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Supplement of

Black carbon in snow in the upper Himalayan Khumbu Valley, Nepal: observations and modeling of the impact on snow albedo, melting, and radiative forcing

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1063 **Supplementary material**

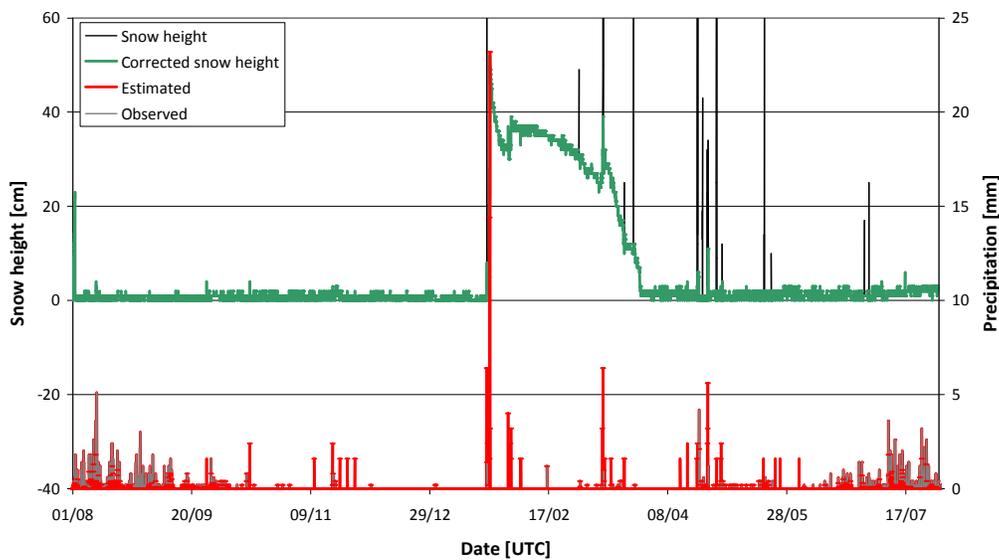
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1071 The supplementary material includes eight extra figures: S1a, S1b, S1c, S2a, S2b, S3a,
1072 S3b, S4.

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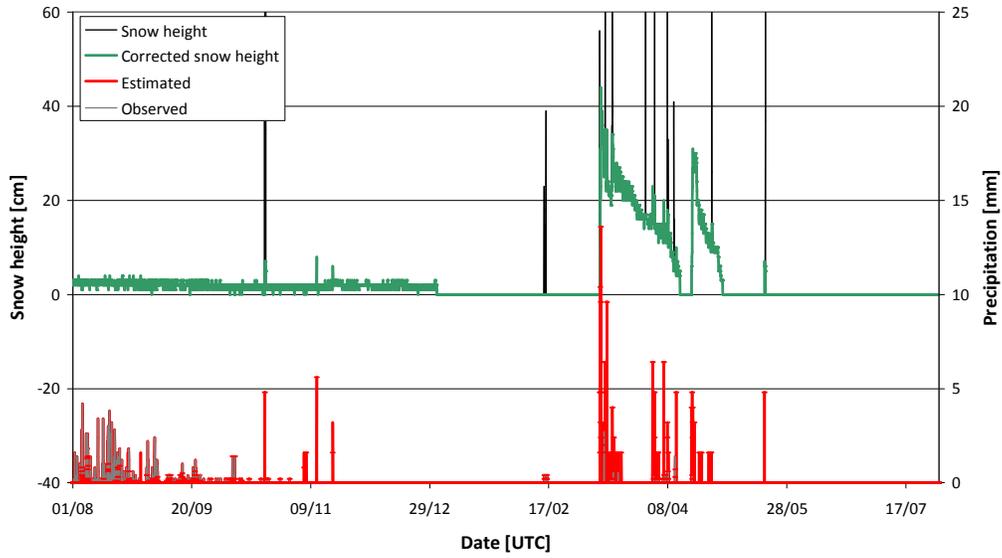


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1078 Fig. S1a: Time series of recorded and corrected snow height (left axis) and
1079 precipitation (right axis) at NCO-P for the winter season 2004/05. The green line
1080 indicates the corrected snow height after removal of the recorded individual peaks
1081 (black lines). Maximum recorded snow height was 200 cm. The red line corresponds
1082 to the corrected time series of precipitation in comparison to the recorded
1083 precipitation (grey line). Horizontal red bars indicate solid precipitation.

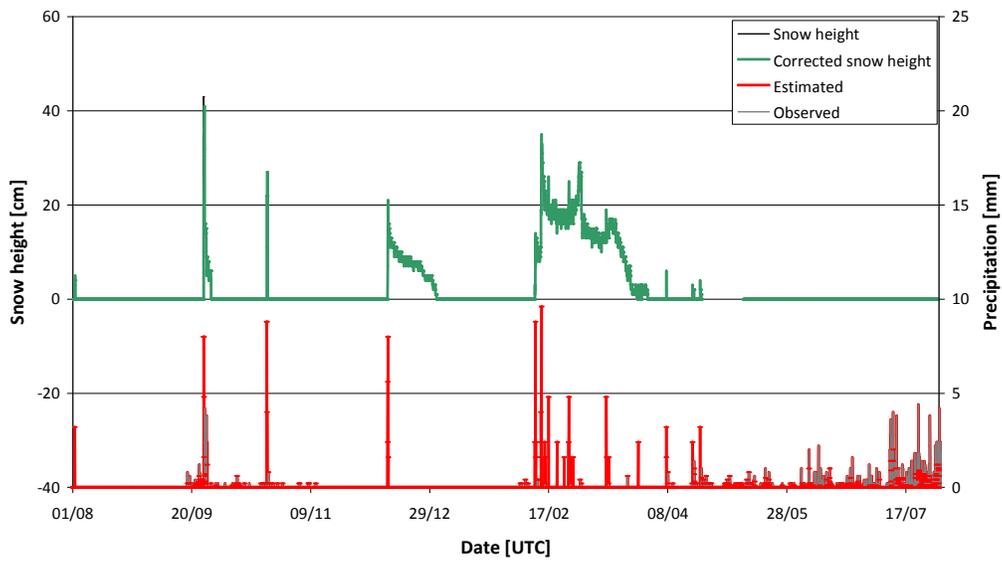
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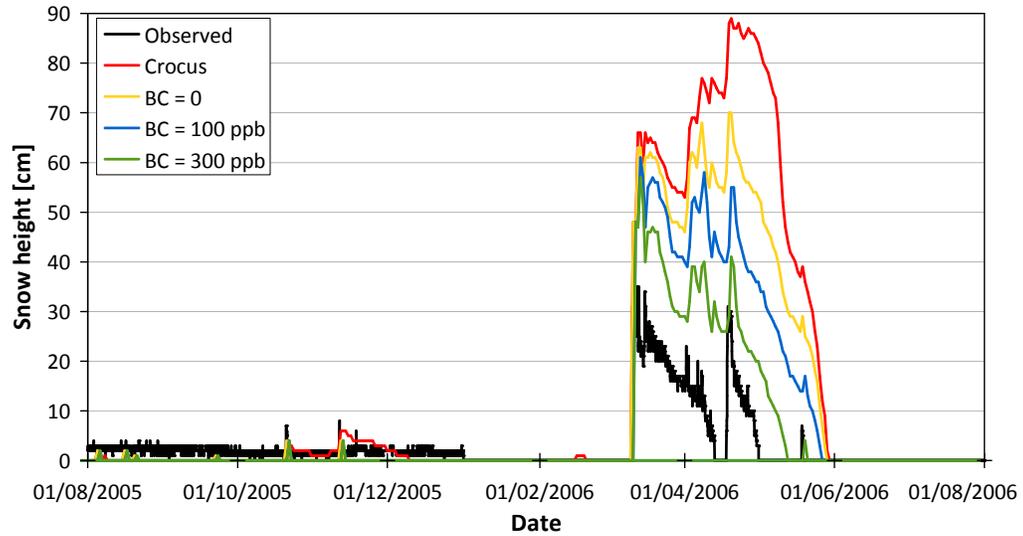
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Fig. S1b: Same as Fig. S1a, but for 2005/06. Maximum recorded snow height was 177 cm.



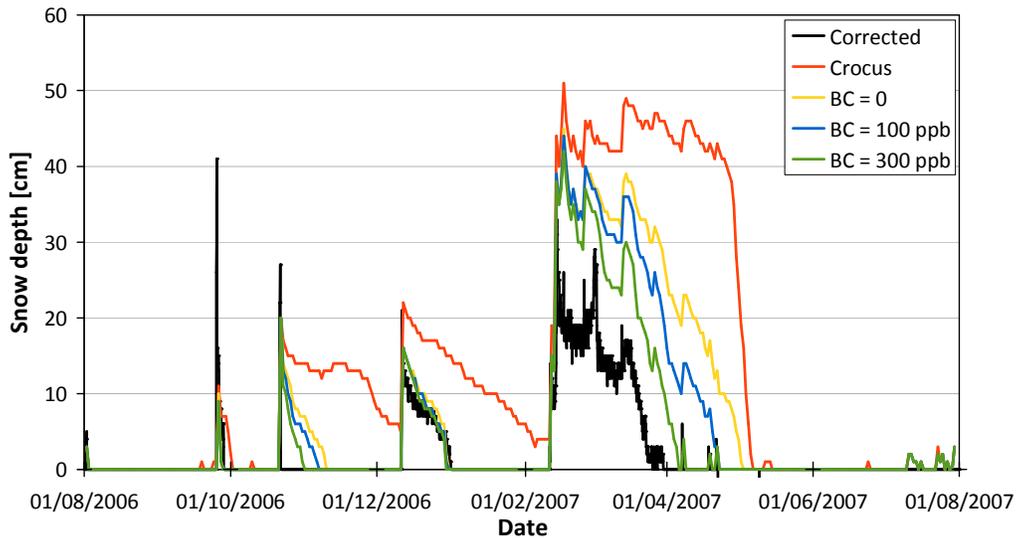
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Fig. S1c: Same as Fig. S1a, but for 2006/07.



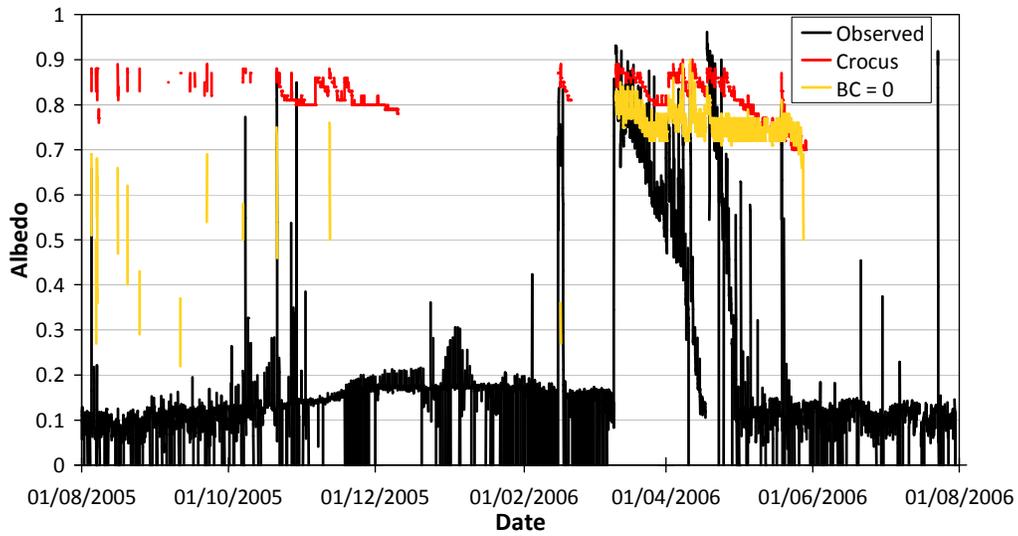
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Fig. S2a: Comparison of observed (black) and simulated snowpack heights at NCO-P for the winter season 2005/06. Simulations were performed with the standard crocus model (red) and with the upgraded model including radiative transfer with constant BC concentrations of 0 (yellow), 100 (blue), and 300 ppb (green).

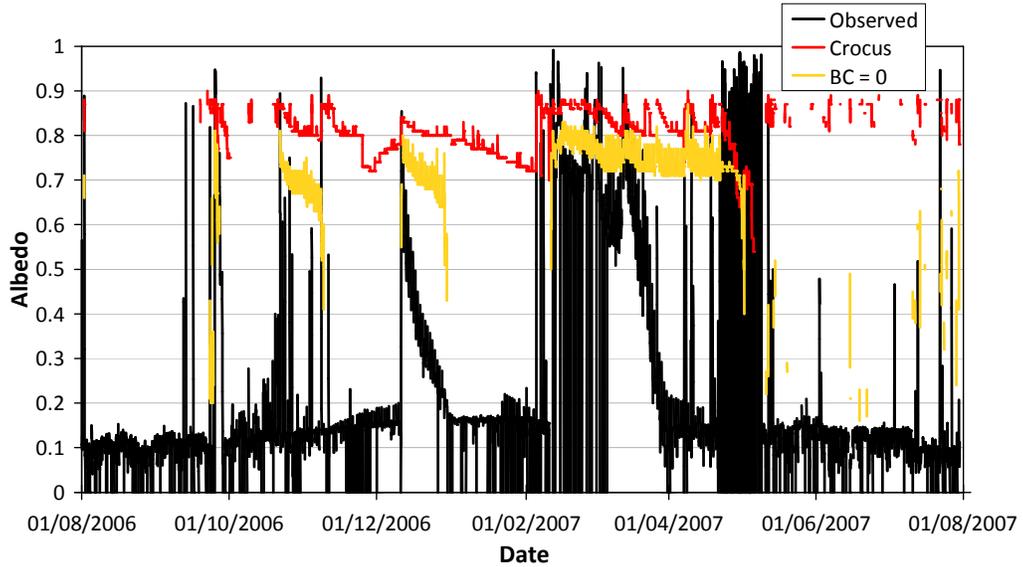


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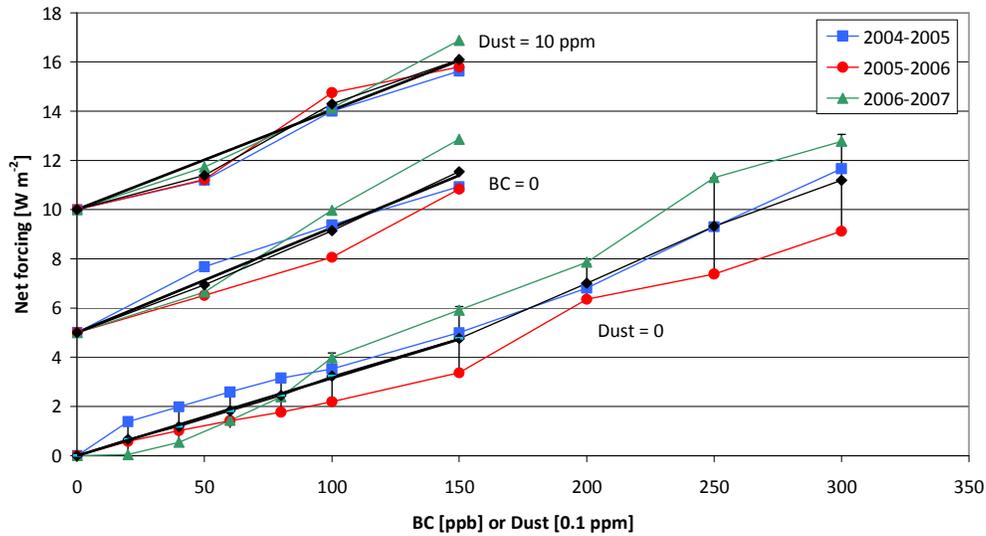
Fig. S2b: Same as Fig. S2a, but for 2006/07.



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 1107 Fig. S3a: Comparison of observed (black) and simulated albedo at NCO-P for the
 1108 winter season 2005/06. Simulations were performed with the standard crocus model
 1109 (red) and with the upgraded model including radiative transfer but without BC
 1110 (yellow).
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 1114 Fig. S3b: Same as Fig. S3a, but for 2006/07.
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 1118 Fig. S4: Simulated annual net forcing related to shortwave radiation and latent and
 1119 sensible heat fluxes due to the presence of BC and dust in the snow. Simulations are
 1120 performed without dust, without BC (shifted by $+5 \text{ W m}^{-2}$), and with dust = 10 ppm
 1121 (shifted by $+10 \text{ W m}^{-2}$). In the last case, the reductions are calculated relative to the
 1122 case with BC = 0 and dust = 10 ppm. Black symbols indicate the 3-yr averages of the
 1123 net forcing with the error bars representing the standard deviation. Black lines
 1124 correspond to results of linear regressions forced through the origin for all average
 1125 values for BC ≤ 150 ppb.