

Interactive comment on “Degree-day modelling of the surface mass balance of Urumqi Glacier No. 1, Tian Shan, China” by E. Huintjes et al.

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Received and published: 19 March 2010

Due to the sparse data available, we decided for a degree-day approach for this glacier. A more complex energy balance model would account for crucial parameters like sublimation and to what degree the energy fluxes lead to either energy loss or mass loss. Unfortunately much of the input data needed is not measured in this region. We are aware of the insufficient validity of the results for longer timescales, but one aim was to show the advantage of including radiation for the spatial distribution of mass balance on this glacier by comparison with the net balance maps. The test data consists of daily ablation-stake measurements. During the period 19 July - 25 July 2007 meltrates were measured at each stake once per day. The differences from day to day (considering local average density measurements) were taken for calibration. The problem of

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correct capturing and calculation of accumulation does also occur in summer as the glacier is a summer-accumulation type.

211-11: Corresponding precipitation amounts measured at both stations differ largely from each other from day to day or are totally missing. The melt or accumulation that was measured at the stakes is very heterogenous, e.g. after a precipitation event there are measurements of ablation at several stakes and accumulation at stakes nearby (possibly also due to small avalanches and snow drift that could be observed).

213-3-5: We were not able to derive a precipitation gradient from the data, so we decided to keep it constant. Measured precipitation at both stations is changing strongly (amounts, gradients, large data gaps). The variation with elevation is changing between positive and negative values and sometimes (during summer) there is no dependency at all due to convection. This is also reported by Hagg (2003). We have no observations of temperature and precipitation type. The hyperbolic function was suggested by Hantel et al (2000) and successfully applied in a DDM by Möller et al (2007).

214-1: One mean value for meltrate for each of the 16 stakes during the 6 day period is considered. Meltrates were measured once per day at each stake, but the measurements varied strongly (e.g. due to mismeasurements, snow drift) so that calibration was not possible.

214-22: No, you are right. But in this case it fits to the measured values at the point of the AWS quite perfectly.

Additional references: Hagg, W.: Auswirkungen von Gletscherschwund auf die Wasserspende hochalpiner Gebiete, Vergleich Alpen - Zentralasien, Diss., 121 pp, 2003. Möller, M., Schneider, C. and Kilian, R.: Glacier change and climate forcing in recent decades at Gran Campo Nevado, southernmost Patagonia, Ann. Glaciol., 46, 136-144, 2007.

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