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Interactive comment on "Assessment of optimal empty flushing strategies in a multi-reservoir system" *by* F. N.-F. Chou and C.-W. Wu

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First of all, we wish to express our appreciation for the review and valuable comments from the reviewers. The comments reveal that two major concerns by the reviewers are the lack of validation on the use of the empirical equation to estimate the de-silting volume, and the neglect of the downstream environmental constraints. Our general responses to these concerns are presented in the following two paragraphs respectively. This study attempts to investigate the feasibility of implementing empty flushing to a large reservoir with heavy water supply burden. It is essential that field measurements precisely representing the condition of free surface flushing are currently unavailable, since the reservoir has never gone through such operations. Due to the lack of field data, the flushing coefficient is directly assigned as the most common and conservative value found in literatures. While using a different coefficient

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value might lead to a linearly-varied value of the flushed sediment volume (which is the objective function), the optimized storage thresholds should remain unchanged due to the dictated impact by the water shortage constraints. Nonetheless, we do recognize the validity of the employed empirical formula should still be investigated when more field measurements become available, for a more accurate evaluation of the benefits of empty flushing. This issue is emphasized in the first paragraph of subsection 3.6. As for the second concern, the comments of the second reviewer suggest that "in order to minimize environmental impacts by high turbidity flow conditions, periodical and short period draw down is more suitable. . . . Additionally, in order to avoid too much social stress to downstream water users, total duration of empty flushing should be limited less than couples of days because they should stop intake river water during high turbid water passing and they have the maximum acceptable duration for stopping intake." Although the environmental constraint is not explicitly considered in the case study, fortunately, the patterns of empty flushing from the optimized results conform well to the above required operations. This is because that the strict requirement on the stability of water supply in the case study system has already restricted the frequency and duration of empty flushing. Further, the empty flushing is designed to be performed during the first flood of the wet season. The flood discharge from the downstream watershed is expected to transport the majority of flushed sediments to the downstream receiving water body. Otherwise, the primary reservoir may have to release extra water to assist carrying sediments downstream. In the revised manuscript, the newly added subsection 3.6 serves to more thoroughly present the assumptions and potential future improvements of this study. In this document, we also provide Tables 1 and 2 as point-by-point responses to the reviewers' comments.

Please also note the supplement to this comment:
http://www.hydrol-earth-syst-sci-discuss.net/hess-2016-61/hess-2016-61-AC1-supplement.zip

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