

Interactive comment on “Levee reliability analyses for various flood return periods – a case study in Southern Taiwan” by W.-C. Huang et al.

Anonymous Referee #1

Received and published: 16 February 2015

It is an interesting paper and thorough analysis. I do believe that the English in the paper needs significant improvement for the benefit of the paper which would make the paper easier to read. I would advice the author to apply a more concise writing style. The layout of the paper is however good. Specific comments: - Page 459: o Here the author mentions that the cause of overtopping lies with the water level exceeding the crest level. This is more the case of overflow. In the case of wave overtopping the mean water level could be much lower. o This section could also benefit from a definition of failure. Is a minor shallow geotechnical slide considered the failure of the embankment or is a full breach formation considered a failure. - Page 463: o Here the author mentions that a steady state seepage analysis was used to determine the loading conditions during the flood event. Would a unsteady analysis not be more

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applicable and lead to higher loading conditions? If, not maybe the author can expand on this o In soil, the capillary action of the water in the soil could also contribute to the geotechnical stability of slopes. Maybe the author could comment on whether this was incorporated in the analysis or not. And if so, what the boundary conditions were during the analysis. If not, how would this effect the outcome of the model. - Page 464: o Here the author first defines the WLD and then uses the same abbreviation to defined the WLD coefficient (normalized Water Level Difference) (later referred to as WLD). This is confusing. Maybe the abbreviation for Water level difference could be left out. Maybe the author could expand on the use of this coefficient. Why was this normalization chosen and not another means of normalizing. F.e. by dividing by the mean water level between the landside and waterside. - Page 465: o Here the author refers to the original backfill, and the flood side. After breach formation water will from through the breach flooding the protected sides. Hence it may be more clear if the author could use landside and waterside of the levee. - Page 467 o Maybe here the author could remind the reader what WLD meant. - Page 468. o Here the author mentions that failure could occur in the scenario when there is no local scour of the backfill and the water level on the protected side is close to the top of the levee. This seems like an unrealistic purely hypothetical scenario as this would mean that the land behind the levee has fully flooded. - Page 469 o In the Monte Carlo Simulations 5000 calculations were performed. Is this sufficient to have the solutions converge? - Page 475: o Here the author mentions “we found that the longer the flood return period, the more sensitive the retaining wall stability becomes to variations in the WLD coefficient”. The WLD coefficient is the water level difference divided by the water level in the river. Hence by higher water levels in the river a smaller increase in WLD coefficient actually means that the water level difference, and pressure gradients are higher. Hence I wonder whether the use of the WLD coefficient is appropriate in this sense since it could be very misleading.