Referee comment on the paper:
"Degree-day melt models for paleoclimate reconstruction from tropical glaciers: calibration from mass balance and meteorological data of the Zongo glacier (Bolivia, 16°S)

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General comments:
The paper provides an interesting and novel evaluation of PDD models under recent tropical climate conditions at Zongo glacier in Bolivia. The study is based on a very important dataset put together and made available under the lead of the French research community in the past years. The evaluation of the considered PDD models regarding their skill has been done in a proper way regarding actual climate and mass balance conditions of Zongo glacier.
However, the conclusions drawn from the study as well as the title of the manuscript are addressing issues not covered by the manuscript:

- No example of a paleoclimate reconstruction is shown, neither is any information provided on how to use the models for paleoclimate modeling.
- There is no indication on how the models perform "outside" the climate conditions of the original dataset.

Specific comments:
1.) The authors claim to use the PDD models for a simplified reconstruction of paleoclimate conditions (p 2122 lines 3-5) using the paleoglaciers (actually ice-free areas) as climate proxies. Furthermore, the authors are pointing to the important fact, that under recent climatic conditions at high elevations and in dry areas, sublimation is becoming the important ablation factor. It is mentioned that under recent climate conditions in the tropics (p2143, lines 11-14), PDD-models should not be used at high elevation sites (e.g. cold, windy,…). This is an important issue as it is shortly described in section 5.3: Ablation by sublimation is not considered by the PDD-models. This implies, that only "humid" and "moderately warm" (e.g. recent tropical) climate conditions favoring melting as the dominant ablation process are allowed by the model prerequisite to reconstruct paleoclimate conditions. Even under today's climate conditions, depending on season, this prerequisite does not completely hold. The dry season favors sublimation and not melting as the dominant ablation process (Winkler et al., 2009). Regarding paleoclimate conditions, it is furthermore obvious, that also a massive temperature depression with less precipitation or no change in precipitation can fill ice free areas with glaciers. Under such cold climate conditions, melting becomes less and sublimation more important. If such paleoclimate conditions, as reconstructed for various periods during e.g. MIS II also in the Andes, still allow for a simplified PDD-reconstruction needs to be evaluated.

2.) Based on the comments above, the title as well as the content of the paper could (should) be: "Degree-day melt model calibration for tropical glaciers: An example from Zongo glacier (Bolivia, 16°S)". Having the data given in the paper as well as the PDD-model comparison available is scientifically a step forward. If this content, as it

stands now, is in line with the scope of "Climate of the Past" needs, however, to be assessed by the editors.

Technical notes:
1. (p.2121, lines 13-14): for what range in precipitation does this relation hold, was this relation tested?
2. (p. 2123, lines 15-20): this has been elaborated in detail in the central Andes e.g. by Kull and Grosjean 2000, or Kull et al. 2008
3. (p. 2124, lines 14-18): see specific comment (1). PDD-models should be used only under climate conditions favoring melting as the dominating ablation process. Sublimation plays an important role on tropical glaciers even under today's climate conditions (Winkler et al. 2009). Besides temperature, the atmospheric moisture content plays a crucial role determining the dominant ablation process (sublimation versus melting) (e.g. Juen et al., 2007).
4.) (p.2141, lines 16-18): comment: This is the case when modeling climate conditions from paleoglaciers in today ice free areas…
5.) (p.2141, lines 18-23): and…. e.g. Ginot et al., 2006; Kull et al., 2008, Winkler et al. 2009
6.) (p. 2144, lines 1-9): this has been done in detail for the central Andes by Kull and Grosjean 2000, as well as Kull et al. 2008
7.) I suggest considering additional literature and results as e.g. mentioned above in order to put the study in a broader context.

Personal Comments:
I am rather sceptical if the paper is at a mature state for publication when linking the effort done to paleoclimate science. The PDD-model comparison and the provided dataset are, however, a good contribution to scientific progress.
I therefore would rate the paper (as it stands) as follows:

Scientific significance: 3
Scientific quality: 3
Presentation quality: 1-2

In my opinion, the authors should provide an example of a paleoclimate reconstruction (with the presented models) in order to be in line with the scope of "Climate of the Past" and in order to validate their claim, that PDD-models are able to reconstruct paleoclimate conditions based on paleoglaciers in today ice free areas of the tropics. Such paleoclimatic conditions (for e.g the LLGM) differ considerably from today's climate.
It needs to be evaluated whether simplified PDD models are suitable tools for this challenge in the central Andes.

References:
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M. Winkler et al.: Measured and modelled sublimation on the tropical Glaciar Artesonraju, Peru; The Cryosphere, 3, 21–30, 2009