

## **Deriving glacier mass balance from accumulation area ratio on Storglaciären, Sweden**

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**Abstract** Glacier net mass balance,  $b_n$ , tends to correlate well with accumulation area ratio (AAR). A method that substitutes the long term  $b_n - \text{AAR}$  relationship by the transient relationship, derived from repeated measurements during one ablation season, is tested on Storglaciären, a well-investigated glacier in Sweden. We use the 1946–2004 long term record, transient mass balance measurements in 2004, and results from a distributed energy-balance mass-balance model. The long term and transient relationships are in good agreement for negative and slightly positive mass balances corresponding to AAR of roughly 0.2 to 0.6, but progressively deviate from each other with increasing net balances and larger AARs. The modelling indicates that the deviation becomes smaller as winter mass balance increases. It is concluded that the transient  $b_{n,t} - \text{AAR}_t$  relationship should: (a) be established during a highly negative mass balance year, and (b) exclude any data from the earlier part of the melt season. Deriving the relationship from mass balance modelling may provide a powerful alternative, circumventing the need for a highly negative mass balance year for the transient measurements.

**Key words** accumulation area ratio; glacier mass balance; Storglaciären; Sweden

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