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Reply on RC2

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Author comment on "Baseline data for monitoring geomorphological effects of glacier lake outburst flood: a very-high-resolution image and GIS datasets of the distal part of the Zackenberg River, northeast Greenland" by Aleksandra M. Tomczyk and Marek W. Ewertowski, Earth Syst. Sci. Data Discuss., https://doi.org/10.5194/essd-2021-48-AC2, 2021

Dear Professor Petrakov,

Thank you very much for your positive and constructive review. Please, find the responses to detailed comments below:

- **In the Introduction it will be better to focus a bit more on glacier-related floods in the Arctic, especially in the Greenland, provide some more details on their observed and projected frequency and magnitude as well as on their geomorphic effect.**

We added the following paragraph to the Introduction:

"GLOFs in Greenland were reported from several locations (see Carrivick and Tweed, 2019 for more detailed review), including Lake Isvand (Weidick and Citterio, 2011), Russel Glacier (e.g., Russell, 2009; Russell et al., 2011; Carrivick et al., 2013; Carrivick et al., 2017; Hasholt et al., 2018), Kuannersuit Glacier (Yde et al., 2019), Lake Tininnilik (Furuya and Wahr, 2005), Lake Hullet (Dawson, 1983), Qorlortorssup Tasia (Mayer and Schuler, 2005), Zackenberg river (Søndergaard et al., 2015; Kroon et al., 2017; Ladegaard-Pedersen et al., 2017), Catalina Lake (Grinsted et al., 2017). Estimated water volume losses varied from ~5 x 10^6 m^3 to ~6400 x 10 m^3, while peak discharges could reach up to ~1430 m^3s^{-1} (Dawson, 1983; Furuya and Wahr, 2005; Russell et al., 2011; Carrivick et al., 2013; Søndergaard et al., 2015; Carrivick and Tweed, 2019). The frequency of GLOFs in Greenland varies from annual through decades (e.g., Zackenberg River, Russel Glacier, Lake Tininnilik) to one-time events (e.g., Kuannersuit Glacier) (Furuya and Wahr, 2005; Russell et al., 2011; Carrivick and Tweed, 2019; Yde et al., 2019). The most significant geomorphological and hydrological effects included the formation of bedrock canyons and spillways, transport of large boulders, riverbanks erosion, development of coarse-sediment bars and deltas, outwash surfaces, and ice-walled canyons (Russell, 2009; Carrivick et al., 2013; Carrivick and Tweed, 2019; Yde et al., 2019). Despite numerous reports, so far, no detailed topographical data of a river system exists, which could serve as a baseline for long-term monitoring of landscape changes to understand, quantify and model changes resulting from GLOF in comparison to normal-frequency processes. "

- **Lines 73-76 – it is not clear what discharge is normal during summer time. Some more details on river regime should be provided.**

We added information about summer discharges:

Typical discharges during summer month were from 20 $m^3\ s^{-1}$ to 50 $m^3\ s^{-1}$, and usually lower at the end of melting season (September-October) (Søndergaard et al., 2015; Ladegaard-Pedersen et al., 2017)

- **3. It might be better to show before-the-flood river channel on "After flood" series of maps, it makes this figure more reader friendly.**

Figure modified as suggested

- **It will be great to add one more figure with DEM difference for some erosion and accumulation areas to provide more data on geomorphological effect of the flood as well to add some a brief information on erosion/ entrainment/ accumulation rates depending on channel slope angle and sinuosity, elevation change etc. despite most of the data has been published in (Tomczyk et al., 2020).**

We added the figure with an example of DEM of Difference for debris flows developed close to the building of the Research Station. We also added a brief text related to observed geomorphological changes.

An example of geomorphic change detection is presented in Fig. 9, demonstrating the acceleration of debris flows resulting from sediment entrainment at the base of the river bans by floodwater. Overall, the observed changes were spatially variable – erosion dominated along steep banks as expected; however, understanding of differences in erosion rates between sites requires further studies, which will consider differences in lithology as well as modelling of water flow to investigate potential erosion forces in relation to channel characteristics.

Please also note the supplement to this comment:
https://essd.copernicus.org/preprints/essd-2021-48/essd-2021-48-AC2-supplement.pdf