Comment on tc-2020-379
Dmitry Petrakov (Referee)

Referee comment on "The 2020 glacial lake outburst flood at Jinwuco, Tibet: causes, impacts, and implications for hazard and risk assessment" by Guoxiong Zheng et al., The Cryosphere Discuss., https://doi.org/10.5194/tc-2020-379-RC1, 2021

General comments

High Mountain Asia is prone to cryosphere related hazards including glacier lake outburst floods (GLOFs) which are frequently recognized as major glacier hazard in the region. Bursts of large lakes could lead to floods traveling a few hundred kilometers, dramatic damage of infrastructure and life losses. However, lack of case studies lead poor understanding of triggering mechanisms and processes for the majority of occurred GLOFs. The authors point out that it is particularly true for GLOFs happened during monsoon period, when cloud-free satellite images are limited.

Assessment of GLOF long-term conditioning and short-term triggering factors as well as flood dynamics is highly relevant topic not just for Tibet but for whole High Mountain Asia. It is especially important now considering changing environment, including lake formation, expansion and drainage, changing land use patterns, growth of population and consequent implications for GLOF hazard and risk.

The manuscript provides high-quality case study with significant conclusions, important for many high-mountain regions with rapid glacier retreat. Remote sensing approach accompanied by eye-witness analysis and numerical modelling is definitely suitable tool for this research. Scenarios for r.avaflow simulations are fully reasonable and description is clear for readers. Authors have explained obtained results and related problems in details. Hypothesis to interpret sequence of events are interesting, however it is difficult to exclude single versions at this stage. Author’s opinion on high and increasing role of lateral moraine collapses in GLOF triggering is interesting and logical despite still based on limited number of cases.

The manuscript is well written and free of technical errors, well structured, appropriate in length. References are adequate. All figures and the table are high-quality. The conclusions are clear and precise. The results obtained in this study are highly relevant to
assess hazard of future GLOFs within regions with fast glacier retreat. Novelty of results is absolutely clear. I strongly recommend to publish the manuscript in the Cryosphere with very minor corrections.

Specific comments.

Line 81 – please indicate year of assessment.

Fig.2 – it will better to identify date or season and year of photos.

Fig.8 – it is not clear, why daily maximum temperature has been chosen as criteria instead of daily mean temperature. Please explain it.

Table 1 - *resolution of multispectral/panchromatic image. If so, for Ziyuan-3 02 and Gaofen-2 resolution of multispectral image is better than panchromatic?

Table 2 – a nice set of equations has been used for the volume assessments. My feeling that it will be better to include a couple of more regionally specified formulae developed by Yao et al. (2012), approach and statistics from (Veh et al., 2020, Supplementary) containing 24 Himalayan lakes which allows to refine volumetric assessments. Similarly, it will be better to include the relation between lake volume and peak discharge (Popov, 1991) was determined specifically for moraine lakes in Kazakhstan. Furthermore, in the Supplement there is no information about type of lakes have been used for equations. I might be wrong, but ice-dammed lakes were considered in some equations.

You might also want to discuss a bit more about specific features of landslide-lake interactions and consequent impact on process chain.

