



## **90 years of seasonal mass balance observations on Claridenfirn, Switzerland: Field data and model results**

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Seasonal components of mass balance provide the best insights to analyze climate-glacier interactions. Point-based observations at fixed locations directly reflect climatic conditions and are not biased by interpolation effects or the dynamic behavior of the glacier. We present an uninterrupted time-series of mass-balance observations of seasonal resolution at two locations on Claridenfirn started in 1914. This dataset represents the far longest available direct mass balance observation world wide.

The spatially distributed glacier mass balance is determined based on the two index stakes. A temperature-index mass-balance model is tuned with the field observations. We calculate mean specific seasonal mass balance and the mass-balance distribution of Claridenfirn. The results show good agreement with ice volume changes derived independently from repeated digital elevation models. Whereas no major variations in winter balances are visible, summer balances show significant fluctuations and cause periods of mass loss and mass gain. The mean specific net balance of Claridenfirn 1914-2005 is  $-0.05 \text{ m WE a}^{-1}$  and, thus, less negative than for other Alpine glaciers. Rates and trends in the mass-balance evolution are discussed in the context of long term temperature and precipitation changes.