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An area-wide snow climatology for Austria since 1961 based on newly available daily precipitation and air temperature grids

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We use the spatially distributed snow cover model SNOWGRID (Olefs et al., 2013) that is run in an operational now- and forecasting mode at the Austrian weather service ZAMG (Zentralanstalt für Meteorologie und Geodynamik). A climate version of SNOWGRID is used to derive daily grids of snow depth (sd) and snow water equivalent (swe) at a spatial resolution of 1x1 km for Austria since the year 1961 using recently created gridded datasets of air temperature and precipitation at same temporal and spatial resolution that take into account the high variability of these variables in complex terrain (Hiebl and Frei, 2016). The model accounts for the shortwave radiation balance and uses a simple 2-layer scheme, considering settling, the heat and liquid water content of the snow cover and the energy added by rain. In a next step so called snow indicators (e.g. snow cover duration, max. 72-H snow amounts) are derived that allow a climatic characterization of the snow cover to finally calculate area-wide changes and long-term trends. Calibration and validation of the model results are realized using homogenized long-term time-series of total snow depth and new snow amounts, recent operational snow depth measurements using laser sensors, winter glacier mass balance measurements, cumulative runoff data and satellite products (MODIS fractional snow cover). Uncertainty of the final results compared to homogenized long-term time-series can be split into the effect coming from uncertain input data and from the model itself (using different model versions and parameterizations). The final product provides a great potential to further investigate past climate change in the Austrian hydroclimate for a broad community of scientists.