Anonymous Referee #1

In general it is an interesting work, showing how environmental tracers can be used for quantifying complex interactions among various water bodies in a coastal Mediterranean area.

➔ We thank Referee #1 for the comments. In detail, we answer to all of these comments below which helped to substantially improve the manuscript.

General comments:
In order to conduct a spatial analysis of the isotopic data, authors should unavoidably present their data on a map through the use of a GIS program.

➔ We can include the data into the map (Figure 1b) if required. We had this idea too before submitting the manuscript but decided against due to several reasons. The information might be too compact and spatial differences not easy to grasp; therefore we decided to present the final results i.e. the freshwater vs. saltwater influence as a function of space (see Figure 5) which is more relevant than data merely. In addition, the isotope data would be presented twice, i.e. in a Figure and in a Table, which would make the manuscript quite lengthy as we prepared other new Figures and text sections of the manuscript. We preferred having the data in the table. Upon request by the editor, we can follow the referee's suggestion and include a map though. What we cannot do is a spatial regression of the isotope data like giving isolines which would be scope of a different study also requiring additional data.

The geological setting (i.e. geological map of the area) as well as the hydrogeological setting (piezometric map) and the conceptual model constitute essential information for the reader to understand the complex interactions taking place in the study area. For example what is the origin of thermal waters? I believe that authors should have based their conclusions on such figures.

➔ We included a Figure presenting the conceptual model of the area for the dry and wet period (see Figure S1). Please note, that we actually found that there is negligible input of groundwater in the dry season, and thus we revised our conceptual model which is thoroughly discussed in the manuscript. Further, we added information about the origin of the geothermal waters, the geology and refer to the geological map which is in detail presented in Bayari et al. (1995). Unfortunately, no additional information from the groundwater bores was available and therefore, a piezometric map cannot be provided.

Modified sections in Chapter 2:
"Köycegiz-Dalyan Coastal Lagoon is located at the southwest of Turkey on the Mediterranean Sea coast within the province of Mugla (Fig. 1a). The geology in this region is mainly composed of allochthonous and authochthounous Flysch and karstic facies overlain by plio-quaternary sediments (Garciansky ,1968). Due to tectonic activities, several faults were formed in this area. Details about the geology and a map can be found in Bayari et al. (1995). The total area of the watershed of Köyceğiz Lake is approximately 830 km^2 and of the lagoon is 130 km^2…."
"…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…."

“….Their environmental isotopic data and chemical data indicate that rainfall and stream flow are low density waters and thermal groundwater is the high density water that controls the mixing dynamics of the lake. The main geothermal inflow at the southern lake coast (Sultaniye Basin) is the Sultaniye spring. It is located at a depth of 8-10 m and about 4 km north-west of the lake exit into the Dalyan channel which is shallow (0-6 m) (Bayari et al., 2001). Complete annual mixing cannot be observed in the lake, and the major factor that controls the stratification is the continuous high density thermal water input to the Sultaniye Basin….”

“…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.”

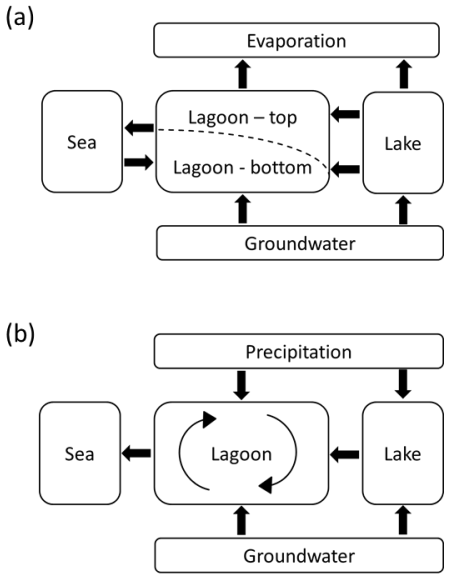

Figure S1: Conceptual model of flow connections between the lagoon and surrounding water bodies for the dry (a) and wet (b) season.

In the introduction section authors state much information that is already known (e.g. lines 27 -32 of page 2). However, they should present the novelties of their work and their contribution to the state of the art regarding their methodology. Environmental tracers are applied in numerous applications. What are the original points of the present application?

- ➔ We mentioned the original points of the present application in the manuscript: "Still, it remains unknown in many lagoon systems what the contribution of different water sources is and how they change not only over time i.e. wet and dry seasons but also over space i.e. both horizontal, spatial locations in the lagoon and vertical, depth locations in the lagoon; the latter is of particular interest in wetland type lagoon systems or lagoons with stratification expecting a not well mixed hydrological systems."
  Thus, the added value of our study is to present an environmental tracer method to identify and quantify temporal dynamics (wet and dry season) and spatial heterogeneities (depth of the water column and distance to coastline) of water sources in a wetland type lagoon system. For clarification these original points were included into the text
  Modified section in Chapter 1:
  "Different sources of water (seawater, groundwater, lake water) were identified at different locations in the lagoon, including top and bottom water column depths, for wet and dry season. Thus, the novelty of this study is to present an environmental tracer method identifying and quantifying temporal dynamics (wet and dry season) and spatial heterogeneities (depth of the water column and distance to coastline) of water sources in a wetland type lagoon system. With improved, detailed understanding of heterogeneous and dynamic hydrological processes in groundwater dependent lagoon ecosystems, targeted strategies to better manage may be developed…."

Specific comments
Page 4, line 24: A mean annual precipitation of 1083mm for the specified area seems too high. What data and what was the time period used for extracting this mean value?

- ➔ On first glance, this value seems high for a warm and mainly dry region like Turkey. Nevertheless, these reported values are long-term averages which were taken in the study area from the State Meteorology Services of Turkish Republic for Köycegiz Meteorology Station covering the period 1976-2010. This value is also in agreement with the previous study in this area reporting 1202 mm (Bayari et al., (1995) and with the data provided by the IAEA together with isotope data in precipitation of Antalya (1111 mm). We included monthly precipitation data in a new Figure (see Figure S2 given below).

Page 5, line 5: Are there thermal waters present in the system? If this is so a fourth end member, i.e., thermal water should have been also examined. Please explain.

- ➔ (see new Chapter on conceptual model); as presented in Bayari et al. (1995; 2001) there are several geothermal springs in the lake area. However, these waters mainly are influencing the bottom part of the lake. On top and connected to the outflow of the lagoon is freshwater only as the layers in the lake are not well mixed. We clarified this in chapter 2.1 and the newly introduced chapter presenting the conceptual model.
  Modified sections in the text:
  "….Their environmental isotopic data and chemical data indicate that rainfall and stream flow are low density waters and thermal groundwater is the high density water

that controls the mixing dynamics of the lake. The main geothermal inflow at the southern lake coast (Sultaniye) is the Sultaniye spring. It is located at a depth of 8-10 m and about 4 km north-west of the lake exit into the Dalyan channel which is shallow (0-6 m) (Bayari et al., 2001). Complete annual mixing cannot be observed in the lake, and the major factor that controls the stratification is the continuous high density thermal water input to the Sultaniye Basin…."
"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 northwards. Still, other unknown geothermal springs in the lagoon cannot be excluded."

Page 5,
line 29: Where has the LMWL been estimated from? Was it a previous work?

➔ We wrote that the data were taken from the IAEA and that we calculated the LMWL based on the closest location in this database, i.e. Antalya. We restructured this part of the manuscript indicating in more detail, where these data were taken from. Further we included a new Figure according to the comment of Referee#2
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."

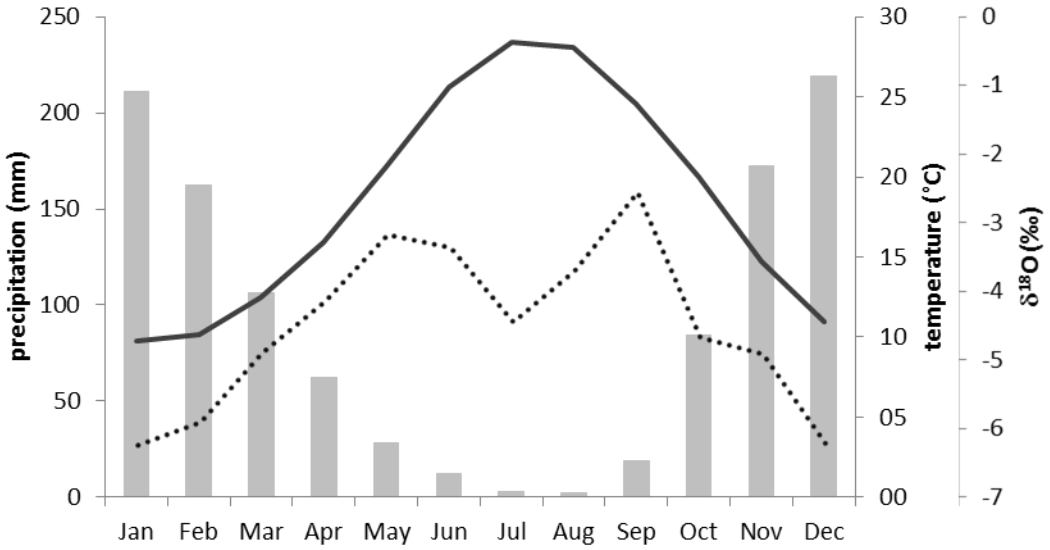

Figure S2: Long-term monthly data of average precipitation (grey bars) and air temperature (solid line) from Köycegiz meteorology station (1976-2010) and isotopic composition of precipitation in Antalya (dashed line). Data from Antalya are available at the IAEA database WISER (http://www-naweb.iaea.org/napc/ih/index.html;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

Additional references:

Graciansky, P.C.: Stratigraphy of the overlapped units of the Lycien Nappes in the Teke Peninsula and their position within the Dinaro-Taurids. Bull. Miner. Res. Explor. Inst., Ankara, Turkey, 71, 73-92, 1968.

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.