

Interactive comment on “Heterogeneity of soil carbon pools and fluxes in a channelized and a restored floodplain section (Thur River, Switzerland)” by E. Samaritani et al.

Anonymous Referee #2

Received and published: 23 March 2011

General comments:

The paper presented addresses an important and interesting aspect in context with restoration of riverine landscapes, soil carbon pools and carbon fluxes in relation to restoration measures, land use and vegetation pattern. The case study of the River Thur is used to compare a restored stretch and a channelized section. The restored site developed already for several years, thus the selected time period seem appropriate for performing the research on carbon dynamics. The main aim of this study links nicely to a larger discussion on how important inland waters might be for the global carbon balance and secondly, what are implications of management measures taken?

C611

The approach and the basic idea are well developed and the research design as well as the methods used are state of the art and described in a satisfactory way. The statistical design is adequate and the presentation of the results is well balanced. The number of samples taken, the seasonal sampling is reasonable and guarantee a solid data base for the interpretations. It might be of advantage for the discussion to make clear how vegetation pattern and hydrological characteristics are interlinked and how important the vegetation pattern might be for the soil carbon pools in each specific functional process zone.

The paper has a clear and logic structure, builds up following a clear idea and deserves an international audience based on publication in HESS. I have added some comments, which might be beneficial for publication and thus, I recommend some minor revisions before acceptance and publication.

Specific comments:

I would appreciate to get some more details of the FPZ in the introduction. The definition is based on the manuscript by Thorp et al, but used here in a bit different spatial context. Thus, a bit more explanation already in the intro might be beneficial. In the method section it would be of advantage to give clear descriptions for the variables (topography, flooding frequency while vegetation is defined) used and the classes for each FPZs. For the willow bush FPZ it might be good to point out, if the selected sites are mainly sites with planted willows or recently established willow vegetation.

Although there is a detailed description on the objectives, the reader would appreciate to see hypotheses to be tested in the research. This is missing.

Some more details and hydrological characteristics to the FPZ sampled would be good. In fig.2 the thresholds for connectivity were presented, still a short table summarizing mean frequency and mean duration of connectivity events for each site would provide a good overview. These values should be based on a longer time series, which seem to be available.

C612

I also suggest adding in the method section a short paragraph which hydrological variables have been measured and estimated for the sites and used in the following data analyses.

In the first paragraph of the discussion the effects of flood disturbance are highlighted – there are two aspects to be discussed. Firstly, vegetation is not mentioned, which seem to have a quite strong effect as well, is this right? If so, I would suggest to include the role of vegetation clearly in the discussion, if not in the analyses as well. Secondly, I would not describe flooding here as disturbance, it is more a driving force controlling the structural development.

The discussion is well structured and addresses almost all main points, still I am wondering what is about the ecosystem services mentioned in the introduction and the link to restoration measures. I would welcome to add some text on what are important aspects for a restoration design addressing the heterogeneity of soil carbon pools, thinking in the line of controlled versus uncontrolled flooding for example.

The last statement of your conclusions sound convincing, but what are the needed measures or better - design criteria to achieve this? Furthermore, what is the minimum of space needed to develop a necessary gradient for heterogeneity?

Technical corrections:

Page 2, line 33: the link between the 2 sentences is not completely clear and not easy to follow. Please add a sentence to make the logic link from environmental policy to organic carbon dynamics.

Page 5, line 117 – 118: please specify the ecosystem services related, not clear here.

Page 8, line 198 – 199: please use the chemical formula (H_2O_2) or the name of the compound.

Page 18 line 505: the conclusion that short term inundation is an important driver for microbial habitat structure might need some more explanation – based on what

C613

parameters and patterns you derive to this statement?

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 8, 1059, 2011.