples ranging from -6.2 to -5.7‰ for $\delta^{18}O$, and were even lower compared to average precipitation contents (-4.9‰ for $\delta^{18}O$). Assuming only negligible differences in isotopic composition of precipitation between Antalya and our observation area due to close proximity and similar location on the Mediterranean Sea, these differences support our assumption of higher altitude precipitation from surrounding mountains as major recharge source of groundwater. Average differences in elevation (400 m) and isotope contents (1.17‰ for $\delta^{18}O$; 9.9‰ for $\delta^{2}H$) give an altitude gradient of 0.29‰/100 m for $\delta^{18}O$ (2.5‰/100 m for $\delta^{2}H$). These gradients are in accordance with values reported for Southern Adriatic region (0.24‰/100 m; Vreca et a. 2006), the global and Italian gradients (0.2‰/100 m; Bowen and Wilkison 2002, Longinelli and Selmo 2003) and simulated values for the Mediterranean Sea region (Lykoudis and Argiriou 2007)."

"In groundwater, more depleted contents were generally observed in the wet season compared to the dry season; however, absolute differences between seasons were small (0.21‰ for $\delta^{18}O$; 2.8‰ for $\delta^{2}H$). These differences can either result from a fraction of local seepage water with short residence times or from uncertainties of groundwater sampling. Well screening depths are unknown and therefore we expect some minor uncertainties when taking groundwater samples, i.e. water from same depths and taken with same flow rates during sampling."

10. p7237, lines 7-9 - are the isotope and chemical signatures of this hypothetical geothermal water contributing to Köycegiz lake known? Please report if this is the case. Also note that from stable isotopes alone you cannot make any statement about geothermal origin of a lake water (eventual geothermal signal in O-18 will be always hidden in the evaporation signal).

➔ Indeed, there are some isotope and chemical signatures reported in the previous lake studies. Here, the isotope signatures of geothermal waters range between -4.87 and -0.81 ‰ for $\delta^{18}O$. As already mentioned by the referee any eventual geothermal signal is hidden in the evaporation/mixing signal as the data would plot directly on the mixing line (see Figure A below; not included in revised manuscript but values given in text). Therefore, we are careful with any interpretation on geothermal water influence here and elsewhere in the manuscript as we don't have any direct evidence and as we cannot distinguish from isotope data between diluted seawater or evaporated water and geothermal water origin. We changed the text in the manuscript accordingly and included information about the Local Evaporation Line too (details see answer comment 14):

“All Köycegiz Lake water samples plotted below the LMWL indicating enrichment due to evaporation and potential geothermal water origin as found in previous studies (Bayari et al. 1995; 2001). When considering isotope contents of reported geothermal origin in the area (-0.81‰, -4.87‰, -4-76‰ and -2.9‰, -30.0‰, -27.2‰ for $\delta^{18}O$ and $\delta^{2}H$, respectively; Bayari et al. 1995), it is evident that the geothermal origin is hidden in the evaporation signal and therefore these two sources cannot be distinguished considering isotope contents only. Additionally, a Local Evaporation Line (LEL) was determined considering the top lake samples for both seasons only. The resulting LEL ($\delta^{2}H = 5.40\delta^{18}O - 0.3$) is similar to another Turkish lagoon ($\delta^{2}H = 5.29\delta^{18}O - 0.55$; Lecuyer et al. 2012). It intersects the LWML in -5.85‰ $\delta^{18}O$ (-31.9‰ $\delta^{2}H$) which is also close to the average groundwater contents (-6.08‰ $\delta^{18}O$ and -34.84‰ $\delta^{2}H$) supporting assumption of higher elevation recharge area for the catchment..”

“It remained unknown though whether an additional water source in the system has to be considered which was of geothermal origin as found for Köycegiz Lake (Bayari et al., 1995) and as common in this area due to geology and tectonic activity (Mutlu and Gülec, 1998).”

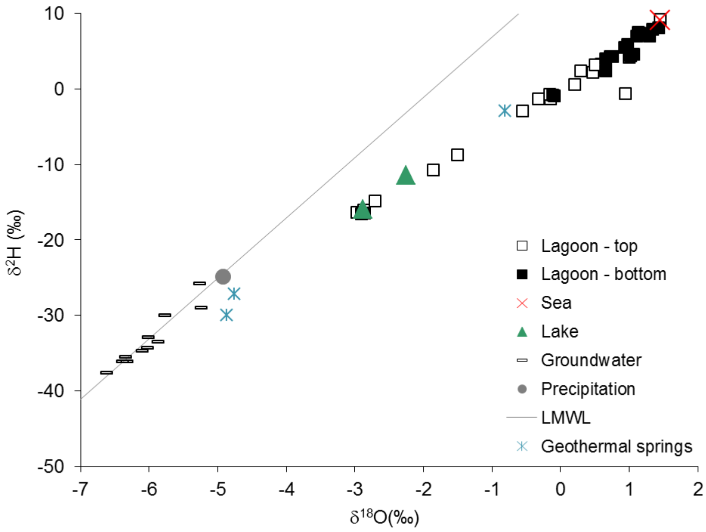

Figure A: Isotope composition of water sources in the dry season

11. p7238, lines 6-8 - as seen in Table 1, the chloride content in GW11 actually varies with stable isotope content of water (lower delta values accompanied by reduced chloride concentration during wet period).

➔ Yes, this is correct; it particularly varies for deuterium contents. We changed the text accordingly.

“Chloride was lowest in groundwater samples for both sampling times suggesting no or negligible seawater influence for most of these groundwater locations. Only one sampling site (GW11) showed increased chloride concentrations (460 mg/l in wet season and 2300 mg/l in dry season), which was also accompanied by higher water isotope contents in the dry compared to wet season (Table 1). If this was caused by mixing with seawater, it would result in an increased seawater contribution of 7±5% for the dry season in GW11. Another reason could be short residence times of recharge from the unsaturated zone. Consequently, chloride originating from agricultural activities (irrigation, pomegranates) would be leached and diluted by winter precipitation with low isotope contents in the wet season."

12. p7238, lines 11-15 - as reported in Table 1, sea water was collected only on the top (10 cm depth). Was any sample collected also close to the bottom?

- ➔ Indeed, we took samples from the top only assuming that the current is strong enough to completely mix the water in the Sea. For the two endmember mixing approach, we additionally followed your suggestion in comment 14 and took the bottom sample of L8 as endmember for the dry season as it seems to be more representative for this two endmember mixing analysis. More details about the endmember mixing analysis is given below (answer comment 14).

13. p7238, lines 25-26 - see comment No. 10. Without information about isotope and chemical characteristics of the geothermal component it is hard to argue about its influence.

- ➔ Yes, we totally agree. According to the previously published chemical and isotope data of three different geothermal springs (Bayari et al. 1995;2001), our explanation here is actually wrong and not supported by these data. We have two explanations now: 1) erroneous analysis or let's say evaporative loss during storage because we measured this particular sample twice, 2) enrichment due to evaporation as the data point is on the local evaporation line (details see answer comment14). Therefore, we changed the text. "One sample (L2B, dry period) had enriched isotope values even though chloride was quite low which we attributed to erroneous analysis rather than to water influenced by geothermal origin because of differences in chemical and isotope characteristics compared to geothermal springs in this area (Bayari et al., 1995)."

14. p7239, whole section 3.3, subsequent discussion and conclusions: I have a major problem with three component end-member mixing scenario proposed by the authors. The two components are obvious (outflow from Köycegiz lake and the seawater). But the third one, groundwater input, is highly questionable. I do not see any solid evidence in the data presented by the authors that groundwater is indeed contributing significantly to the water balance of the lagoon, neither in dry nor in wet season. If there are any other data/evidence that groundwater is indeed entering in significant amounts the lagoon, they should be presented and discussed at length in the manuscript. The key figures in the manuscript are Figs. 2 and 3. Figure 2a shows that during dry season essentially all lagoon data are plotting in delta(H-2)-delta(O-18) space on the mixing line between the seawater and the lake water (top) end-members. There is one clear outlier here (L14-top). It would be worth to check the numbers and eventually repeat the analysis. Spread of the data points towards the upper portion of the mixing line may stem from impact of evaporation going on within the lagoon. During wet season the situation is totally different (Fig.1b). Now majority of the data is grouped within tight cluster around the two other end-members: lake water (top) and local precipitation input. Also in this case the cluster of data points representing the isotopic composition of groundwater clearly stays away of the two-component mixing field. The outliers (L33(bottom) and the lake data: L13(bottom), L14(bottom), L05(bottom)) apparently represent 'memory' of the lagoon with respect to the preceding dry period. The position of seawater suggest that there is a very little, if any, contribution from this source during the wet season. The data point representing the bottom of Köycegiz lake is irrelevant because the Daylan channel is apparently too shallow to receive significant contribution from this source. Now comes Fig.3 with the mixing triangles proposed by the authors. I would stay away of this scenario. For the dry period stable isotope data clearly point to two end-member mixing. If we draw a mixing line in Fig. 3a between the data points representing Köycegiz lake (top) *and the seawater, we have two problems: (i) majority of the data points is positioned to the right of this line, and (ii) at the upper end of this line we have several points which are clearly above the line i.e. they show distinctly higher chloride content than that adopted for the seawater component, although with comparable O-18 isotope composition. The first problem is relatively easy to explain. During the dry period we have strong evaporation of water going on in the entire lagoon. So, the impact of evaporation on both delta(O-18) and chloride content has to be taken into account. Rough assessment suggest that during evaporation of an isolated water body an increase of chloride content by 10% due to water loss will be accompanied by the increase of delta(O-18) in the order of 2-3‰˙In chloridedelta (O-18) space in Fig. 3a this would be an almost horizontal line along which the data points are dragged away of the mixing line, to the right. This is in fact seen in Fig. 3a. As to the second problem, I can offer the following explanation. It is apparent from Table 1 that highest salinities (and chloride content) were measured during the dry period in points L8 and L9 (bottom waters). As far as I could see in Fig. 1b, point L8 sits directly in the channel connecting the lagoon and the open sea. Unfortunately, no bottom sample was collected for the open sea. Then, if we accept that the bottom sample of L8 represents true seawater input during the dry season (and this is most reasonable assumption in view of possible density currents, etc.) than the position of seawater end-member in Fig. 3a should be shifted up vertically to the position of the two topmost data points. Now, essentially all data points would plot to the right of the modified mixing line. For explanation, see problem (i). Summarizing, my favorite conceptual model for the system studied by the authors would be as follows:*

A. During summer (dry period), with essentially no rainfall and high temperatures dominating in the region, surface water from Köycegiz lake feeding the lagoon is predominantly lost by evaporation within the lagoon (some mass balance calculations would be welcome here). This creates favorable conditions for invasion of seawater to the lagoon, predominantly via bottom flow through the channel connecting the lagoon to the open sea. This water has specific chemical and isotope signatures (chloride content in the order of 24000 mg/L, delta(O-18) ~ +1.3 ‰ delta(H-2) ~ +8 ‰. Influence of this water can be traced up to the point L22 (Dalyan channel). Essentially entire lagoon is impacted by the seawater input. In my view, the two-component mixing would be the most appropriate option here, with two end-members: (i) the sea water as specified above, and (ii) Köycegiz lake represented by surface water sample. Note: eventual mixing proportions in different regions of the lagoon should be calculated rather from the chloride-delta(O-18) plot, after correcting the data points back to the mixing line. As seen in Fig. 2a, disentangling the evaporation effects from the mixing is practically impossible in this case.

B. During winter (wet period) the lagoon is 'flooded' by freshwater originating both from the increased input of Köycegiz lake (some numbers would be welcome here) and from the local precipitation (ca. 1 meter of rainfall is reaching the lagoon during wet season). There is essentially no evidence for seawater entering the lagoon (L8 has 'freshwater' isotope and chemical signatures, both at the top and at the bottom of the water column). The 'memory' of the dry season is seen only in very few places in the lagoon. The two-component mixing scenario would also apply for this season, this time with Köycegiz lake (top) and the local precipitation as two end-members. Because these two end-members are very similar in terms of their isotopic composition, while chloride contents are inconclusive (possible agriculture input by surface runoff), I would not attempt any balance calculations for this season.

I would conclude emphasizing once more that in my view, neither isotope nor chemical data presented in the manuscript suggest any discernible groundwater input to the studied lagoon system. Of course, the lagoon ecosystem depends indirectly on groundwater via the Köycegiz lake which is apparently groundwater dependent.

- ➔ We thank the referee for these thorough thoughts and helpful suggestions. We followed the referee's suggestions for the dry season and compared results from the

two endmemeber mixing (2EMMA) approach to previous results of the three endmember mixing approach (3EMMA). For the 2EMMA (see Figure 3a – revised; end of file) we (i) simplified our assumptions and neglected any groundwater influence, (ii) took L08B as seawater endmember, (iii) corrected the data due to evaporation (see details below), (iv) calculated mixing ratios based on a two component mixing approach (lake and seawater) and using evaporation corrected lagoon data.
The newly calculated freshwater and seawater contributions are similar to the previously presented results (revised Figure 5, see end of file), and therefore, the main conclusions and message of the manuscript is not changing. This gets even more obvious when comparing the data directly. Both, the freshwater (Figure S3a) and seawater fractions (Figure S3b) of the mixing approaches plot close to the 1:1 line. Differences can be considered as insignificant due to the uncertainty of the method (see error bars in Figure 5).

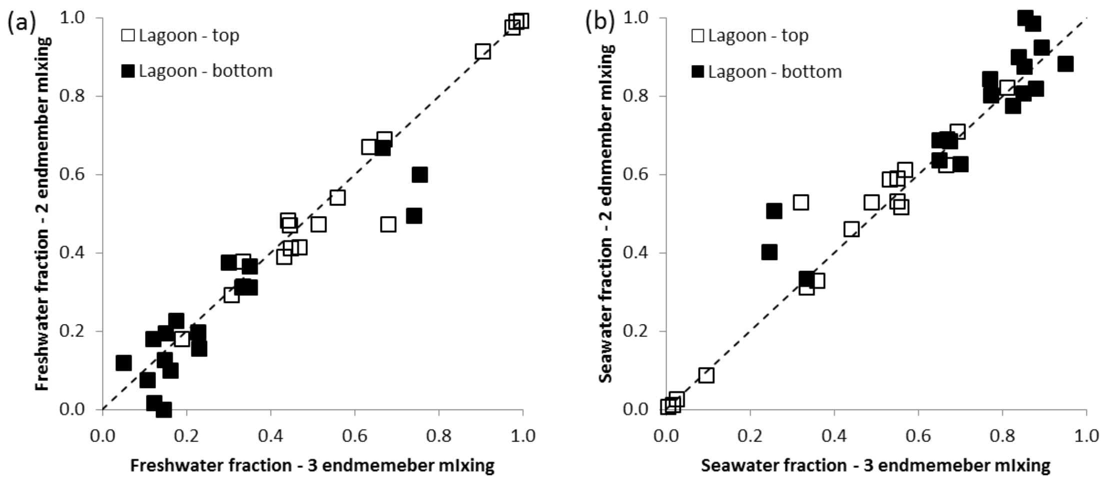

Figure S3: Fractions of freshwater (a) and seawater (b) contributions in the top and bottom lagoon samples calculated from two and three endmember mixing approaches; dashed line gives 1:1 line.

Now, coming back to the correction of the data for the dry period: We correct the data according to the suggestion of the referee to account for enrichment due to evaporation. Therefore, we determined a Local Evaporation Line considering the measurements of the lake top samples in the dry and wet season (δ^2H=5.40 δ^{18}O-0.3) which is almost similar to data presented by Lecuyer et al (2012) (δ^2H=5.29 δ^{18}O-0.55). The calculated LEL insects the LWML in -5.85‰ δ^{18}O (-31.9‰ δ^2H) which is also close to the average groundwater contents (-6.08‰ δ^{18}O and -34.84‰ δ^2H) and actually supports our previous statement about differences in Antalya precipitation and average groundwater contents. Further, we calculated the evaporation line also based on the δ^{18}O-chloride relationship aiming in zero chloride for the average intersect of -5.85‰ (Cl=670 δ^{18}O+4000; see figure below); by the way, this also explains the outlier in Fig. 3a. With the slope of this relationship, we corrected the lagoon samples in the dry period moving them back onto the mixing line. The determined relationship is in agreement with the roughly assessment given by the referee, i.e. 10% increase in chloride accompanied by 3.4% increase in δ^{18}O. These calculations also enabled us to do some mass balance calculations on evaporation estimates as suggested by the referee. We additional preformed the same procedure for the salinity-isotope data to account for uncertainties. The evaporation results are given in the revised Table 2 (see below). For the top lagoon samples the results (average of 3.4%) are in agreement with our expectations and smaller compared to the mass balance assumptions for Köycegiz lake i.e. 6.8% (Bayari et al. 1995). However, similar values of evaporation were found for the bottom lagoon samples (average of 2.2%) which physically make no sense. Further, the correction of the data back to the mixing line is kind of arbitrary without knowing the actual evaporation. Only detailed information about spatial distribution of evaporation would enable a precise correction of the isotope-chloride data which would probably put some of the data to the left side of the lake-seawater mixing line requiring a three component mixing approach though.

Summarizing, we prefer to keep our previous 3EMMA due to (i) lacking physical explanations, (ii) lack of information on actual evaporation and (iii) the similarity of results of both mixing approaches. However, we happily include a 2EMMA and a critical discussion about the results into a revised version of the manuscript if the editor wants us to present these data.

For the wet season, we are convinced that groundwater is a major component of the water in the lagoon due to several reasons:
(i) Water residence times in the lagoon in the wet season are short which is supported by the high outflow rates from the lake (see answer comment 3) and by modeling results of Ekdal (2008) indicating residence times <2 days for the wet season in the main lagoon channel. Therefore, the lagoon responds to rainfall only on short terms and contributions of precipitation are certainly higher when sampling during events. Due to the fast response, the main water sources under “baseflow conditions” need to be other sources than precipitation. Certainly, some precipitation is indirectly inherent in the lake and groundwater component anyway which is why we also give freshwater vs seawater contributions in the end of the manuscript. As indicated by Bayari et al. (2001) the lake levels respond quickly –i.e. within several days- to changes in rainfall, and we expect even faster response times for the lagoon as the water surface area is much smaller than that of the lake. The sampling in the wet season was during “baseflow conditions” without major antecedent rain events and therefore, a significant contribution of precipitation can be excluded. We will certainly include these points in the revised version of the manuscript.
(ii) Most of the lagoon sites range between -5 and -4‰ which is a significant variation. A linear mixing line between lake water (or precipitation) would not account for this scattering to the left and right of a two-component mixing approach (see Figure B given below but not included in manuscript as is). In contrast, the variation is perfectly covered by the triangle between average winter gw, seawater and lake water. The only locations outside are samples from the lake structures within the lagoon which are (a) enriched in both chloride and isotopes due to the “memory of the lagoon with respect to the preceding dry period” as suggested by the referee and as presented in the manuscript and (b) lying on the local evaporation line (equation in Figure B given below) which will be discussed in the revised version of the manuscript. Additionally, only one of the top lagoon samples had small chloride concentrations compared to the lake which is unlikely if dilution due to precipitation plays a major role (because relative contribution of precipitation to lagoon water volume much larger compared to lake water volume). Also here, the salinities perfectly match the different endmembers enveloping the lagoon samples.

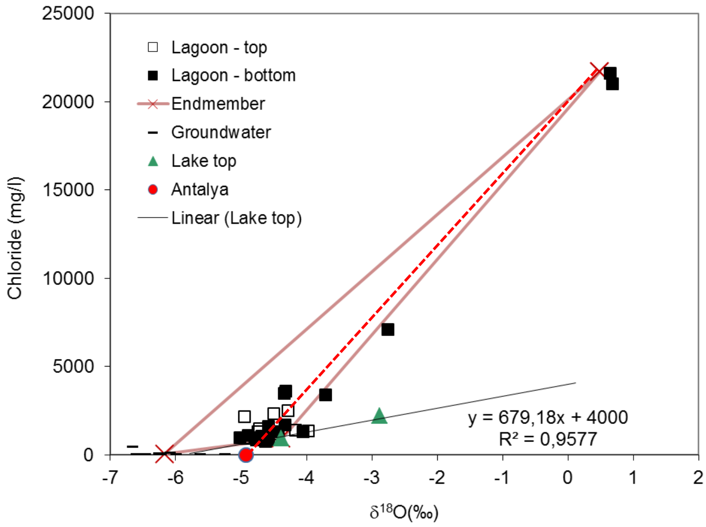

Figure B: d18O –Chloride relationship of different water sources in the wet season.

Technical comments:

Table 1. There is something wrong with the salinity units. Definitely they are not in (ppt) as indicated in the Table (ppt indicates the ratio of 10 to -12). Salinity can be measured either as electrical conductivity or as total dissolved solids (TDS) expressed in mg/L. From the numbers it looks that these are ‰˙... I would suggest to mark the top and bottom position for each sample: eg. L01T, L01B, etc. Please report filter depth for the sampled wells, if available.

➔ We corrected to unit for salinity which is given in g/L. We also followed the suggestion and marked the top and bottom locations (L01T, L01B). Unfortunately, we do not have any detailed information about the sampled wells and screen depths.

Figure 1. Add the position of Antalya station in Fig. 1a. Enlarge the map in Fig. 1b to include entire area of Köycegiz lake. Make the labels of the sampling sites more visible (e.g. using white background). Indicate on the map the position of the sampling site representing Köycegiz lake.

➔ We added the position of Antalya in Figure 1a and made the labels more visible. The position of the sampling site in the lake is masked by the lake label; we changed it accordingly. As indicated above (see answer comment 5), we did not enlarge the map in Figure 1b.

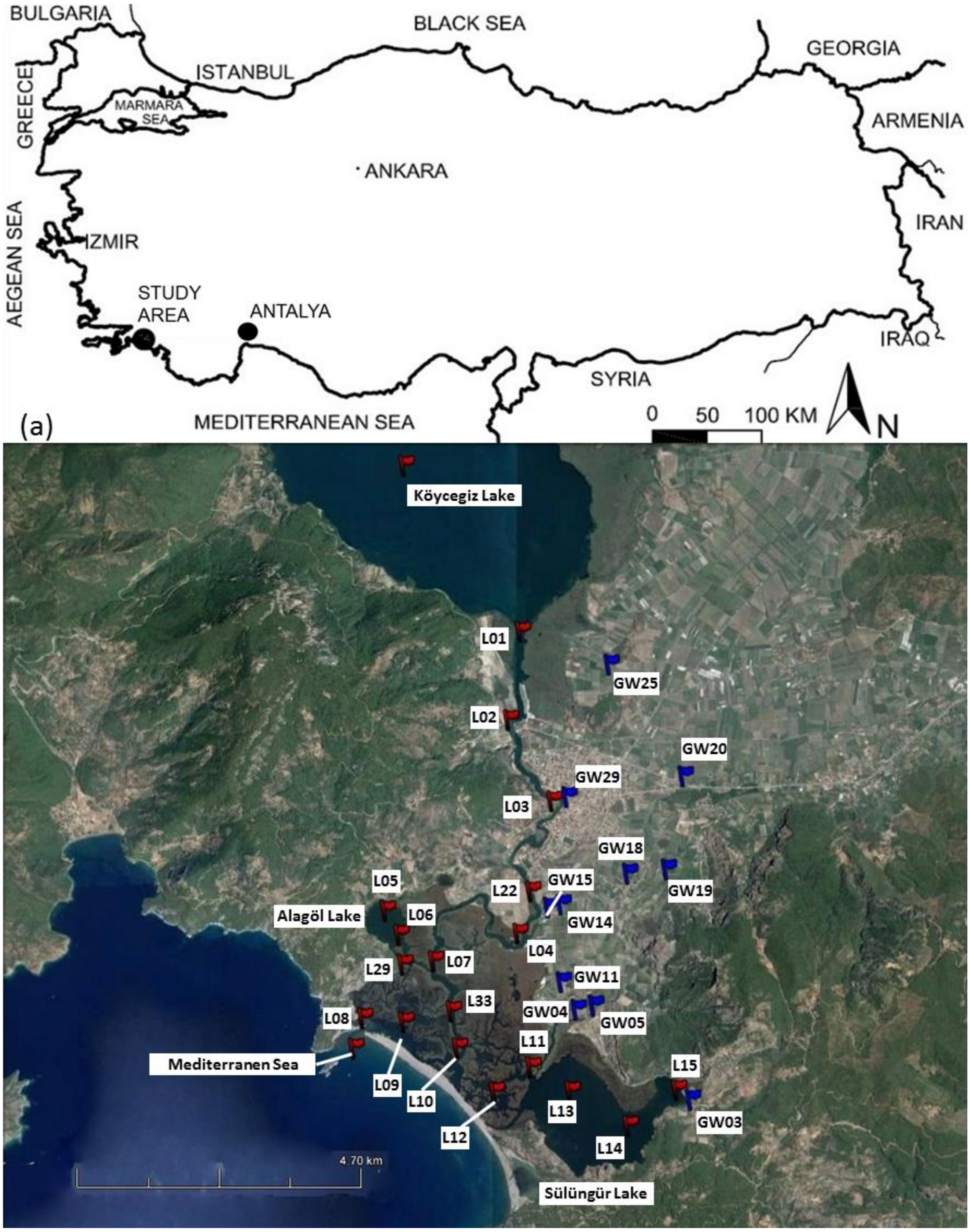

Figure 1 - revised. Geographic location of the Köycegiz-Dalyan Coastal Lagoon (a) and sampling locations (b); lagoon and groundwater sample sites are marked with red and blue labels; source of modified satellite picture was Google Earth (2014).

Figure 2. Make the horizontal scale of higher resolution (step: one per mill). Label the outliers with codes allowing their identification in Table 1.

- ➔ We changed the horizontal scale accordingly and marked the outliers:

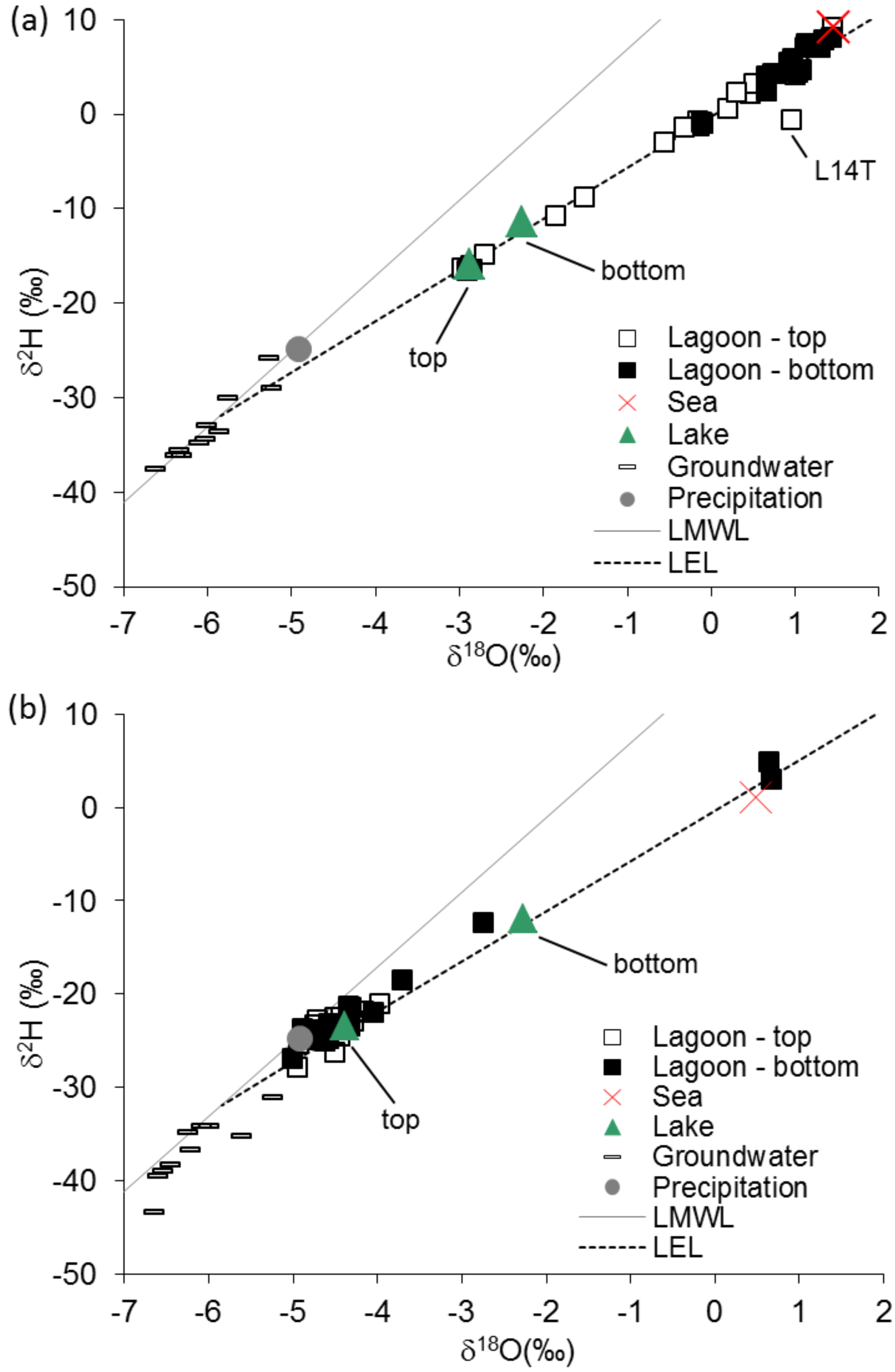

Figure 2 - revised. Dual isotope plot for (a) dry season and (b) wet season sampling campaign; LMWL and average precipitation taken from closest station of the GNIP data base i.e. Antalya.

Figure 3. Modify according to the discussion above. Make the horizontal scale of higher resolution (step: one per mill).

➔ We changed the horizontal scale accordingly and marked the outliers:

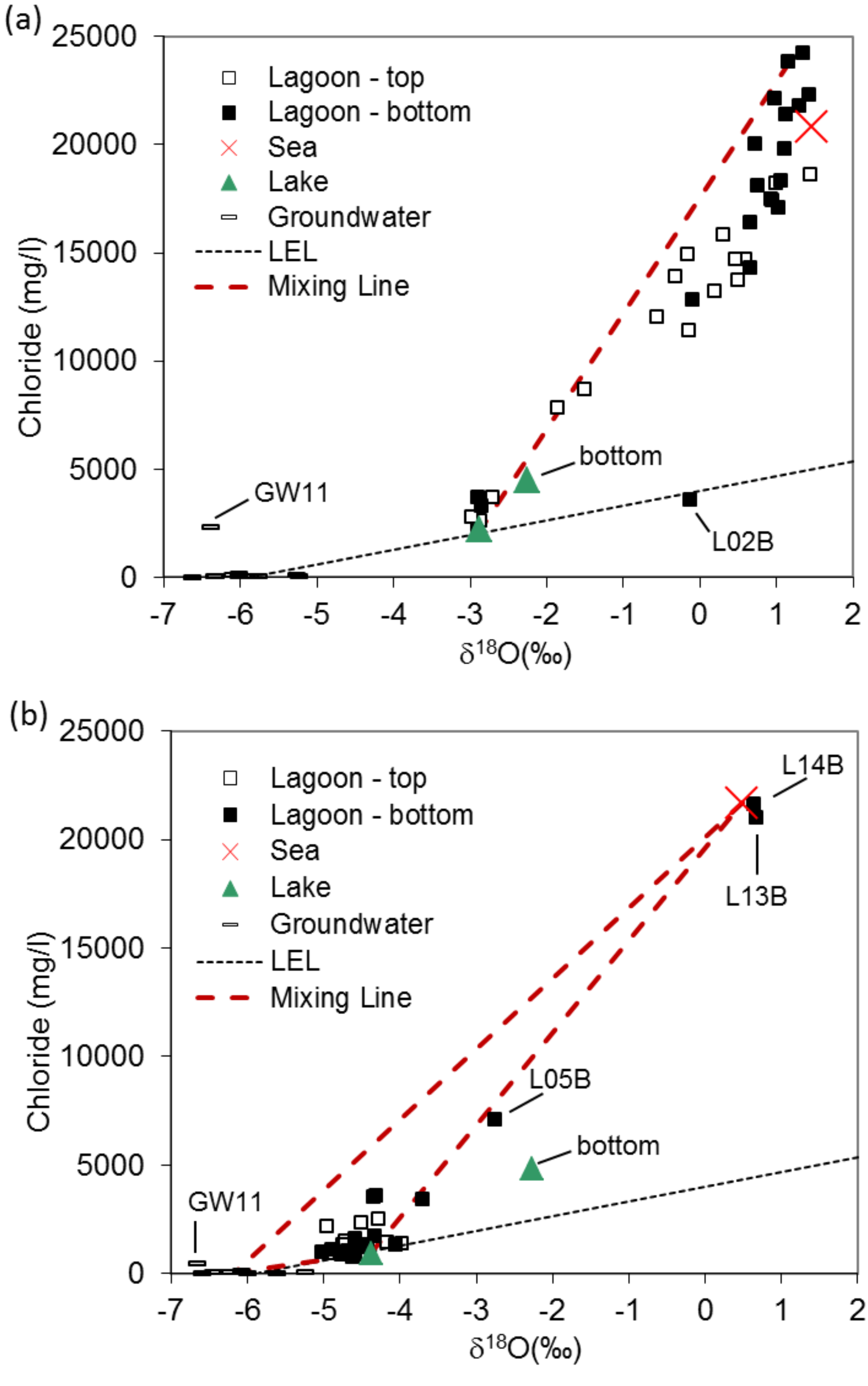

Figure 3 - revised. Chloride concentrations and $\delta^{18}O$ ratios for (a) dry season and (b) wet season sampling campaign; the dashed line connects the endmembers used for the two and three component mixing analysis, respectively.

Figure 4, 5. Modify according to the discussion above. Include additional table (monthly data for Antalya station). Include additional figure with local climatology (mean monthly surface air temperature and precipitation data).

➔ Instead of giving a table with monthly isotope data, we included these data in a local climatology figure (see Figure S3 given above). Further, we updated Figures 4 & 5 according to the new results; we noticed that Fig 4a and b were mixed previously:

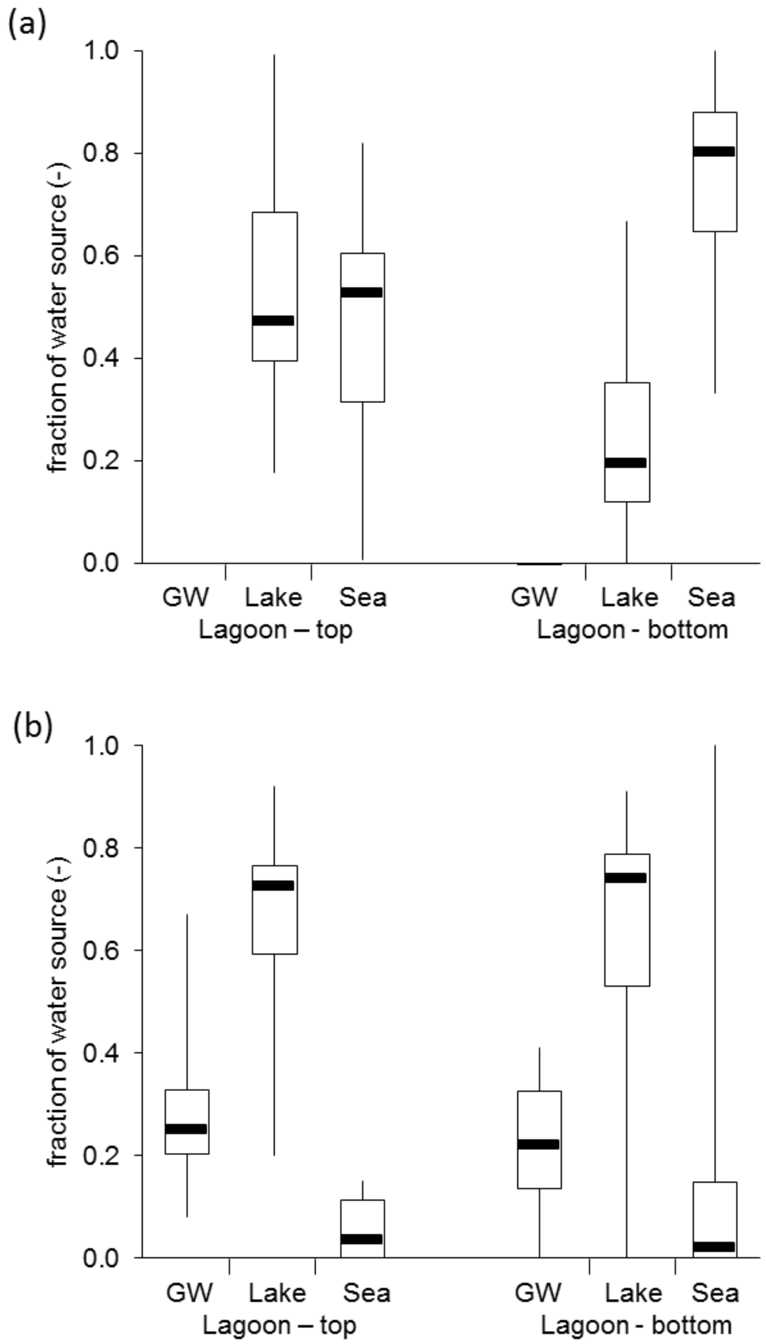

Figure 4 - revised. Fractions of different sources of the lagoon water for (a) dry and (b) wet season sampling campaign.

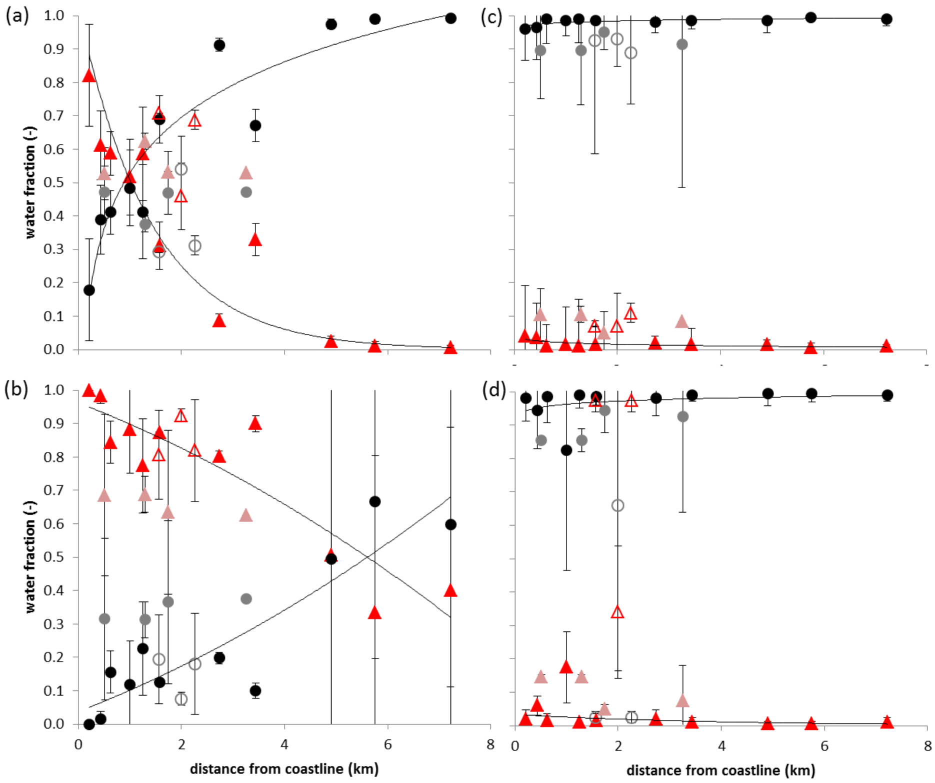

Figure 5 - revised. Changing fractions of freshwater (circles) and marine water (triangles) with distance from the coastline for (a) the top layer in the dry season, (b) bottom layer in the dry season, (c) top layer in the wet season, (d) bottom layer in the wet season; closed dark symbols indicate locations at the main lagoon channel, open symbols indicate surrounding lake locations and closed light symbols indicate their inflow/outflow connections to the lagoon system; error bars were determined from variability of endmember mixing analysis using salinity and chloride data individually in combination with $\delta^{18}O$.

Revised Table 2:

Table 2 -revised. Average results of endmember mixing analysis giving the contributions of groundwater (f_{GW}), lake water (f_{LW}) and seawater (f_{SW}) in the lagoon top and bottom for dry and wet season; average percentages of evaporation calculated for dry season based on data correction (details given in text).

	dry season				wet season		
	f_{GW}	f_{LW}	f_{SW}	evaporation (%)	f_{GW}	f_{LW}	f_{SW}
Location -TOP							
L01T	-	0.993	0.007	-	0.210	0.780	0.010
L02T	-	0.989	0.011	0.1	0.080	0.915	0.005
L03T	-	0.975	0.025	-	0.265	0.720	0.015

L04T	-	0.913	0.087	-	0.360	0.620	0.020
L05T	-	0.540	0.460	5.3	0.255	0.675	0.070
L06T	-	0.469	0.531	3.3	0.320	0.630	0.050
L07T	-	0.689	0.311	-	0.210	0.775	0.015
L08T	-	0.179	0.821	3.7	0.320	0.640	0.040
L09T	-	0.389	0.611	4.7	0.130	0.835	0.035
L10T	-	0.412	0.588	4.7	0.260	0.730	0.010
L11T	-	0.376	0.624	3.1	0.605	0.290	0.105
L12T	-	0.472	0.528	5.0	0.230	0.665	0.105
L13T	-	0.292	0.708	4.3	0.135	0.790	0.070
L14T	-	0.312	0.688	4.5	0.065	0.825	0.110
L15T	-	0.472	0.528	2.1	0.250	0.665	0.085
L22T	-	0.671	0.329	0.7	0.240	0.745	0.015
L29T	-	0.413	0.587	5.0	0.150	0.840	0.010
L33T	-	0.483	0.517	1.6	0.265	0.720	0.015
Location - BOTTOM							
L01B	-	0.598	0.402	-	0.225	0.765	0.010
L02B	-	0.667	0.333	0.2	0.220	0.775	0.005
L03B	-	0.494	0.506	-	0.235	0.760	0.005
L04B	-	0.198	0.802	1.4	0.425	0.555	0.020
L05B	-	0.075	0.925	1.9	0.200	0.460	0.340
L06B	-	0.365	0.635	2.4	0.250	0.695	0.050
L07B	-	0.126	0.874	1.7	0.355	0.630	0.015
L08B	-	0.000	1.000	-	0.115	0.865	0.020
L09B	-	0.016	0.984	0.8	0.130	0.815	0.060
L10B	-	0.156	0.844	2.9	0.280	0.705	0.015
L11B	-	0.312	0.688	4.8	0.375	0.480	0.145
L12B	-	0.315	0.685	3.6	0.350	0.505	0.145
L13B	-	0.194	0.806	2.6	0.025	0.000	0.975
L14B	-	0.181	0.819	1.4	0.025	0.000	0.975
L15B	-	0.374	0.626	4.2	0.110	0.815	0.075
L22B	-	0.100	0.900	0.8	0.205	0.785	0.010
L29B	-	0.226	0.774	2.7	0.135	0.855	0.010
L33B	-	0.118	0.882	1.5	0.150	0.675	0.175

Additional references:

Bayari, C.D., Kurittas, T., Tezcan, L.: Dynamics of Lake Köycegiz, SW Turkey: An Environmental Isotopic and Hydrogeochemical Study. In: Use of isotope techniques in lake dynamics investigations, IAEA-TECDOC-1206, Vienna, Austria, 73-69, 2001.

Bowen, G.J. and Wilkinson, B.: Spatial distribution of $\delta^{18}O$ in meteoric precipitation. Geology, 30, 315-318, 2002.

Longinelli, A. and Selmo, E.: Isotopic composition of precipitation in Italy: a first overall map. J. Hydrol., 270, 75-88, 2003.

Lykoudis, S. P. and Argiriou, A. A.: Gridded data set of the stable isotopic composition of precipitation over the eastern and central Mediterranean. Journal of Geophysical Research-Atmospheres 112, D18, 2007.

Vreca, P., Bronic, I.K., Horvatincic, N. and Baresic, J.: Isotopic characteristics of precipitation in Slovenia and Croatia: Comparison of continental and maritime stations. J. Hydrol., 330, 457-469, 2006.