

Interactive comment on “Hydroclimatic control of sediment and metal export from a rural catchment in Northwest Spain” by L. Palleiro et al.

Anonymous Referee #1

Received and published: 14 May 2014

General comments:

The manuscript by Palleiro et al. presents field data on sediment and metal export from a rural catchment over a period of 3 years. Generally, the presented field-based approach is sound and the manuscript is written fairly well. The manuscript lacks, however, a more thorough discussion including all available data. In particular, chapter 4.5 needs some more in-depth discussion and could thus considerably increase the value of this scientific contribution and, finally, answer the question for the “hydroclimatic controls of sediment and metal export”.

Some of the main findings, e.g. that particulate metal loads are driven by runoff events and that sediment transport is variable over time, are maybe of only little novelty. The

C1398

strength of this study is the comprehensive data base of 50 sampled discharge events along with meteorologic and hydrologic data over a period of 3 years. However, I have the impression that the potential of this data pool is not fully exploited. For instance, Tables 4 and 5 provide important information on statistical relationships that should be complemented by a process-based discussion of the causal connections. This is not done although the hydrometeorological and hydrochemical data series should provide loads of process information.

Is it possible to distinguish origins of metals or the involved runoff generation processes?

What is the role of the antecedent conditions? These data are shown but not really used for a thorough interpretation.

Do any information on organic carbon contents of the suspended matter exist? It is not clear if the particulate transport of metals occurs sorbed e.g. to organic matter or as part of the minerals themselves.

Specific comments:

p. 3758, l. 9: I do not understand these numbers: If 38 % of the total metal load was transported particle-bound, then 62 % should be transported in dissolved form. However, the range of the dissolved fraction is only up to 49 %.

p. 3759, l. 4: How do runoff processes contribute to metal pollution? Do you mean dissolution of metal-bearing minerals?

Section “2 Study area”: Since runoff events are decisive for metal transport you should give some information about hydrological characteristics, e.g. mean discharge, frequency and magnitude of flood events.

p. 3761, l. 20: At which distance from the river bed was the inlet of the automatic sampler tubing?

C1399

- p. 3762, l. 25: How many samples were collected in total?
- p. 3765, l. 9: Were dissolved LOADS or CONCENTRATIONS high at low discharge? I can imagine that concentrations decrease when Q increases but loads should always increase with Q.
- p. 3765, l. 24 ff.: Comparisons with adjacent catchments are reasonable, but the value of comparisons of loads from catchments with different geologies and climates is limited unless you do explicitly focus on the different geochemical settings and processes.
- p. 3767, l. 23: Is there any indication for the transfer of Zn to the soluble phase? I did not find an explanation in the cited reference as well.
- p. 3768, l. 10-13: This sentence is unclear – please reword. Which kind of runoff processes favor Zn transport? Surface runoff?
- Figure 4: Are the events shown chronologically or ordered by any variable, e.g. sediment load? This has to be explained somewhere.
- p. 3769, l. 10-12: Does the hydrological data give any indication that different particles were transported compared to other events? Or is it possible that particles and metals came from another source / another runoff component?
- p. 3770, l. 17: "...efficiency..." This is an awkward explanation. Sediment transport from the catchment's surface means erosion, so the correlation between sediment load and runoff maybe reflects the proportion of surface runoff which is responsible for erosion from surfaces. Moreover, the correlation between sediment load and discharge reflects the concentration of suspended sediment.
- p. 3771, l. 4-5: Loads are the product of concentration and flow rate, so it is clear that loads are correlated with flow rates. Because of this link also the loads of sediment and metals are likely correlated with each other. Here it could be interesting to correlate concentrations instead of loads. Have you tried this?

C1400

- p. 3771, l. 19-20: How much was the explained variability improved? Is it possible to give the same measure of correlation for tables 4 and 5 so that the improvement gets visible?
- p. 3772, l. 7-8: Loads of Fe(D) and Mn(D) are higher during low flow? Or do you mean concentrations (see also comment above)?
- p. 3772, l. 22: I would reword this as follows, since this reflects the causal chain: Particulate metal loads were highly related with sediment load.
- p. 3772, l. 24: How can base flow govern sediment loads? Please explain.
- In particular figures 1 & 2 need to be in color or the grey shades should be adjusted. In the present state they are difficult to read.
- Technical corrections:
- p. 3759, l. 13: "Time data" sounds odd. Temporal data? Time series?
- p. 3761, l. 19: The sampling site...
- p. 3762, l. 19: ...of a/the multielemental...
- p. 3763, l. 1-3: This sentence is unclear. What about this version: "...were determined by summing up the products of mean concentrations of two consecutive samples and the total discharge volumes between the times of sampling."
- p. 3763, l. 3: Direct runoff load...load from the total load...
- p. 3764, l. 2: ..., a stepwise...
- p. 3764, l. 18: ...the hydrological...
- p. 3765, l. 8: ...of a microparticulate...
- p. 3766, l. 9: ...2007/2008 the maximum occurred...
- p. 3767, l. 15: ...short period of time...

C1401

p. 3768, l. 13: delete “s” in actives

p. 3769, l. 17-18: ...by a high...under wet conditions...

p. 3770, l. 13: ...which is not a relevant variable...

p. 3771, l. 27: The fact that...

p. 3772, l. 1: Kurtenbach

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 11, 3757, 2014.