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Calculating the Mass Balance of Glaciers based only on Temperature and Precipitation by using Seasonal Sensitivity Characteristics

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The modelling of the mass balance of glaciers is often impaired because of lack of data. Therefore it is worthwhile to try and determine a method that uses data that is globally available for long periods of time. In this contribution we model glacier mass balance by using seasonal sensitivity characteristics. We use temperature and precipitation data from local stations and from the ECMWF reanalyses ERA-15 and ERA-40. We have selected ten glaciers with long mass balance records (Abramov, Alfotbreen, Devon Ice cap, Engabreen, Gries, Hintereisferner, Nigardsbreen, Peyto, Tuyuksu and White Glacier). Together they cover the Northern Hemisphere well, but unfortunately, no long series are available from the Southern Hemisphere. Our method explains part of the annual mass balance fluctuations. For some glaciers, however, it works much better than for others. In most cases, the use dat from ERA gives better results than data from local weather stations.