Hydrol. Earth Syst. Sci. Discuss., 11, C5569–C5571, 2014
www.hydrol-earth-syst-sci-discuss.net/11/C5569/2014/
© Author(s) 2014. This work is distributed under
the Creative Commons Attribute 3.0 License.

Hydrology and Earth System Sciences
Discussions

Interactive comment on "Natural stochasticity vs. management effort: use of year-to-year variance for disentangling significance of two mutually confounding factors affecting water quality of a Norwegian cold dimictic lake" *by* A. T. Romarheim et al.

Anonymous Referee #2

Received and published: 9 December 2014

Using a combination of modelling and statistics, the authors aim at disentangling the responses of a lake to metrological forcings and several runoff variables. This study elaborates on the effects of natural year-to-year variation on ecosystem state, which is timely and relevant for ecosystem management. In general the paper is synoptic and well written. Nevertheless, I do have several comments that should be considered before publication in HESS. I used line numbers of the printer-friendly pdf version to

refer to certain sentences.

Major:

In the abstract and at the beginning of the introduction it is stated explicitly that natural stochasticity may obscure the effectiveness of management efforts, and that this is considered a problem. Although this study does a good job in showing the relative importance of year-to-year variation of different forcings for lake water quality, it does not show the importance of these forcings in relation to management efforts. In order not to set false expectations, the authors should be more straightforward in describing in de introduction how the aim of this paper contributes to disentangling between variation and management effort. Currently most attention in the paper goes to linking specific forcings to certain lake responses, and although this reveals some interesting insights, most of these relations are quite obvious.

Although the results of the calibration procedure look very convincing, and validation is given for different depths, it is a pity that the authors show no validation in time. As the paper deals with year-to-year variation, one would like to see proof that the model does a good job in predicting the year-to-year variations. It would be good if the authors could show some validation using an independent dataset.

P12496 L6 Six scenarios are presented, and also in table 3 (A, B, C, D, Dt and Dp). However, nowhere in de manuscript I can trace back the results of scenarios Dt and Dp. This is a pity because such scenarios could provide information about the importance of individual forcings, rather than studying the effect a whole group of forcings. Please include the results of scenarios Dt and Dp, or change the text and the table at least.

Table 3: The 'runoff inputs' include more than only nutrient loading e.g. also suspended matter and inflow water temperature, while it is explicitly stated in the introduction that the aim of the paper is to differentiate between meteorological forcing and nutrient loading. I miss an explicit motivation for taking a group of runoff inputs (thereby obscuring the effect of nutrient loading alone), and an explanation why specifically these runoff

inputs were chosen. For example, why was nitrogen not considered, and what is the consequence of including air temperature in the meteorological group, and including inflow water temperature in the loading group. In other words, what is the influence of the choices that were made regarding the grouping on the outcome of this study?

Minor:

I think the title does not cover the aim of the manuscript: Management is now prominently mentioned in the title, whereas the manuscript itself only addresses management effort indirectly. I also think a shorter title would be better. I suggest something like: “The importance of year-to-year variation of meteorological and runoff forcings for water quality of a cold dimictic lake”

The abstract is generally well written. The statement in lines 12-13, that the study revealed many scientifically and managerially relevant understandings, can be debated however as some of the examples that are mentioned subsequently are not very surprising, such as that thermal related properties in the lake are determined by weather conditions, and that nutrient loading is important for phytoplankton biomass.

1: P12491 L10: Here it is postulated that two factors affect nutrient loading to lakes (1) soil and land use in the catchment and (2) the hydrology of the watershed. I would argue that sewage treatment is also very important, as sewage treatments have traditionally been an important cause of eutrophication, which is also stated by the authors at P12492 L13

2.4: Please present the default/apriori parameter values/ranges of the MyLake model in Table 2

2.6: Please describe which software was used to do the statistics. It would be good to present the F-value of the Anova.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 11, 12489, 2014.