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Interactive comment on "Eutrophication mitigation in rivers: 30 years of trends and seasonality changes in biogeochemistry of the Loire River (1980–2012)" *by* C. Minaudo et al.

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The paper presents 30 years of trends in nutrients and algae (pigments) as well as spatial patterns in pressures for the Loire River in France. It's a unique dataset, which clearly shows the correlations in space and time between water status and pressures (Fig. 2 is excellent!).

The topic is of interest for Biogeosciences readers and the paper is very well written, presented and structured. After reviewing the paper, I strongly support its final publication in Biogeosciences.

Some minor suggestions on how to further improve the paper follows. Please, consider

to:

1) Insert “spatial patterns” in the title as this is a substantial part of your analysis.(e.g. “Eutrophication mitigation in rivers: 30 years of trends in spatial and seasonal patterns of biogeochemistry in the Loire River (1980–2012)”

2) Indicate significance (bold numbers?) of slope trends in Tables 3-4 and the method for calculating this significance in Section 3.3.

3) Discuss the impact of Climate Change on diffuse nitrogen leaching from arable land in the Discussion section 5.1 as a potential driver to the trends, see Comment below.

4) Discuss the potential influence of the constructed dams in the river network and how they may affect the nutrients/algal concentrations on downstream locations.

5) Extend the list of European river on page 17300 row 25, by adding a reference to reduced nitrogen concentrations in Swedish rivers (Grimvall et al. 2014, see below).

6) Insert reference to another very early model study on changes in nutrient concentration due to climate change among the other references on page 17301 row 6 (Arheimer et al., 2005; see below).

Comments and Points for Discussion:

i) Page 17314, row 25 and forward: It is interesting that the nitrate is increasing over time from arable land. Could this, in addition to intensified agriculture and lack of implementation of the nitrate directive, also be an effect of higher mineralization of organic matter in the arable soils, due to increased temperature over time? Please, see for instance modelling work on climate change impact on nitrogen leaching by Arheimer et al., 2005.

ii) The importance of constructed dams are mentioned in ‘Introduction’ and ‘Study area and data compilation’ but then it is not commented in in ‘Results’ or ‘Discussion’ sections (what I could notice). If I am right, I think it is worthwhile to mention If OR If Not

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they could have had any major influence on the trends/changes in biochemistry or lack of such trends (smoothing out the results?).

iii) On drivers: a recent Swedish study of 45 rivers show that downward trends in nitrogen were due to mitigation measures in agriculture during the last decades. Please, find reference below! (Grimvall et al., 2014). Such findings from elsewhere than Loire River could be further elaborated on in the Discussion section.

References:

Arheimer, B., Andréasson, J., Fogelberg, S., Johnsson, H., Pers, C.B. and Persson, K. (2005). Climate change impact on water quality: model results from southern Sweden. Ambio 34(7):559-566

Grimvall, A., von Brömssen, C. and Lindström, G. (2014). Using process-based models to filter out natural variability in observed concentrations of nitrogen and phosphorus in river water. Environmental Monitoring and Assessment, 186:5135-5152. doi: 10.1007/s10661-014-3765-y

Please also note the supplement to this comment:
http://www.biogeosciences-discuss.net/11/C8833/2015/bgd-11-C8833-2015-supplement.pdf

Interactive comment on Biogeosciences Discuss., 11, 17299, 2014.