Supplemental material for "Examining the atmospheric radiative and snow-darkening effects of black carbon and dust across the Rocky Mountains of the United States using WRF-Chem"

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Supplement Text

S1. Spatial pattern of BCD Burden

The spatial distributions of in-domain February-through-July-averaged anthropogenic BC and dust surface emission rates are shown in Figs. S2a and S2b, respectively. BC emissions are maximized within cities of the WUS, such as Denver, Salt Lake City, and Las Vegas. Anthropogenic BC emissions also collocate with the federal interstate network. We note that, especially during summer months, a sizeable fraction of the BC emissions is associated with wildfires (not shown). Wildfires are scattered during our simulation record (not shown), although they emit 100s to 1000s of mg m^{-2} of BC into the atmosphere. Dust emissions on the other hand are maximized over the Mojave and Great Basin deserts as well as eastern Montana. As shown in Figs. S2c and S2d, the largest burdens of BCD are simulated near or atop their respective emission sources. However, CNT emits over an order of magnitude more dust than BC, contributing to a large difference in February-through-July-averaged burdens (0.31 mg m^{-2} for BC, 9.9 mg m^{-2} for dust).

Supplement Figures

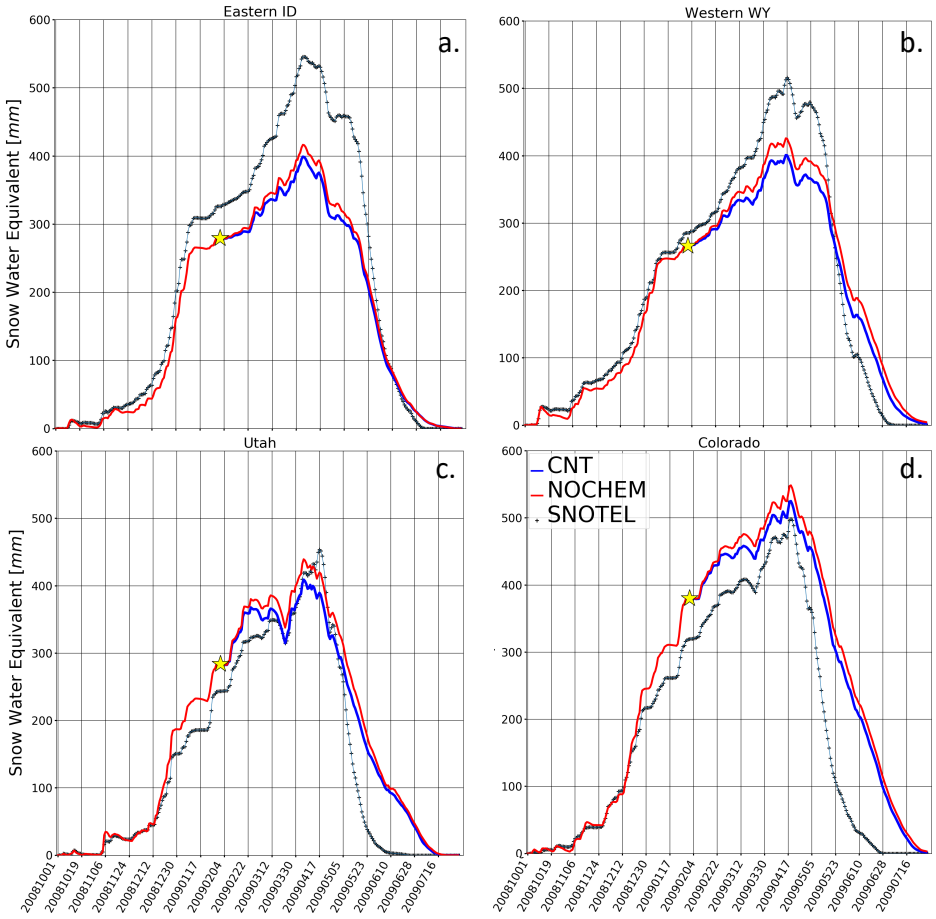

Figure S1. SWE across (a) the Idahoan, (b) Wyoming, (c) Utah, and (d) Coloradan subregions.

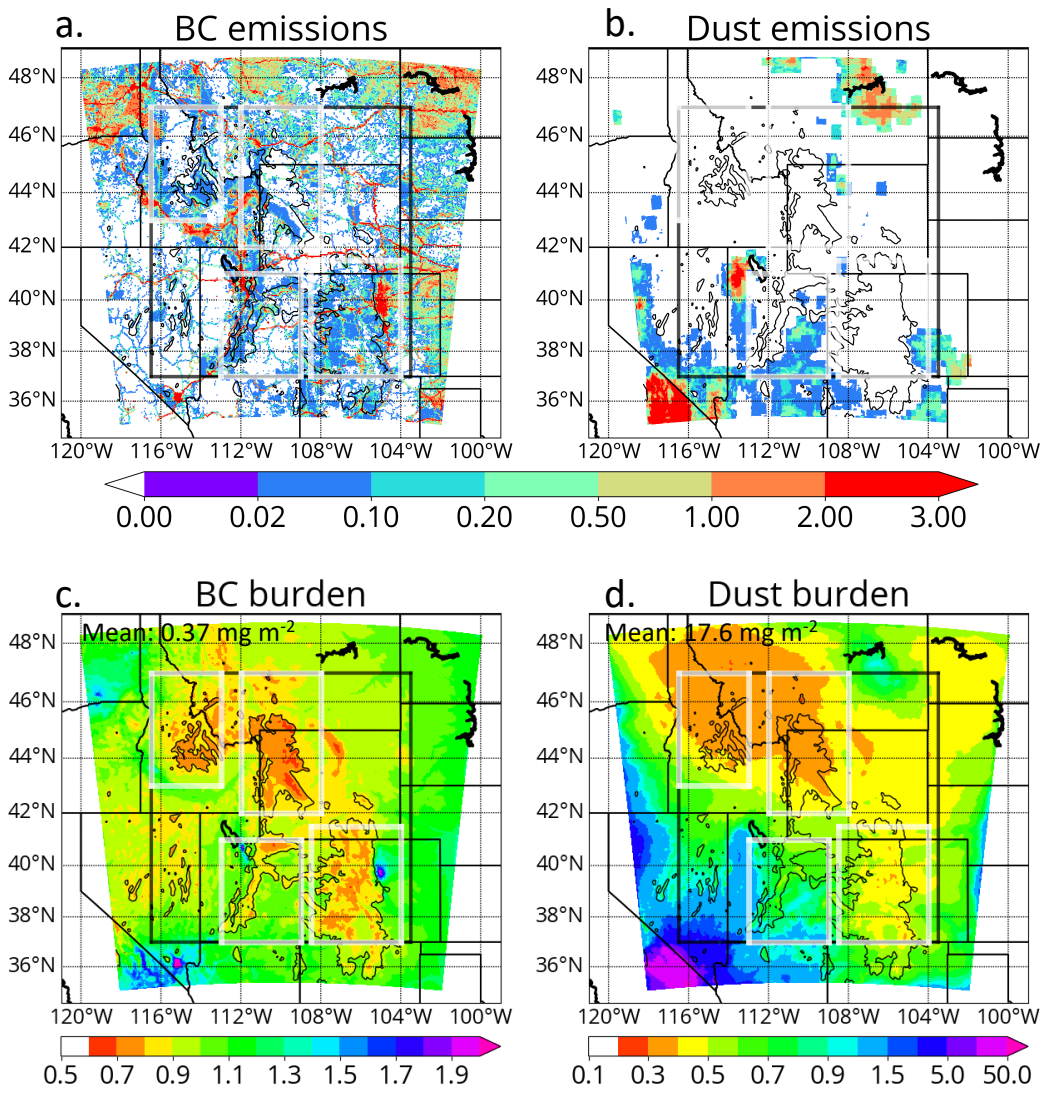

Figure S2. Spatial distribution of (a) daily-averaged anthropogenic BC emission rates from EPA NEI ($\mu g\ m^{-2}s^{-1}$) and (b) averaged dust emission rates ($\mu g\ m^{-2}s^{-1}$). Panels (c) and (d) show the March-through-June-averaged mean-normalized BC and dust burdens, respectively (unitless). Note the difference in the colorbars.

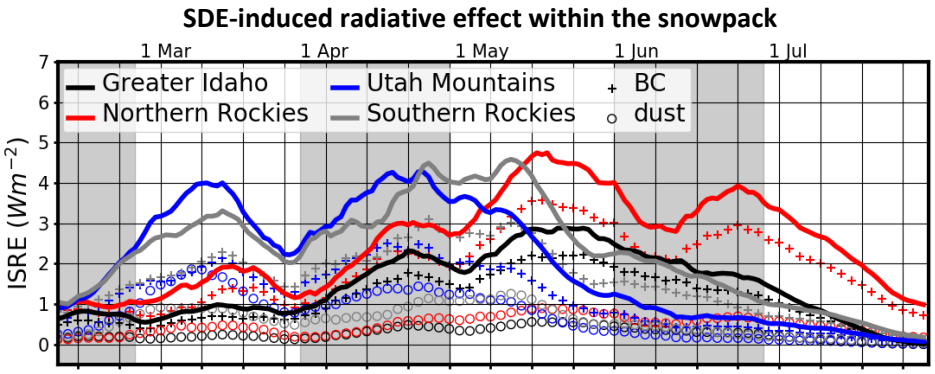

Figure S3. Presented by region are low-pass filtered time series of surface ISRE across various subregions, separated by aerosol type (BC or dust).

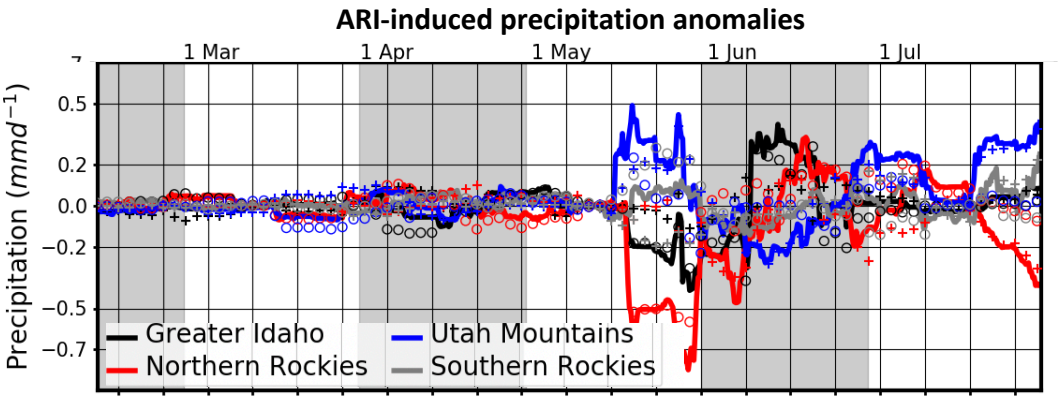

Figure S4. Presented by region are low-pass filtered time series of surface ISRE across various subregions, separated by aerosol type (BC or dust).