Supplement of

Comparison of on-line and off-line simulation for impacts of Snow-Darkening by Black Carbon deposition on the Arctic

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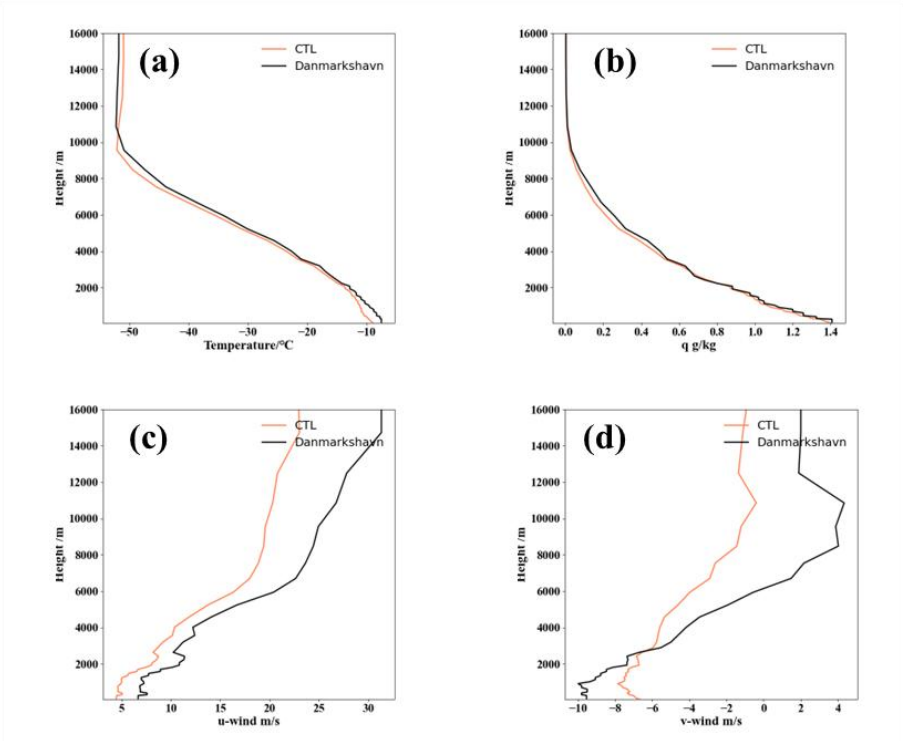

Figure S1. Vertical profiles of simulated (in orange lines) and observed (in black lines) (a) temperature (℃), (b) specific humidity (g kg^{-1}), (c) u-wind speed (m s^{-1}) and (d) v-wind speed (m s^{-1}) at the Danmarkshavn station at 00:00 and 12:00 (UTC) averaged from 15 April to 15 May 2020.

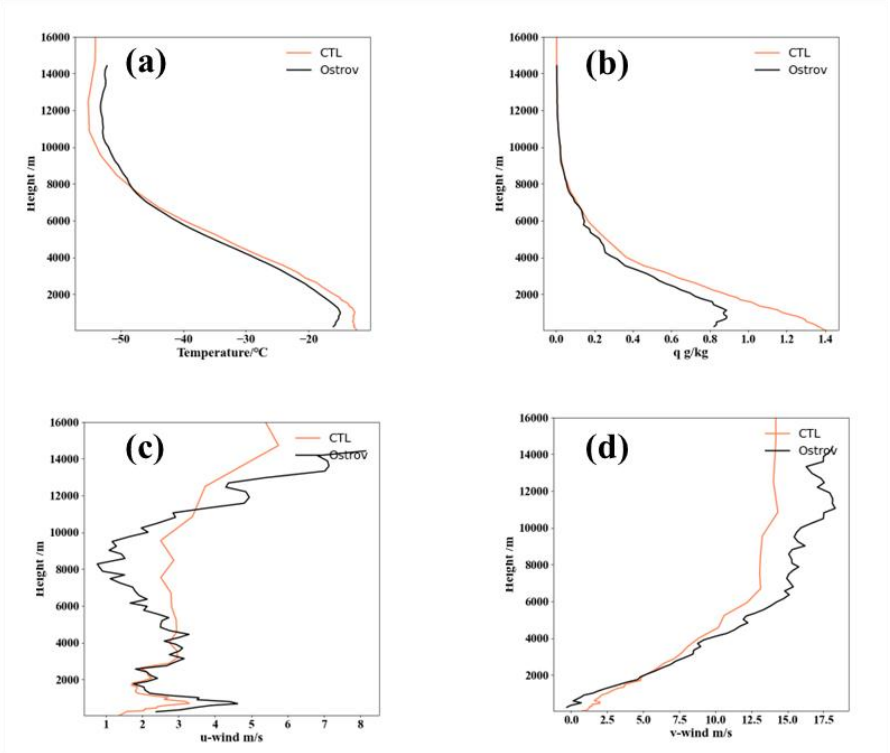

Figure S2. Vertical profiles of simulated (in orange lines) and observed (in black lines) (a) temperature (℃), (b) specific humidity (g kg^{-1}), (c) u-wind speed (m s^{-1}) and (d) v-wind speed (m s^{-1}) at the Ostrov station at 00:00 and 12:00 (UTC) averaged from 15 April to 15 May 2020.

Table S1. Statistics for observed and simulated meteorological fields (T2, RH2, WS10 and WD10) from 15 April to 15 May 2020 at Barrow and Summit stations.

	Barrow			Summit		
	MB	**R**	**RMSE**	**MB**	**R**	**RMSE**
T2 (℃)	**2.08**	**0.97**	**2.48**	**2.58**	**0.89**	**4.88**
RH2 (%)	**-2.97**	**0.81**	**5.95**	**0.59**	**0.68**	**6.06**
WS10 (m s^{-1})	**-0.23**	**0.81**	**1.65**	**-0.87**	**0.93**	**1.71**
WD10 (°)	**-5.52**	**0.63**	**80.1**	**-27.5**	**0.56**	**57.4**

Table S2. Statistics for observed and simulated surface energy balance (SW, HS, and LH) from 15 April to 15 May 2020 at Alaska.

	MB	R	RMSE
SW (W m^{-2})	**0.24**	**0.88**	**53.21**
HS (W m^{-2})	**3.12**	**0.57**	**17.39**
LH (W m^{-2})	**-0.96**	**0.58**	**3.24**