Referee 1 (R1)	Comments from referee	Author's response	Author's change in manuscript
R1-1	However after reading the manuscript I'm left with the feeling: "What to do with all this data?". The authors provide no outlook to how this data can be used to down-scale legislation to the field scale. I would appreciate if the authors could provide/speculate on this outlook more. Is it based on these measurements, in their opinion, possible to downscale legislation to the field-site?	The reviewer has a point. How the outcome of this study can be used in future legislation and as an initial guideline for whether it is possible to N regulate at field-scale or regional-scale needs to be described clearly. We will revise the manuscript to address these important issues and additionally include new data presented in the attached in Table X1 and X2, and Supplementary data, Fig. SX.	The revised manuscript will include the following: ***Abstract and final part of Introduction*** will address these issues more clearly. ***Paragraph 2.1:*** The three fields were selected to cover different types of clayey geology and climate (primarily expressed by the amount of annual precipitation). The three study sites are representative for about 71% of the clayey areas in Denmark (Faardrup: 30 %, Silstrup: 30%, and Estrup 11%). ***Paragraph 3.1:*** A discussion of the daily average air temperatures (5 °C for "biological zero", 10 °C, and 15 °C) at the time for drainage will be added. The data are presented in Table 5 and show that 49 %, 56 %, and 58 % of the drainage at Faardrup, Silstrup, and Estrup, respectively, took place at daily average temperatures above 5 °C. The corresponding data for 10 °C is 16 %, 12 %, and 22 %. ***Paragraph 3.2:*** A discussion of the number of days within the period 2001-2011 with drainage larger than 0 mm d^{-1} (Table 5) will be added. This number is 86, 88, and 243 days $year^{-1}$ at Faardrup, Silstrup and Estrup, respectively. ***Paragraph 5:*** The long-term simultaneous monitoring of many different parameters related to the inherent physical appearance of the fields (e.g., soil type, geology, precipitation, temperature and drainage) and the management of the fields (e.g., crop type, type of N fertilisers, agricultural practices) confirm that the three fields are different in terms of future water management. These data confirm that the outcome of on-field or out-of-field ("end of pipe", e.g. wetland and constructed wetland) actions may be different in fields of different hydrogeological settings and

			climatic conditions and we propose a regional conceptual model with three water management scenarios: *The Faardrup type* with low net precipitation, high concentration of nitrate, short-term intensity drainage at air temperatures often below 5 °C. The concentration of nitrate should be regulated on-field by the selection of crop type and introduction of catch crops. Low reduction of nitrate out-of-field in wetland/constructed wetlands due to low temperature drainage. *The Silstrup type* with medium net precipitation, medium concentration of nitrate, short-term high intensity drainage at air temperatures often above 5 °C. The concentration of nitrate should be regulated on-field by selection of crop type and introduction of catch crops. Medium reduction of nitrate out-of-field in wetland/constructed wetlands. *The Estrup type* with high net precipitation, low concentration of nitrate, long-term high intensity drainage at air temperatures above 5 °C. The concentration of nitrate may be regulated on-field by selection of crop type and introduction of catch crops. Large reduction of nitrate out-of-field in wetland/constructed wetlands. The scenarios cover 71 % of the areas of Denmark dominated by clay. The remaining 29 % needs to be elaborated in the future.
R1-2	Or is the variability too large and too complex to come up with sensible field scale target values for N (could we ever make a model that produces sensible/realistic target values ?)	As mentioned in R1-1 the proposed three scenarios has an application on regional level, and may only be applicable at field scale in areas with very homogeneous clayey geological settings corresponding to the three scenarios. More monitoring data will be needed before a field scale regulation on more complex geological settings	***Paragraph 4 and 5:*** Here the issue regarding variability and representability will be discussed.

		will be possible. For now water management on catchment level seems possible.	
R1-3	And how would these target values look like? One annual value for flux or average concentration, or even seasonal values for flux and concentrations?	Future regulation on field scale calls for more intensive target oriented monitoring with high resolution data (on e.g., drainage days, - intensities, and temperatures) to improve the understanding of the nitrate-dynamic and to apply the most cost-benefit combination of "on-field"/"out-field" reduction of nitrate in the drainage.	***Paragraph 4 and 5:*** A short paragraph on the data needed for optimizing the N reduction in the future via "on-field" and "out-of-field" regulation will be given.
R1-4	What are alternatives?	To continue with the national regulation of nitrate without using the regulation tools and taking the advantage of the obvious tool that has been pointed out in this project.	***Paragraph 4 and 5:*** A discussion of alternatives will be addressed in these two paragraphs taken outset in the Introduction.
R1-5	If you put Nitrate leaching data in the abstract I would uses kg N ha^{-1} $Year^{-1}$. This unit can more easily be compared to other sites	The N leaching in the abstract and annual leaching elsewhere in the manuscript has been calculated as kg N ha^{-1} ha $Year^{-1}$	Annual leaching data will be expressed as kg N ha^{-1} yr^{-1}
R1-6	I don't understand line 17 Input had short-term and low intensity drainage?	We do agree that the sentence is meaningless as long as "and fertiliser input" has not been deleted. Short term indicates that the drainage occurred for only short time and low intensity indicates that the run off was low (few mm ha^{-1} d^{-1})	Delete "and fertiliser input"
R1-7	Page 641 Line 16: outcome of what?	The word outcome is not right here and the sentence will be rewritten	The agriculture , however, has been identified as a large contributor to nitrate-pollution of surface water and groundwater

R1-8	Page 647 You don't report the days with drainage and days with groundwater lower than 2.5m for Faardrup. It is nicer to keep the same format/data for each site.	We do agree that the same format/data would be preferable but we did not obtain daily measurements of the ground water table at Faardrup, unlike measurements at the two other sites: Silstrup and Estrup. Besides, the ground water level often drops below the maximum level for registration of the ground water table, which also makes the calculations impossible.	No changes will be done in the text.
R1-9	Page 654 line 23 d?	Letters are missing and will be added	d will be changed into days
R1-10	Page 654 line 25: if you report annual values I think it is best to also use units $year^{-1}$ to prevent misunderstanding. This throughout your manuscript, figure and tables. I sometimes struggled to find out if fluxes where per year of for the entire period.	We agree	We will add $year^{-1}$ where needed in text, figures, and tables to avoid misunderstandings.
R1-11	Recommended references: Rozemeijer, JC., Y Van der Velde, FC Van Geer, MFP Bierkens, HP Broers 2010. Direct measurements of the tile drain and groundwater flow route contributions to surface water contamination: From field-scale concentration patterns in groundwater to	Thank you for the information about the two references. Both papers describe important elements in the field site – catchment assessment for the future water management. We appreciate the contribution to the discussion of the possible scale for future N regulation.	We will include the two papers in the introduction and discussion where ever it is appropriate in the discussion of scale for the regulation of the supply of N fertilisers.

	catchment-scale surface water quality. Environmental Pollution, 158: 3571-3579 Van der Velde, Y., JC Rozemeijer, GH de Rooij, FC van Geer, HP Broers, 2010. Fieldscale measurements for separation of catchment drainage into flow route contributions. Vadose Zone Journal, 9:25-35		