



## **Comparison of glaciological and volumetric mass balance measurements at Storglaciären, Sweden**

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Seasonal glaciological mass balances have been measured on Storglaciären without interruption since 1945/46. In addition, aerial surveys have been carried out on a decadal base since the beginning of the observation program. Early studies used the resulting vertical photographs to produce glaciological maps with which the in-situ observations could be verified. However, these maps as well as the derived volume changes are subject to errors which resulted in major differences between the derived volumetric and the glaciological mass balance.

As a consequence, dia-positives of the original photographs were re-processed using uniform photogrammetric methods and resulting in new volumetric mass balances for 1959–69, 1969–80, 1980–90, and 1990–99. We compare these new volumetric mass balances with mass balances obtained by standard glaciological methods including an uncertainty assessment considering all related previous studies.

The absolute differences between volumetric and the glaciological mass balances are 0.9 m w.e. for the 1959–69 period and 0.3 m w.e. or less for the other survey periods. These deviations are slightly reduced when considering corrections for systematic uncertainties due to differences in survey dates, reference areas, and internal ablation whereas internal accumulation systematically increases the mismatch. However, the mean annual differences between glaciological and volumetric mass balance are below the uncertainty of the in-situ stake reading and, hence, do not require an adjustment of the glaciological data series. In other words, the comparison with geodetic volume changes confirms the excellent quality of the long-term mass balances monitoring program at Storglaciären.