

## ***Interactive comment on “Tracing the spatial propagation of river inlet water into an agricultural polder area using anthropogenic gadolinium” by J. Rozemeijer et al.***

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Thanks for your suggestions to improve the manuscript. In response to your suggestions 1-5: (1) We will rewrite the discussion and add a discussion on the magnitude (and significance) of the differences and the implications and a comparison with results from the literature.

(2) We agree that the first part (P. 1423, lines 5-24) is a too long summary of the results. In the revised discussion, we reduced this section to 2 sentences to summarize our main results (which is a common opening of the discussion section): “In this study, we

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obtained a spatial image of the propagation of diverted river water into a hydrologically complex polder system during dry and wet conditions. We applied this information for the interpretation of chemical water quality monitoring data and for the evaluation of an integrated water and solute transport model.”

(3) We added the full normalized REE patterns in the supplementary information.

(4) We added the following to the methods section: “Rabiet et al. (2009) considered Gd-anomalies lower than 1.4 uncontaminated by anthropogenic sources, as Gd-anomalies up to 1.3 have been found in natural waters. In WWTP’s, Gd-anomalies up to 1680 have been reported in literature (Bau and Dulski, 1996). In rivers, Gd-anomalies may vary in time and space and depend on the number of MRI patients and on the contribution of effluent from WWTP’s to the total discharge. For the German rivers Weser, Ems, and Elbe, Kulaksiz and Bau (2007) reported Gd anomalies around 5.”

(5) We agree that the modeling was not accurately described in the paper. The focus of the paper was on the tracer method and, therefore, we preferred to keep the model description very short and to rely on the references to online available reports. We added supplementary information on the modeling methods. We added a reference to this supplement in the main text of the revised paper.

Page 142 line 24: Thanks for checking. We replaced this reference with (Roelofs, 1991).

Page 1412-1415: We agree that the introduction is rather long. We reduced the introduction from 1100 to 775 words.

Page 1413 line 13: We added Van Vliet & Zwolsman to the reference list.

Page 1418 line 25: See our response to suggestion (4) above.

Page 1419 lines 21-28: We reached sufficient accuracy for the REE that were needed for calculating the Gd-anomalies (Sm, Tb, and Gd) with the presented

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setup. Pre-concentration would have been much more labor-intensive and expensive. We changed the text into: “This setup enabled accurate measurements (with a reproducibility limit of ca. 10%) without the frequently applied labor-intensive pre-concentration procedure.”

Page 1420 lines 7-21: See our response to suggestion (4) above. We did not present the full REE profiles because only the Gd-anomalies were needed to reach our objectives. In the revised paper we added the full normalized REE patterns to the supplementary information.

Page 1421 lines 14-22: A comparison with (variability of) Gd-anomalies reported in the literature is added to a rewritten discussion section.

Page 1422 lines 4-14: In the rewritten discussion section we added more explanation/interpretation on the differences. We changed the notation to NO<sub>3</sub>-N throughout the paper to avoid misunderstanding.

Section 3: We added supplementary information on the modeling methods. We added a reference to this supplement in the main text.(see our response to comment (5). The modeled proportions are not based on the snapshot sampling, but on labeling the source within the model. We used a transient model and the travel times are accounted for. For comparison to the Gd sampling results we only presented the modeled proportions for the two sampling dates.

Figure 2: Done as suggested

Figure 3: We enlarged the labels.

References: Thanks again for checking this. We removed these references.

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