

**General**

The authors are thanked for their paper which provided an interesting view on modelling Karst processes. The methodology and results are well described and of interest. However, I detail a number of changes below and my concerns are as follows:

- Definition of what geographical area the paper covers. The title says “Europe” but Figure 2 suggests the inclusion of Western Asia, North Africa and the Middle East. Greater clarity as to the geographical zone covered would be appreciated.
- Following on from the above point, given the areal extent of the study, the recharge modelling results culled from the literature is rather limited. A quick literature review of the results of recharge modelling in Carbonate aquifers reveals a number of papers:
  - Vilhar, U., Starr, M., Katzensteiner, K., Simončič, P., Kajfež-Bogataj, L., & Diaci, J. (2010). Modelling drainage fluxes in managed and natural forests in the Dinaric karst: a model comparison study. *European journal of forest research*, 129(4), 729-740.
  - Vita, P. D., Allocca, V., Manna, F., & Fabbrocino, S. (2012). Coupled decadal variability of the North Atlantic Oscillation, regional rainfall and karst spring discharges in the Campania region (southern Italy). *Hydrology and Earth System Sciences*, 16(5), 1389-1399.
  - Fleury, P., Plagnes, V., & Bakalowicz, M. (2007). Modelling of the functioning of karst aquifers with a reservoir model: Application to Fontaine de Vaucluse (South of France). *Journal of Hydrology*, 345(1), 38-49.
  - Hughes, A. G., Mansour, M. M., & Robins, N. S. (2008). Evaluation of distributed recharge in an upland semi-arid karst system: the West Bank Mountain Aquifer, Middle East. *Hydrogeology Journal*, 16(5), 845-854.
  - Bakalowicz, M., El Hakim, M., & El-Hajj, A. (2008). Karst groundwater resources in the countries of eastern Mediterranean: the example of Lebanon. *Environmental geology*, 54(3), 597-604.
  - Bakalowicz, M. I. C. H. E. L., & Mangion, J. O. H. N. (2003). The limestone aquifers of Malta: their recharge conditions from isotope and chemical surveys. *International Association of Hydrological Sciences, Publication*, (278), 49-54.

These are just a selection and demonstrate that the Table 3 is somewhat limited.

Additionally the UK examples are from a very large scale study by Arnell and would benefit again from a more detailed study of the literature.

- The reader is rather rushed into the main part of the paper, and detailed comments are provided below on the introduction. However, it is strongly suggested that to provide a proper context for the equations in Section 2.1 then a basic explanation of the main features of a karst system is provided.
- How is river discharge used to calibrate the model? It is mentioned at the start of the paper (line 7, pg 7890), but not addressed. Given the lack of runoff in Karst regions, can this be used as calibration parameter?



## Specific

Page	Line	Comment
7888	24	Change “regions constitute” to “regions only constitute”
7888	25	Change “yet up to 50%” to “yet contribute up to 50%”
7889	1-3	Add in sentence before “Climate simulations....(Christensen et al., 2007)”to introduce topic
7889	5	Add explanation of impact after “can be expected”
7889	5-6	Clarify size of regional models as in groundwater modelling the scale is 1000-10000 km <sup>2</sup>
7889	8	Change “predictions derive” to “predictions should derive”
7889	11	Change “presently available” to “Currently available”
7889	19	Add description of scientific discourse after “scientific discourse”
7889	28	“a priori” to be italicised (Latin not English) – same for “posterior” elsewhere
7890	1	Change “dynamics prohibited” to “dynamics have prohibited”
7890	7	Change “and river discharge” to “as well as river discharge”
7890	14	“vertical recharge” this not a regularly used term within the literature, so would benefit from a better explanation or use “actual recharge” is you mean the recharge that reaches the water table
7894	1	Charge “from FLUXNET” to “from the FLUXNET observation network”
7895	1	Change “clusteranalysis” to “cluster analysis”
7896	4	Change “trial-and-error reducing the initial sample” to “trial-and-error which reduced the initial sample”
7898	22	Change “medium range mountains show” to “medium range mountains (MED) show”
7898	23	Change “Desert hills and plains are” to “Desert hills and plains (DES) are”
7899	3	Add an explanation as to Greece and Turkey have both HUM and DES in close proximity; something like “Where mountainous regions are in close proximity to the coast”
7900	10	Northern Africa isn’t in Europe (see general comments above and title of the paper)
7902	18	Remove “as”
7902	19	Change “Transitions” to “Typically transitions”
7902	19	Remove “rather”
7902	21	Change “transient,” to “graded”
7902	28	Change “the correlation” to “the order of the correlation”
7903	1	Remove “in their order”
7903	2	Change “the other order” to “the alternative order”
7903	3	Change “indicating similar” to “indicating the similar”
7904	21	Change “recharge volumes” to “recharge rates”
7904	24	Is it Northern UK or Northern England (as in line 9 pg 7900)? This difference is important to Scottish readers!
7905	19	Change “content of the” to “contained in the”
7906	22-23	Two uses of the word “additional” in the same sentence – choose another
7906	26	Change “distribution parameter” to “parameter distribution”
7907	3	Change “elaborates” to “elaborate”
7907	5	Change “this study” to “this paper”
7907	16	Change “does not exist” to “is not generated”
7907	19	Change “therefore” to “subsequently”

7908	3	Change “contribute” to “consists of”
7908	7	Change “present” to “current”
7908	11	Change “over-estimation” to “over-estimation of recharge”
7908	12	Change “financial resources excessive investments into drinking water” to “financial resources the excessive investment in ensuring the security of drinking water supply”
7908	16	Change “we presented” to “we have presented”
7908	24	Change “present” to “current”
7909	8	Change “prone” to “liable”
7909	14	Change “than the inflow and pumping” to “than just the inflow. Further pumping”
7909	19	Change “Strub from the Chair of Hydrology” to “Strub, Professor of Hydrology”