

# ***Interactive comment on “tran-SAS v1.0: a numerical model to compute catchment-scale hydrologic transport using StorAge Selection functions” by Paolo Benettin and Enrico Bertuzzo***

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We thank referee 1 for his/her positive assessment of the paper. We agree with the useful comments on reactive transport:

*On p10, l2-3 a catchment with legacy agricultural inputs is put forward as an example of a diluting system such as that simulated here with a synthetic dataset. I don't think that's correct because agricultural inputs are subject to reactive transport, not just dilution, which is not implemented in this code. Please come up with a better example.*

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*On p15, l25-26 the authors claim that reactive transport can be easily implemented. I would question this general statement as especially agricultural solute transport can be quite complex as dissolution, precipitation and re-mobilisation as well as spatial variables (e.g. temperature) matter greatly. Please limit this statement to "simple" reactive transport.*

Indeed, the transport of agricultural solutes (particularly nitrate and phosphorus) is far more complex than a simple dilution and we do not want to convey the idea that a conservative transport model is appropriate in those situations. Agricultural inputs were mentioned just as an example of input that, due to regulation, can undergo rather drastic reductions. We will be more specific, mentioning more conservative solutes like chloride, that can have an agricultural origin (see e.g. van der Velde et al., 2010 and Martin et al., 2004) and a substantially simpler biogeochemical cycling.

#### REFERENCES:

van der Velde, Y., de Rooij, G. H., Rozemeijer, J. C., van Geer, F. C., Broers, H. P. (2010). Nitrate response of a lowland catchment: On the relation between stream concentration and travel time distribution dynamics. *Water Resources Research*, 46(11). <https://doi.org/10.1029/2010WR009105>

Martin, C., Aquilina, L., Gascuel-Oudou, C., Molénat, J., Faucheux, M. and Ruiz, L. (2004), Seasonal and interannual variations of nitrate and chloride in stream waters related to spatial and temporal patterns of groundwater concentrations in agricultural catchments. *Hydrol. Process.*, 18: 1237–1254. <https://doi.org/10.1002/hyp.1395>

Interactive comment on Geosci. Model Dev. Discuss., <https://doi.org/10.5194/gmd-2017-305>, 2018.

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