Earth Surface Dynamics Discussions

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Comment on esurf-2021-99

Marc F. Muller (Referee)

Referee comment on "Unraveling the hydrology and sediment balance of an ungauged lake in the Sudano-Sahelian region of West Africa using remote sensing" by Silvan Ragettli et al., Earth Surf. Dynam. Discuss., https://doi.org/10.5194/esurf-2021-99-RC2, 2022

The paper presents a (in my opinion clever) technique to simultaneously assess changes in water elevation and sediment balance based on changes in the position of the shoreline monitored with high resolution satellite imagery. The approach crucially relies on a high resolution DEM obtained from a UAV. This limits the scalability and applicability of the approach but is duly discussed in the paper. Although focusing on a specific site, the authors make a convincing argument in the introduction to support the broader applicability of both their findings and the developed methodology. As such, I believe that the paper is of high potential interest to the broad readership of ESD. The paper is well organized and well written and, while the process-interpretation issues brought up by the other reviewer are valid and should definitely be discussed and elucidated, I find the methodology itself novel and compelling enough to recommend the paper's prompt publication in ESD.

One (very minor) comment that I have relates to the limitations of the approach. The authors present a solid discussion in Section 7 about the practical constraints/requirements of the approach, but one constraint that is perhaps missing relates to the resolution of the satellite imagery that limits the application of the approach to sufficiently large lakse, whereas smaller ponds and reservoirs are arguably at least as critical to ecological and socio-economic applications in arid regions. This could be easily addressed, for example by extending the discussion on L 465-470 to discuss the number of pixels (n) necessary for the standard errors on WSH and sediment balances to remain "acceptable".

My only other suggestion would be to make the finalized GEE code available (via a static link in the paper) if possible. Many researchers would without a doubt benefit from using this approach and this would increase the impact of the paper.

Again, these are very minor comments. This is honestly one of the most compelling initial

submissions that I have reviewed for a long time and I congratulate the authors on their work.

Marc F. Muller