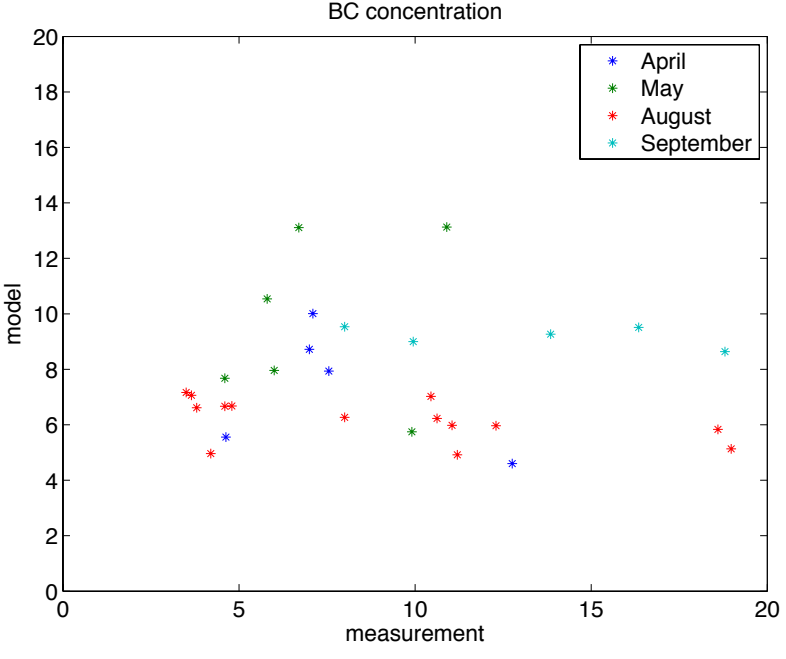

Fig. 1. Model and observed BC concentrations (ng g^{-1}) in the top, surface scattering layer of sea ice or snow on sea ice are compared. Each point represents an average of observations compared with a climatological value for the model grid box that contains those latitude-longitude locations.
figure

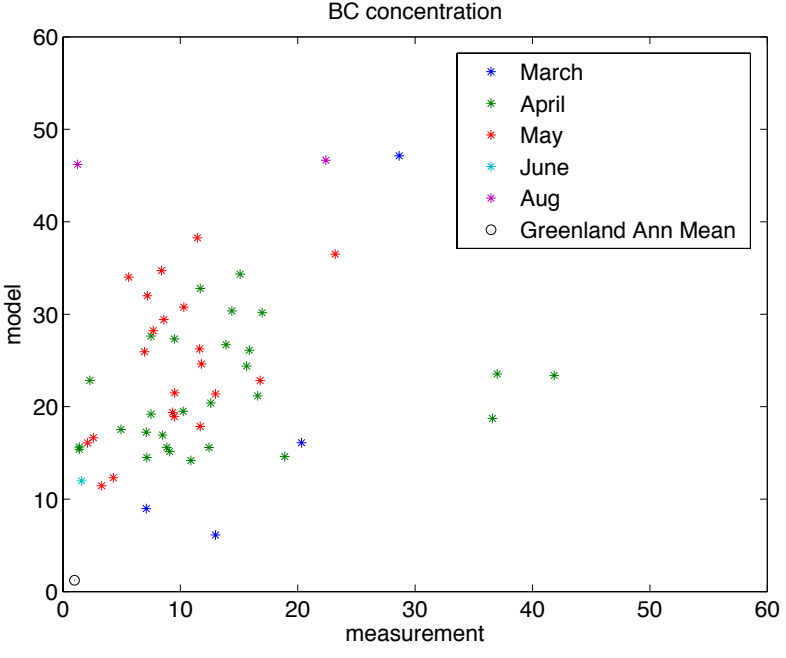

Fig. 2. Model and observed BC concentrations (ng g^{-1}) in the top snow layer on land are compared. Each point represents an average of observations compared with a climatological value for the model grid box that contains those latitude-longitude locations. For comparison, an annual mean value for the year 2000 from the ice core described in **?** is also plotted against model climatology.

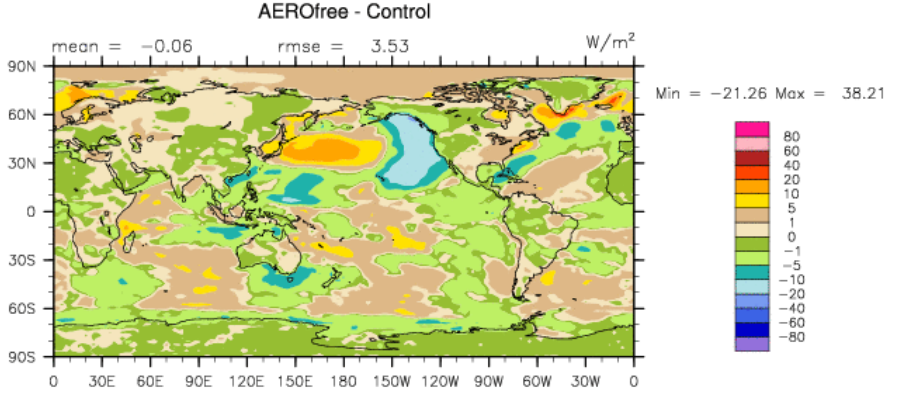

Fig. 3. Surface residual heat flux (W m^{-2}) in December-January-February for a simulation with aerosol deposition (labeled Control here) subtracted from one without. (For illustration of response, not inclusion in final paper.)

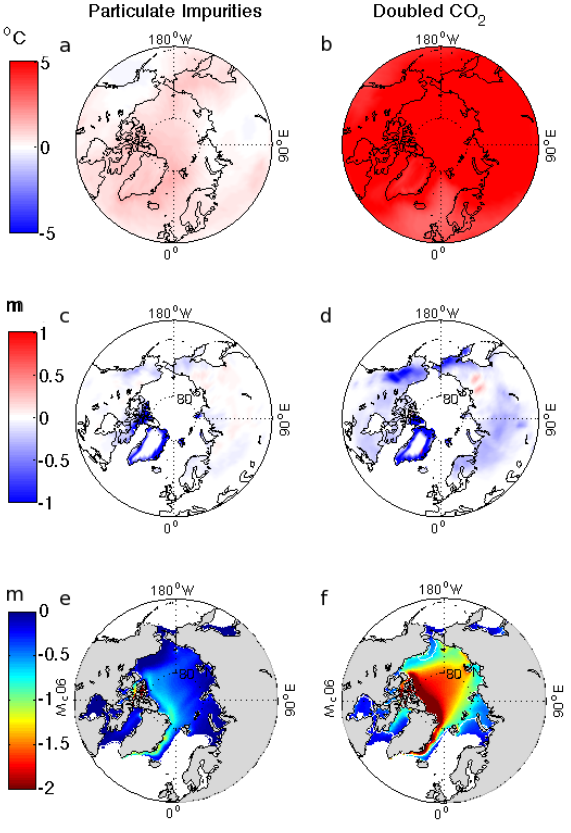

Fig. 4. Annual mean difference in 2m reference temperature due to particulate impurities in snow and sea ice **(a)**, and due to doubled carbon dioxide **(b)**. The same to forcings are compared for the response in snow water equivilent **(c** and **d)**, and for sea ice thickness difference **(e** and **f)**. Values may be saturated in some cases so that the same scale could be used for a given field.

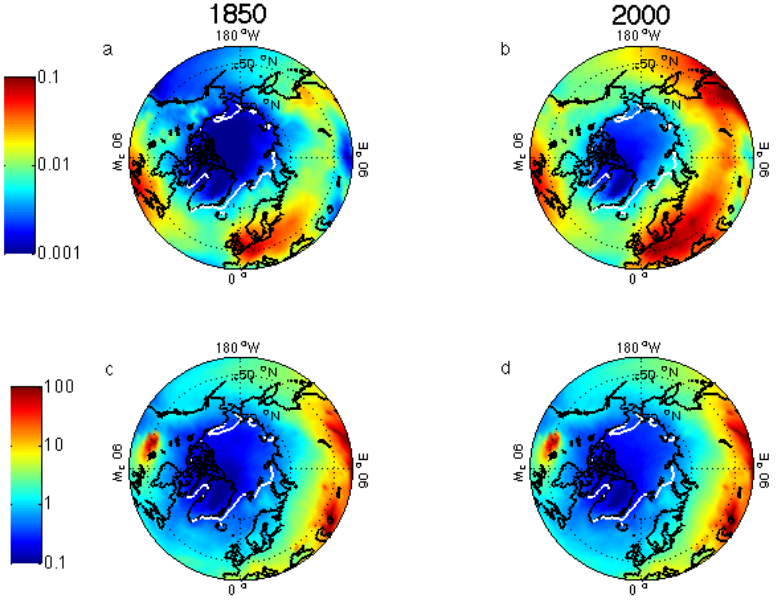

Fig. 5. Prescribed black carbon year 1850 **(a)** and year 2000 **(b)** deposition fluxes ($\mathrm{g\,m^{-2}\,yr^{-1}}$) annual average, demonstrate the much smaller quantities of aerosol deposited on sea ice compared to land snow. The white line shows September sea ice 15 % concentration contour for reference from one of our simulations without aerosol deposition. **(c)** and **(d)** show the same for dust deposition fluxes.

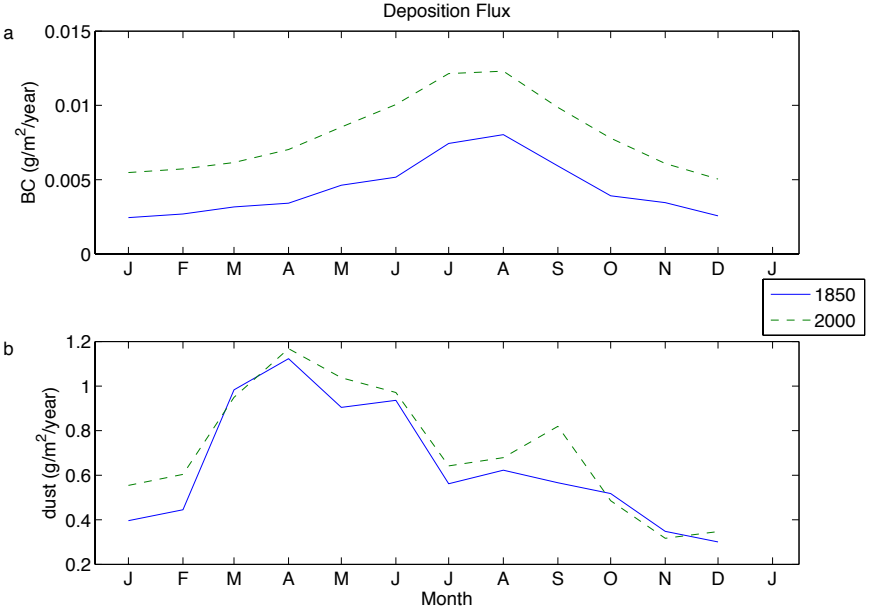

Fig. 6. Prescribed black carbon **(a)** and dust **(b)** year 1850 and year 2000 deposition fluxes ($\mathrm{g\,m^{-2}\,yr^{-1}}$) as a function of month for latitudes North of 60°N.