**Authors' Response to Reviewer#3**

We thank the reviewer for their timely review of our paper. We also thank the editor for securing the review in a timely manner. The overall assessment of the reviewer on the paper is that "*The main problem of this manuscript is lack of enough novelty as original research. However, it can be a case study paper (not original research).*

The complete review comment is as follows:

*"The main problem of this manuscript is lack of enough novelty as original research. However, it can be a case study paper (not original research). The approaches and methods are known and currently in use which means the authors need to add novelties to the method, if they would like to publish it as the original research paper. It is like an excellent technical report in the current form. My recommendation is to explore the methods better and adding some specific novelties to the methodology. In the current form, it can be seen (even from the title) that no significant insight is added".*

**Our response**:

We thank the reviewer's comments. We realize that we may not have made the innovative aspects of our study clearer in the original manuscript. Please note that we have provided a more detailed response in this regard to Reviewer#1 and we ask that this reviewer refers to our response to this same issue of 'novelty.'

The study primarily focuses on the application and effectiveness of a combined remote sensing and hydrological modelling framework in tracking reservoir operations during extreme weather events in high precipitation and steep topography regions. Kerala was chosen as the test bed for this purpose. The study has shown that such a tool, herein the Reservoir Assessment Tool (RAT), is in-fact effective in tracking the dynamic state of the reservoir in such conditions and can contribute significantly to the short-term planning required for flood moderation. The downsides and limitations of the framework have also been explicitly highlighted to give an unbiased view of the effectiveness.

Our work is also about the '***representation of water infrastructure in large scale hydrological models***' which is the HESS special issue theme. We pursue this by using state of the art data informatics solutions (e.g. cloud computing) and satellite remote sensing to solve the critical but less-understood problem of *flood preparedness in mountainous regions where hydropower dam operations exacerbate downstream flood risk.* Here the 'water infrastructure' is reservoir/dam that is explicitly accounted for in the modeling/prediction of flood events in fast response, high terrain basins where flood risk management by hydropower dams (that are generally designed to keep full supply level for power generation) are particularly challenging due to its traditional lack of transparency. To the best of our knowledge such work is missing in today's literature. So, we believe our work is innovative and a key contribution to the body of knowledge as we have identified scalable or generalizable methods for dealing with the flood preparedness issue in similar environments around the world. This work can be scaled to other reservoir in such environments (Please refer Fig.1)

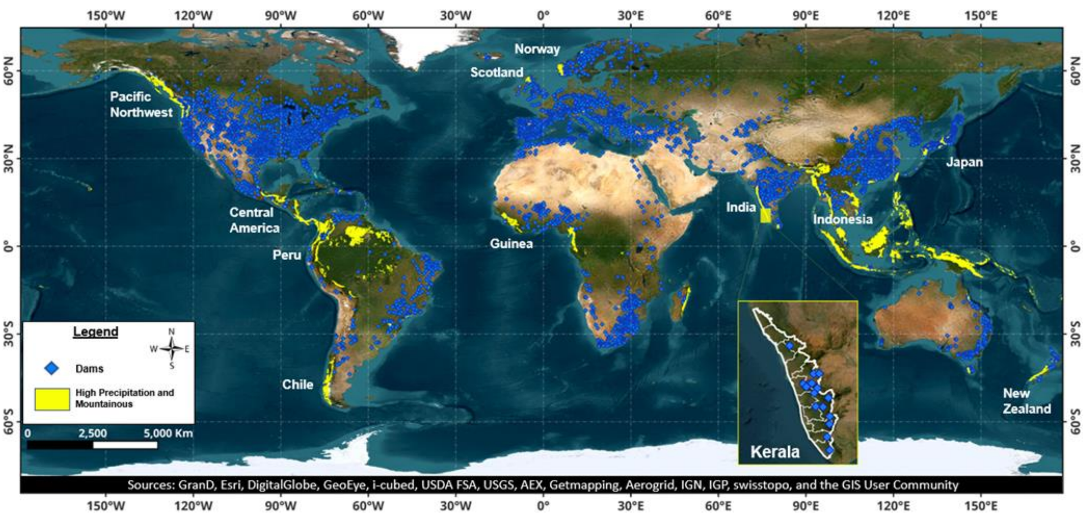


**Fig 1.** (also in the paper) – Regions in yellow show where the findings and lessons learned for RAT 3.0 application over Kerala during 2018 August floods (i.e., our HESS paper) can be applied around the world where flood risks appearing to be increasing due to the combination of climate change, energy production requirements and land use change.

Some of the key scalable findings are (which we plan to make clearer in our revised manuscript):

1) In mountainous, coastal, and fast response basins, RAT3.0 was found to be able to track the temporal trends of the reservoir state with good accuracy. However, tracking reservoir storage changes at the highest frequency and accuracy is more important for such cases. Herein, we argue that the SWOT mission with the suite of nadir altimeters to track reservoir elevations will play a key role.

2) Given that RAT is model agnostic, mountainous regions require improved and better calibrated hydrologic models or reservoir inflow. In particular, the routing scheme requires attention as the area draining into the very upstream reservoirs is quite small in such highly mountainous basins where the dams are often at the edge of the boundary. This is where strong engagement from local partnering agencies to improve the calibration of the model (VIC in our case of RAT 3.0) is critical. Fortunately for Kerala, we are already engaged with Kerala Centre for Water Resources Development and Management (CWRDM) and Kerala State Electricity Board (KSEB) who have agreed to help address this issue.

3) Because of perennial high cloud cover in such regions around the world with hydropower dams (see Fig 1 yellow regions), microwave/radar based satellite sensors is more critical and lay a central role in tracking reservoir state. We recommend that SWOT KaRIN sensor with as many

radar altimeters (Sentinel 3A, 3B, 6, SWOT altimeter) be used for tracking reservoir storage change as accurately and frequently as possible for such regions around the world identified in yellow in Fig 1.

In summary, we therefore argue that our work is more than just a technical report of RAT for Kerala. Although we had articulated the novelty of the work in lines 28-115, we plan to integrate a concise summary of the above in the introduction section of the paper to make it clearer how our work makes a contribution to the body of knowledge.