Hydrol. Earth Syst. Sci. Discuss., 8, C5948–C5950, 2012
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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 #2

Received and published: 31 January 2012

General comments: This paper highlights a source of contaminated sediment entering rivers that has not been well studied previously. Other studies have reported on contaminated mining material contributed to river systems, but the mechanism for sediment introduction in this case is a landslide. The situation presents an excellent opportunity to study the transfer of contaminated material downstream because frequent turbidity measurements downstream of the landslide were available during the failure events. The paper is well organized and clearly written. The title and abstract are clear, and the figures are helpful to the understanding of results. Previous studies are properly credited. The authors use the advection-dispersion equation (ADE) to model

sediment transport, and this equation has been widely used in a variety of applications. Besides the standard ADE, the authors also tried more complex solutions using different sediment particle sizes and by using a time-varying function rather than an instantaneous source. The authors make the point that large landslides do have the potential to be a source of pollution and should be considered in landslide risk analyses, which should be of interest to the readers of HESS.

Specific comments: P. 10592 L. 21. Re: Long-term release of contaminants takers place through erosion of the run-out of the slide. Does erosion of the landslide scar also contribute additional contaminants? P. 10598. What is the drainage area of the Gota River? It would be helpful on Figure 2 to include an inset map of Sweden showing the location of the Gota River. P. 10606: What was the discharge at the time of failure? On P. 10610 discharge is estimated to be between 180 and 230 mˆ2/s. The units should be mˆ3/s. What is the recurrence interval of this flow – is this considered to be a high flow event? Was the landslide triggered by a rainfall event? P. 10611 L. 5 states the landslide area was 8000 mˆ2. Previously, on P. 10606 L. 6 the landslide area is stated to have an area of 2400 mˆ2. Which is correct? Much of the landslide material was clay (P. 10606), yet the authors estimate that only 0.6% of the landslide-released material was transported downstream as suspended particulate matter (SPM) (P. 10611 L. 6). How do the authors explain this low percentage of SPM? On P. 10615 they state that most of the material remained at the site in the river. Was this based on surveys or observation? P. 10606 mentions a geotechnical investigation of the site, but it was not clear if any pre-landslide data were available. On P. 10598 the authors state the suspended particles in the Gota River are purely inorganic. P. 10608 L. 15 shows sediment samples after the slide had a loss of ignition of 4.4%. Did this represent organic material in the landslide-derived sediment? P. 10615 L. 23. I agree with the authors that the impact of landslides is more than a marginal influence on sediment budgets. High turbidity in rivers may not only affect sensitive species but also affects other beneficial uses such as drinking water and swimming. Fig. 11 models two different sediment sizes with two different settling velocities, but what size particles do

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these represent, and are they realistic for the material actually involved in the landslide movement?

Technical corrections: P. 10594 L. 20 "..a few are (not is)..." L. 27. "The landslide-derived sediments cause extreme sedimentation in Swift Creek.." P. 10595 L 8. It would be useful to state the sediment transport in the same units, for example, "62 g/s to 23,000 g/s." P. 10601 L. 22. "...upstream of a certain location." P. 10615 L. 17. "...where particles lose contact..." (not loose) P. 10616 L. 8. Copper, not cupper. L. 16 "...one has..." (not have) P. 10618 L. 4 "...the equation provides..." References: P. 10594 USEPA not in reference list. P. 10597 Deng et al. 2001 and Deng et al. 2011 aren't in reference list. P. 10602. Carslaw and Jager 1959: The year is 1956 in reference list. P. 10608 Goteborg Vatten, 2005 not in reference list. P. 10614 GAVVF – need to spell out to match reference list. Persson, R. 2007, is listed in references but I don't see it in the text.

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