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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**Supplementary material**

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

**Fig. S1a:** Time series of recorded and corrected snow height (left axis) and precipitation (right axis) at NCO-P for the winter season 2004/05. The green line indicates the corrected snow height after removal of the recorded individual peaks (black lines). Maximum recorded snow height was 200 cm. The red line corresponds to the corrected time series of precipitation in comparison to the recorded precipitation (grey line). Horizontal red bars indicate solid precipitation.
Fig. S1b: Same as Fig. S1a, but for 2005/06. Maximum recorded snow height was 177 cm.

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

Fig. S2b: Same as Fig. S2a, but for 2006/07.
Fig. S3a: Comparison of observed (black) and simulated albedo 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 but without BC (yellow).

Fig. S3b: Same as Fig. S3a, but for 2006/07.
Fig. S4: Simulated annual net forcing related to shortwave radiation and latent and sensible heat fluxes due to the presence of BC and dust in the snow. Simulations are performed without dust, without BC (shifted by +5 W m\(^{-2}\)), and with dust = 10 ppm (shifted by +10 W m\(^{-2}\)). In the last case, the reductions are calculated relative to the case with BC = 0 and dust = 10 ppm. Black symbols indicate the 3-yr averages of the net forcing with the error bars representing the standard deviation. Black lines correspond to results of linear regressions forced through the origin for all average values for BC ≤ 150 ppb.