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Hydrology and Earth System Sciences Discussions

Interactive comment on "Mass transport of contaminated soil released into surface water by landslides (Göta River, SW Sweden)" *by* G. Göransson et al.

Anonymous Referee #1

Received and published: 30 December 2011

I conclude there will be significant value in publishing (1) analysis, based on simulation of convective/dispersive/settling processes, of a recorded event of the downstream transport of landslide material, (2) some information on the recorded event, and (3) some information on the potential for water quality impacts of the landslide entering the stream. In doing so I strongly suggest that you substantially re-write, concisely edit, your manuscript to sharply focus on these three aspects and specifically on the original work you have done.

Issue #1 (transport analysis): A. The relevant transport analyses references for your

work are: (i) the 2 papers you cite: Influences of seasonal flow regime on the fate and transport of fine particles and a dissolved solute in a New England stream Karwan, D.L., Saiers, J.E. 2009 Water Resources Research 45 (11), art. no. W11423

Thomas, S.A., Newbold, J.D., Monaghan, M.T., Minshall, G.W., Georgian, T., Cushing, C.E. The influence of particle size on seston deposition in streams (2001) Limnology and Oceanography, 46 (6), pp. 1415-1424

along with (ii) these two additional papers: Paul, M.J., Hall Jr., R.O. Particle transport and transient storage along a stream-size gradient in the Hubbard Brook Experimental Forest (2002) Journal of the North American Benthological Society, 21 (2), pp. 195-205.

Huang, Y.H., Saiers, J.E., Harvey, J.W., Noe, G.B., Mylon, S. Advection, dispersion, and filtration of fine particles within emergent vegetation of the Florida Everglades (2008) Water Resources Research, 44 (4), art. no. W04408. doi: 10.1029/2007WR006290

I strongly suggest that you focus your presentation of your simulation analysis around discussion of how your work adds to these authors having previously used simulation of convective/dispersive/settling processes to help us better understand surface water fine particle transport.

B. Is eq (5) - the exponential release function - a new idea in your work? Has this form been previous used in analysis of fine particle transport? Is there any evidence for laboratory/flume/stream studies supporting use of this form. If its use here is simply ad hoc, I think that is OK - but that needs to be explicitly stated.

C. Section 2.3 (Suspended sediment transport and distribution) There is very little in this section about 'Suspended sediment transport". Essentially the entire section is about 'distribution'. Unfortunately almost all of the text about distribution is about skewed distributions – for which your analysis does not account. Much of the discussion is then about some of the Transient Storage Models – which your analysis does

not included. I suggest removing essentially all of this section. If you do want to say something the various storage processes which do influence fine particulate transport, then consider the work of A.I. Packman; I suggest starting with the review chapter in book Streams and Ground Waters (2000) (edited by J. B. Jones and P. J. Mulholland, Academic, San Diego, Calif.) If you do want to say something about the influence of transient storage processes on solute transport pulses & real field data, then I suggest starting with the analysis of R. L. Runkel: Toward a transport-based analysis of nutrient spiraling and uptake in streams Runkel, R.L. 2007 Limnology and Oceanography: Methods 5 (JAN), pp. 50-62

D. Start time, t0 & Figures 7 & 8. I fully appreciate the difficulty you face in not knowing the 'start time' of the landslide's erosion in the stream channel. You have to pick 'sometime' to start, so why not - by-trial&error - pick a simulation event start time that brings you close (or at least closer) to matching the peak times in the measurements and the simulations? The obscuring aspect of the simulations as presented is that the influence of the processes of the material release, dispersion, and settling change with time – the more time, the more release, the more spreading, the more settling. As presented the pulse of particulates for the simulation have been in the stream roughly 4 times as long as the measurements indicate.

E.Settling velocity (Figures 3 &4). I found the placement of Figures 3 &4 before the main results to be distracting. I wanted to see how your analysis worked out with real data. The single sentences in the text referring to each of the figures truthfully tell your readers nothing - expect that the figures exist. I suggest removing these figures (& the two sentences). If you do want to include some information on the influence of settling velocity then I suggest adding at the end of your results some parameter variation simulations as you have presented in Figures 9, 10 &11.

Issue #2 (the event): I think the majority of the information in the current manuscript is simply distracting from the main value of your work. There is far too much detail in this manuscript on the event and mechanics of landslides that does not add to our

understanding of the downstream transport and the transport analysis actually performed. Additionally I wonder how much of the information currently in this manuscript can already be found in: Combining landslide and contaminant risk: A preliminary assessment: A study of the Göta Älv river Valley, Sweden Göransson, G.I., Bendz, D., Larson, P.M. 2009 Journal of Soils and Sediments 9 (1), pp. 33-45.

Issue #3 (potential contamination impacts): I see that you have one result, the calculated mass of various metals likely associated with the sediments released in the event. I think there is far too much introductory and speculative text (Section 2.2 & 6.2) relative to presented results. Again, I find this - not 'wrong' - but rather, quite distracting – the result you do have is almost lost amid all of the text.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 8, 10589, 2011.