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*Supplement of*

## **How much can we save? Impact of different emission scenarios on future snow cover in the Alps**

**Christoph Marty et al.**

*Correspondence to:* Christoph Marty (marty@slf.ch)

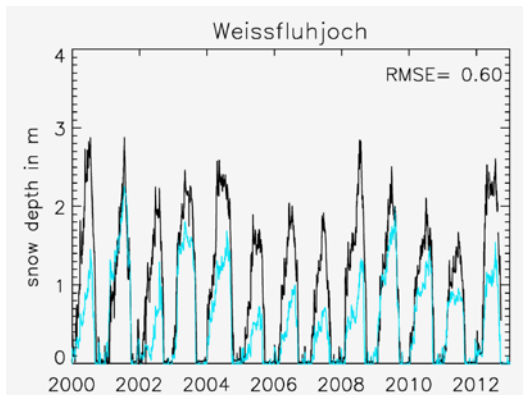
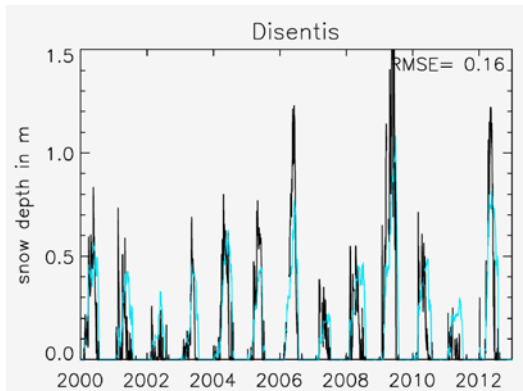
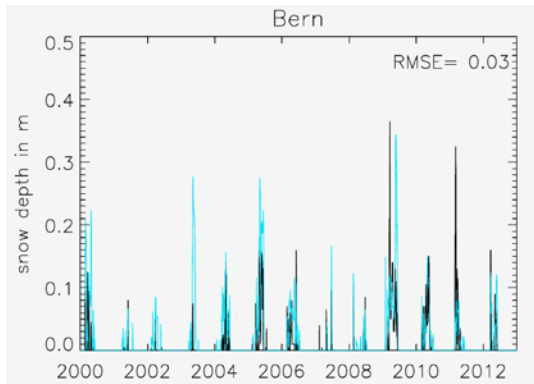
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**Table S1: Root mean squared error (RSME) calculated for snow depths greater than 0.01 m for selected stations in the Aare and Grisons catchment during the 13 years of the reference period.**

Stat	Altitude	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Chur	550 m	0.04	0.03	0.03	0.03	0.03	0.03	0.03	0.06	0.03	0.03	0.03	0.03	0.03
Bern	550 m	0.09	0.04	0.08	0.05	0.06	0.06	0.08	0.08	0.03	0.08	0.08	0.09	0.05
Disentis	1090 m	0.18	0.17	0.18	0.18	0.16	0.17	0.18	0.19	0.17	0.17	0.18	0.15	0.18
Arosa	1320 m	0.42	0.41	0.41	0.44	0.42	0.42	0.43	0.47	0.43	0.43	0.44	0.40	0.44
Samedan	1750 m	0.31	0.29	0.31	0.31	0.29	0.31	0.32	0.31	0.31	0.30	0.30	0.26	0.33
Weissfluhjoch	2540 m	0.98	0.95	1.02	1.02	0.98	1.03	1.02	1.04	1.05	1.00	0.98	1.01	1.03

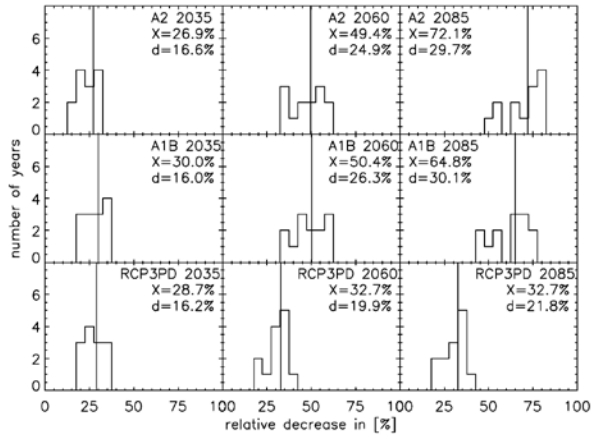
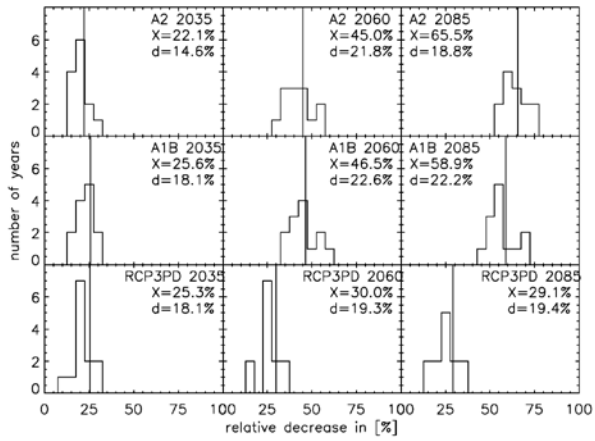
**Table S2: Mean number of snow days (snow depth at least 5 cm) for the reference and the three future time periods based on the A2 scenario for 5 stations in the Aare region (above) and the Grisons region (below).**

Station	Elevation	Reference	2035	2060	2085
Bern	542 m	40	13	5	0
Interlaken	568 m	41	14	6	0
Grindelwald	1034 m	101	72	37	14
Adelboden	1350 m	139	107	75	35
Mürren	1650 m	173	148	116	77
Chur	593 m	39	14	5	0
Disentis	1130 m	98	68	40	18
Davos	1560m	157	123	86	49
Samedan	1721 m	165	139	101	61
Weissfluhjoch	2690 m	254	228	197	163

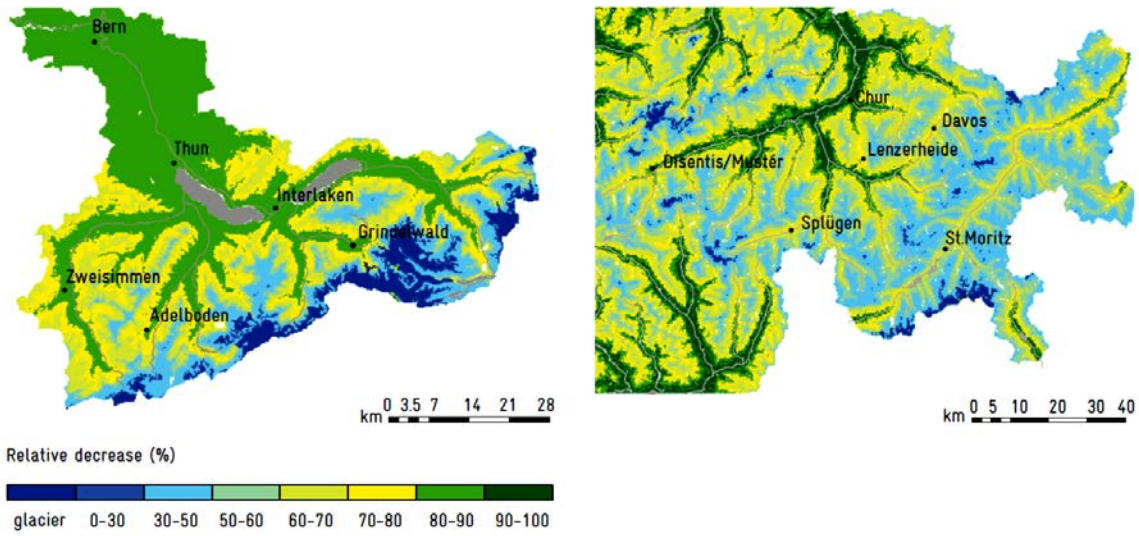


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**Figure S1: Measured (black) and simulated snow depth (grey) for Bern (542 m), Disentis (1190 m) and Weissfluhjoch (2540 m). Note: the scale of the y-axis is different for each station.**

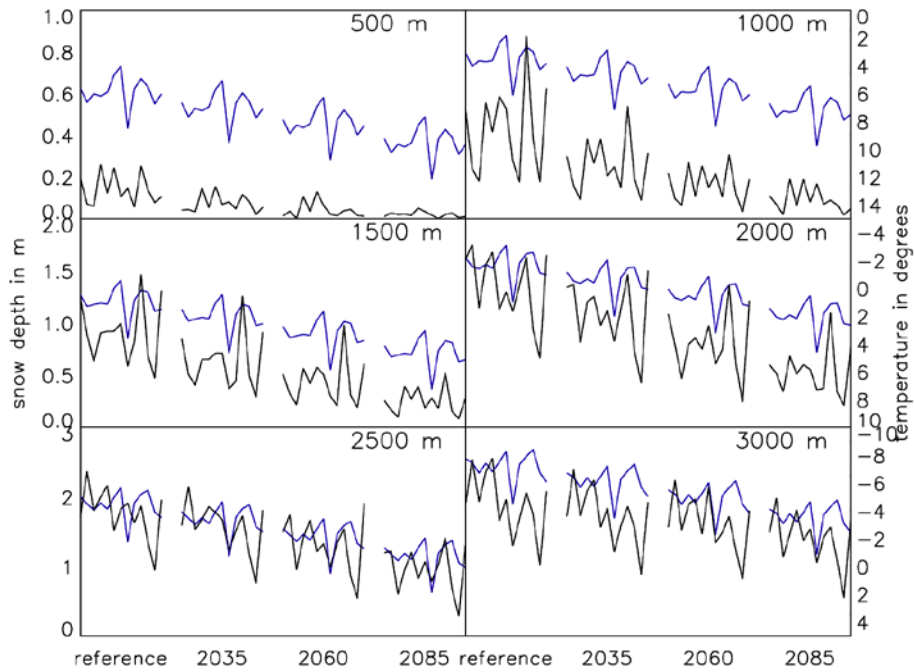


5 **Figure S2: Distribution of the annual relative decreases of the snow depth for A2, A1B and RCP3PD and the three different future time periods (2020-49, 2045-74, 2070-99) for Aare (top) and Grisons (bottom) based on the inter-annual variability of the reference period. The value X corresponds to the spatial and temporal mean relative decrease in [%], which is visualized in Figure 3. The value d defines the difference between the highest and the lowest relative decrease within the scenario period. The number of the simulated years is N=13.**

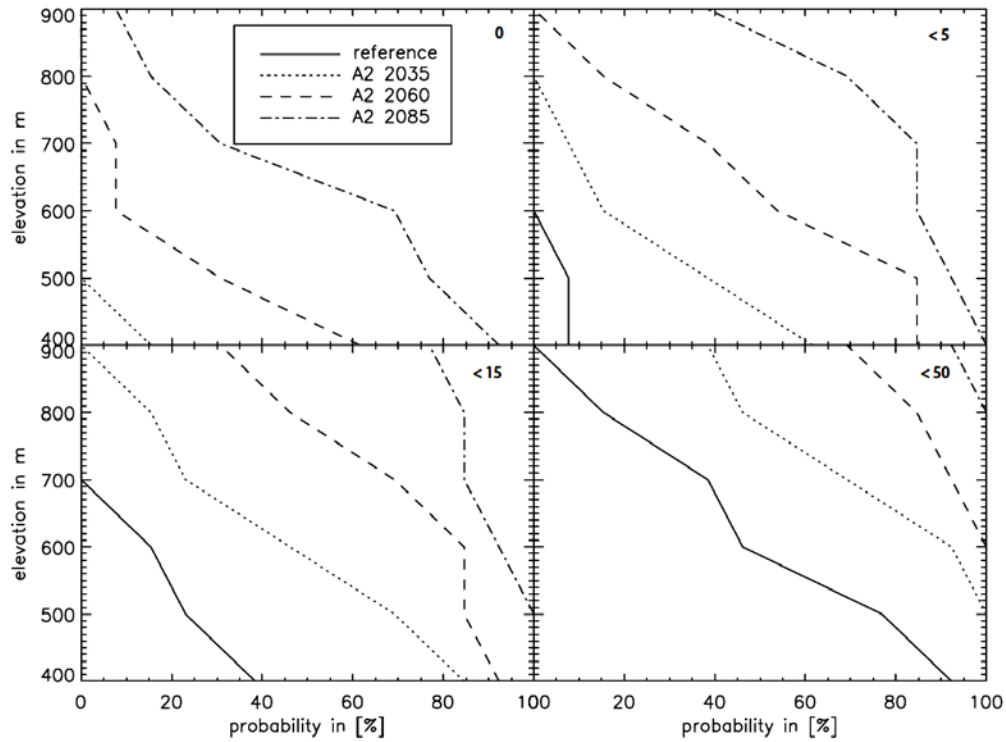


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Figure S3: Relative decrease for February 1 snow depth during the last time period (2085) and the A1B scenario for the Aare region (left) and the Grisons region (right).

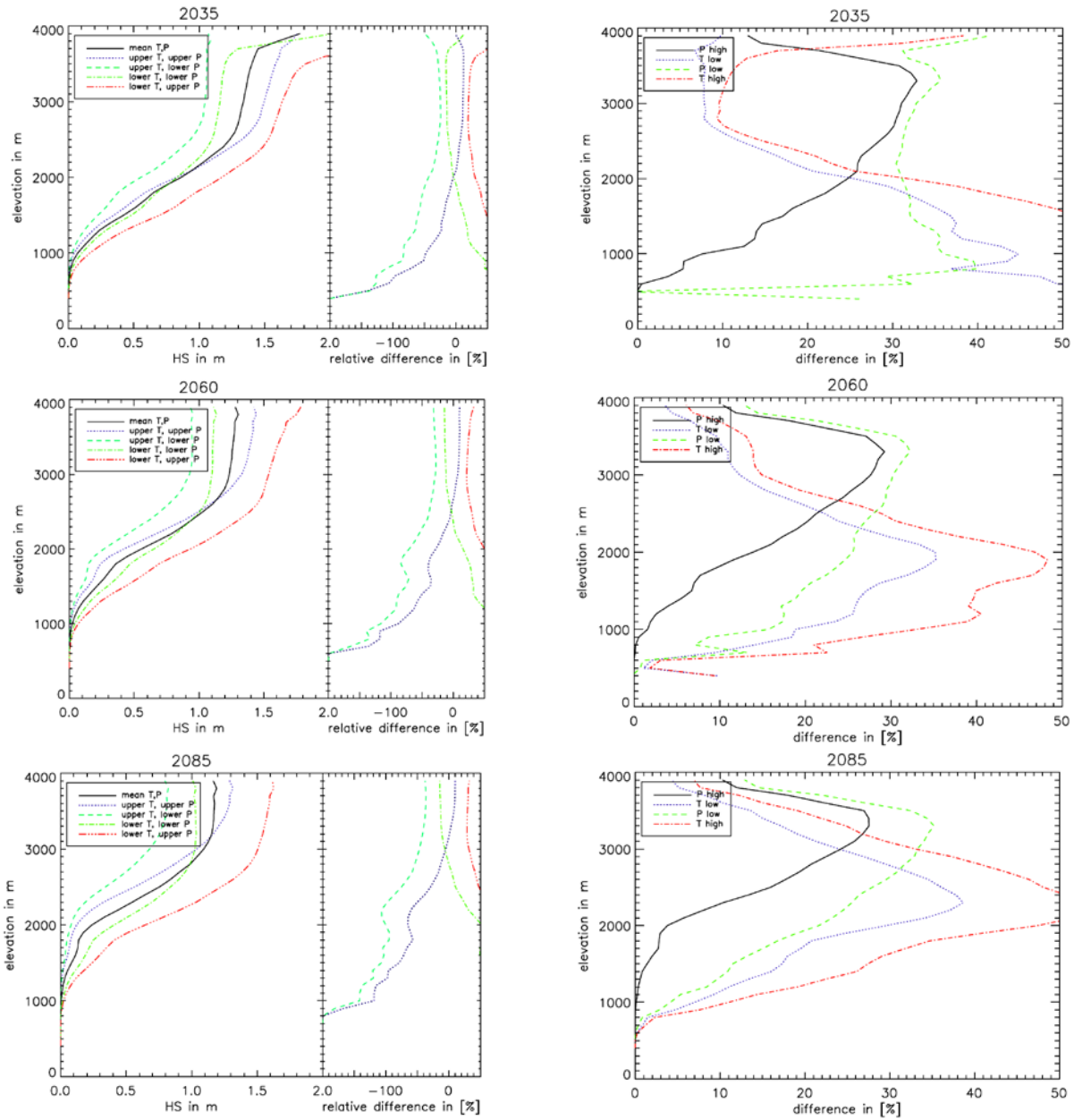


5 **Figure S4: Current and future variability of maximum snow depth (solid line) and mean winter temperature (dashed line) from November to April for 6 elevation zones and the A2 scenario for the Aare region. Note, the scale of the y-axis changes with elevation.**



5 **Figure S5: Probability of winter with 0 (upper left), less than 5 (upper right), less than 15 (lower left) and less than 50 (lower right) snow days for Grisons.**





5 **Figure S6: Elevation dependence of absolute snow depth for five possible T-P combinations (left) and decrease relative to the mean T, mean P configuration (left panels). Elevation dependence of the relative snow depth difference (%) for four different combinations T-P (right panels). "T high" means the difference of the upper T - lower T at the upper P configuration. "P low" means the difference of the upper P - lower P at the lower T configuration. This is shown for 2035 (top), 2060 (middle) and 2085 (bottom) based on the A2 emission scenario in the Aare region.**