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Biogeosciences Discussions

Interactive comment on "Denitrification and inference of nitrogen sources in the karstic Floridan Aquifer" *by* J. B. Heffernan et al.

Anonymous Referee #2

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This manuscript is an interesting paper that addresses denitrification in karst aquifers. It has a wide meaning because denitrification in karst aquifers is not well studied. It is often assumed that no denitrification is likely. The authors use a sophisticated approach to characterise denitrification. They show that little but relevant denitrification happens. I have several major comments and a series of minor comments, which I ask to be considered in the revision of the manuscript.

First, the authors should point out that NO3 contamination is actually low when compared with the drinking water standard of 50 mg NO3/L and common agricultural pollution up to several hunderds of mg NO3/L across the world. This is not pointed out in any way. The way in which the authors come to the regional picture is not fully clear and actually underexplored. I would like to see a more specific mass balance of input

and discharge at the springs.

Second, section 2.5 does not belong to METHODS. Please carefully split the text into two parts where a part remains under METHODS and the rest goes to RESULTS. Similarly, the first part of section 4.4 (589-626) is summarising and can be rigorously shortened and combined with CONCLUSIONS. Lines 627-644 belong to section 4.1.

Third, the remark at l.340-342 is crucial. What is the implication of the simplification at the regional scale. I expect full denitrification for these samples, so how can you deal with this? Similarly, what can be said about land use in the Ichetucknee springshed (l. 350-352). This information must exist.

Minor comments l.14-17: omit l.77 and further. Bring in pyrite in the discussion besides organic matter l.88-90: meaning unclear to me l.104: counfounded ?? l.141: "sometimes subsaturated in mineral chemistry" is very unscientifically phrased. Do you expect that groundwater is saturated with all minerals of the world? l.186 and else: time series instead of times series? l.202-203: what's the difference between an observation and a total observation? l.248-251: argue why l.255: meaning of for each observation air?? l.257+258: define [Ne]obs and [Ar]obs as well l.269-270: wrong sentence l.291: meaning of concentration predicted by physical processes l.320: what is cross-system analysis? l.416: confusing that the ratio is expressed in the opposite way as in the figure. l.422: Fig 98c –> 9c l.427: Fig 9ef –> 9e,f l.435: put "In springs with low dissolved O2" after "processes" in l.436 l.476: meaning of low power in our data? l.512-514. This is stated too general. It all depends on the scale of reaction capacity heterogeneity versus scale of hydrogeological system. Please comment as such. l.553: a standard deviation of 0.32 mg N/L seems to me erroneous when average is 0.003. Or discuss the occurrence of outliers and extremes. l.575-l.580 please, be more quantitatiive here. Big springs are also big discharge points, so how do they contribute to the overall discharge? To me it is logical that smalll springs can be neglected. Comment on this. l.586-587: vague and how does it compare to the earlier remark that the overall N-load is not high from international perspective. l.647: never use subjective

words as surprising in a scientific paper l.654: add Upper in front of Floridan l.678: incomplete or erroneous reference l.782-783 (and else): please add a report number or so figure captions 5,7,8,9: be consistent in using abc versus ABC and putting them in front of or behind the relevant text

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Interactive comment on Biogeosciences Discuss., 8, 10247, 2011.