Impacts of large-scale atmospheric circulation changes due to winter sea-ice retreat on Black Carbon transport and deposition to the Arctic

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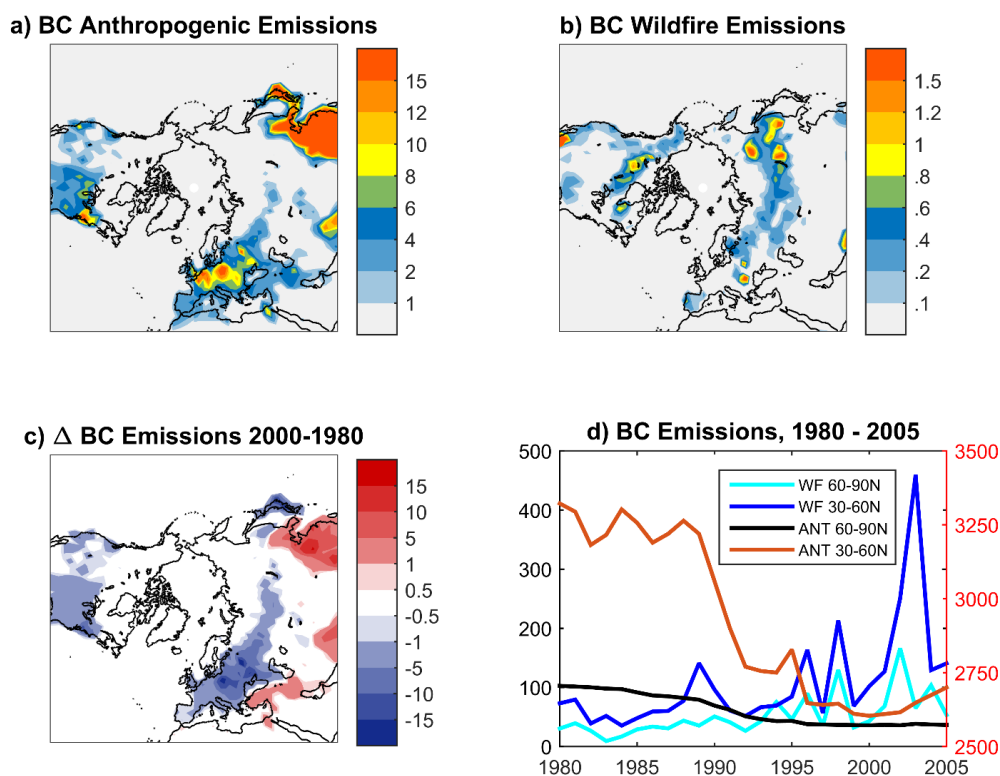
Figure S1 Overview of BC emissions above 30°N as used in the ECHAM5-HAMMOZ simulations: a) multi-annual mean (1980-2005) of total BC anthropogenic emissions (Gg year^{-1}); b) multi-annual mean (1980-2005) of total BC wild fire emissions (Gg year^{-1}); c) difference of BC total emissions (Gg year^{-1}) between years 2000 and 1980; d) annual variability of BC total anthropogenic (ANT) and wild fire (WF) emissions (Gg year^{-1}) at mid- (30°N-60°N) and high-latitudes (60°N-90°N) [ANT 30-60N emissions are displayed on the right y-axis].
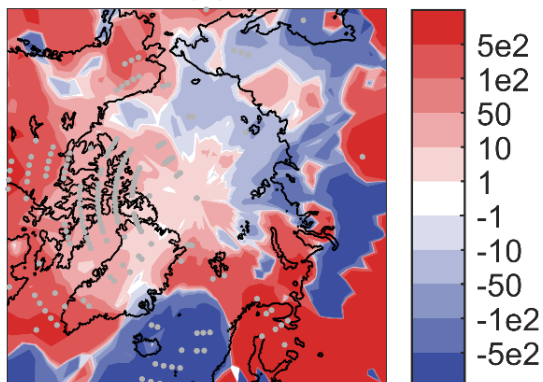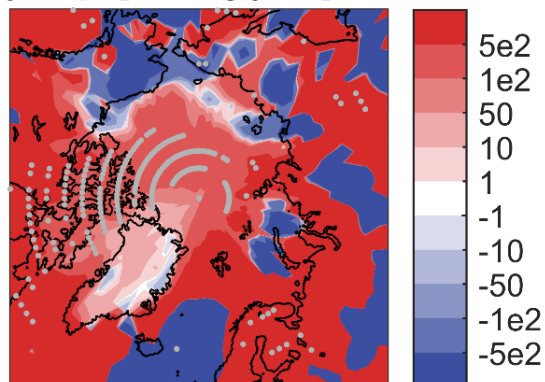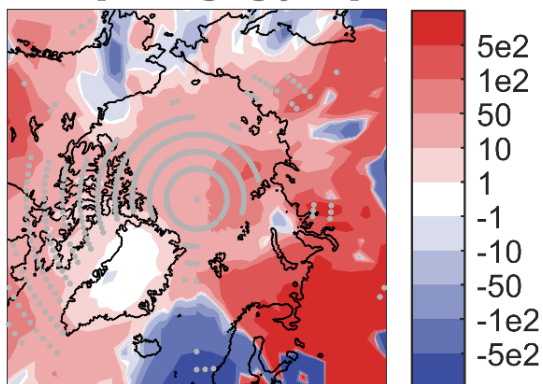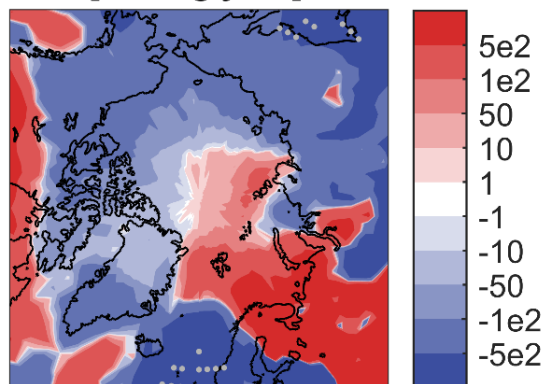
Figure S2 Winter (DJF) trends of BC wet deposition (a), dry deposition (b), surface concentration (d), and total load (d) for the ECHAM5-HAMMOZ FIX1980 simulation. Grey dots represent the grid points with trend significant at 5% level.

BC Load [10^{-2} kg/year]
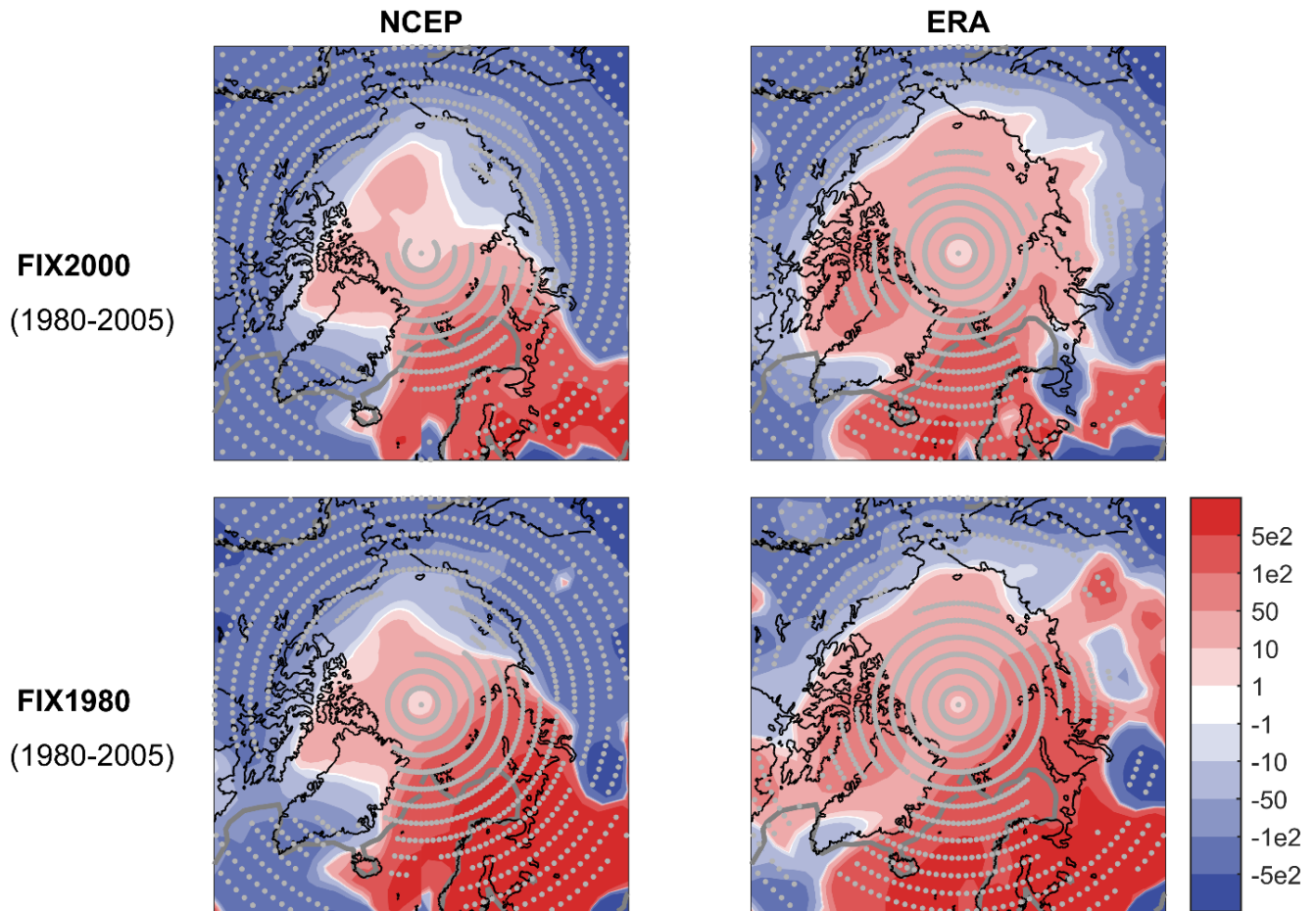
Figure S3 Four different estimates (see also Table 1) of total trends of maximum likelihood BC load associated to three atmospheric circulation patterns (Total=NAO+SB+ENSO). The grey line represents the mean winter sea ice and snow cover larger than 50% since 1980 to now. Grey dots represent the grid points with trend significant at 5% level.

BC Load [10^{-2} kg/year]
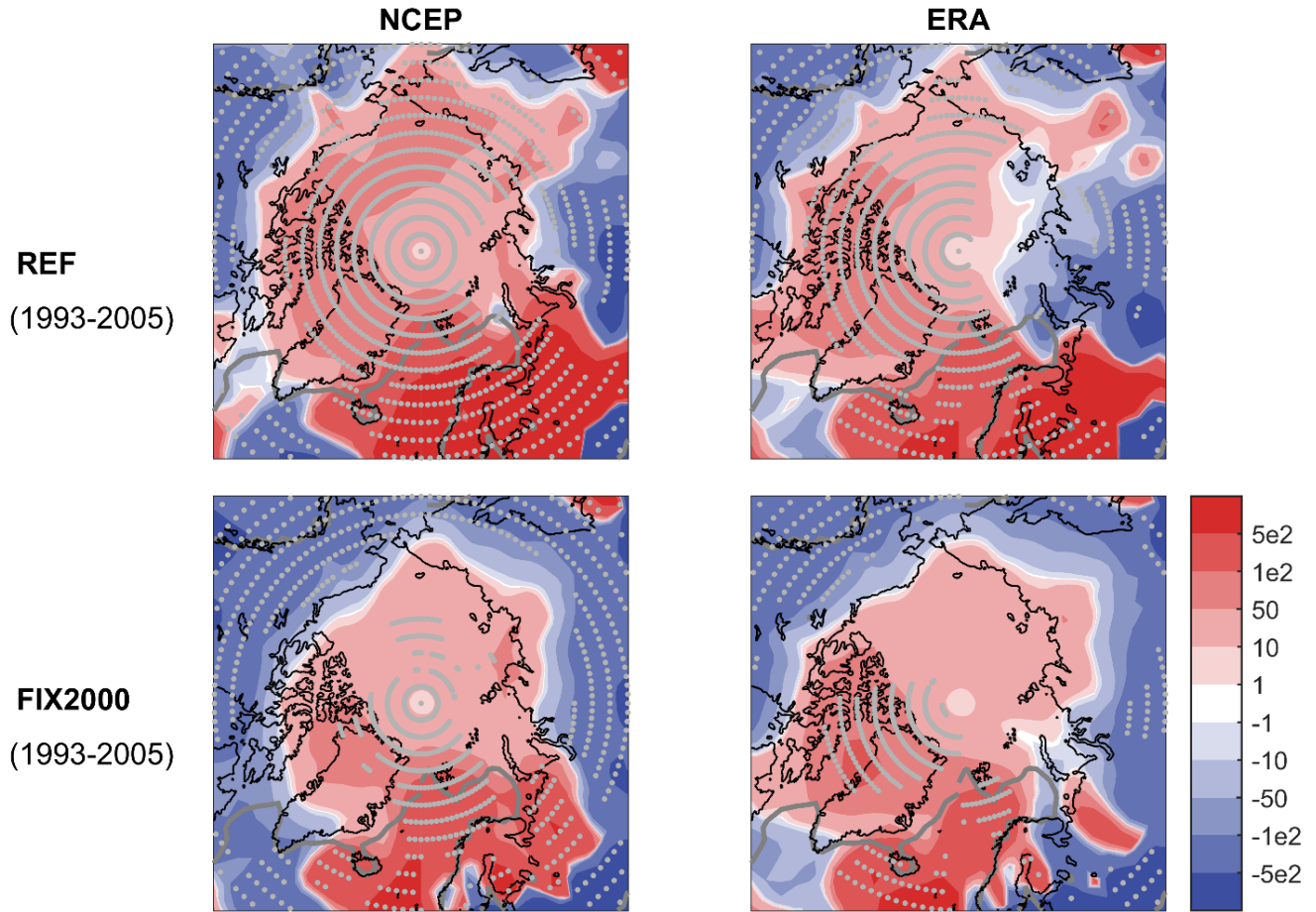
Figure S4 Four different estimates (see also Table 1) of total trends of maximum likelihood BC load associated to three atmospheric circulation patterns (Total=NAO+SB+ENSO). The grey line represents the mean winter sea ice and snow cover larger than 50% since 1980 to now. Grey dots represent the grid points with trend significant at 5% level.
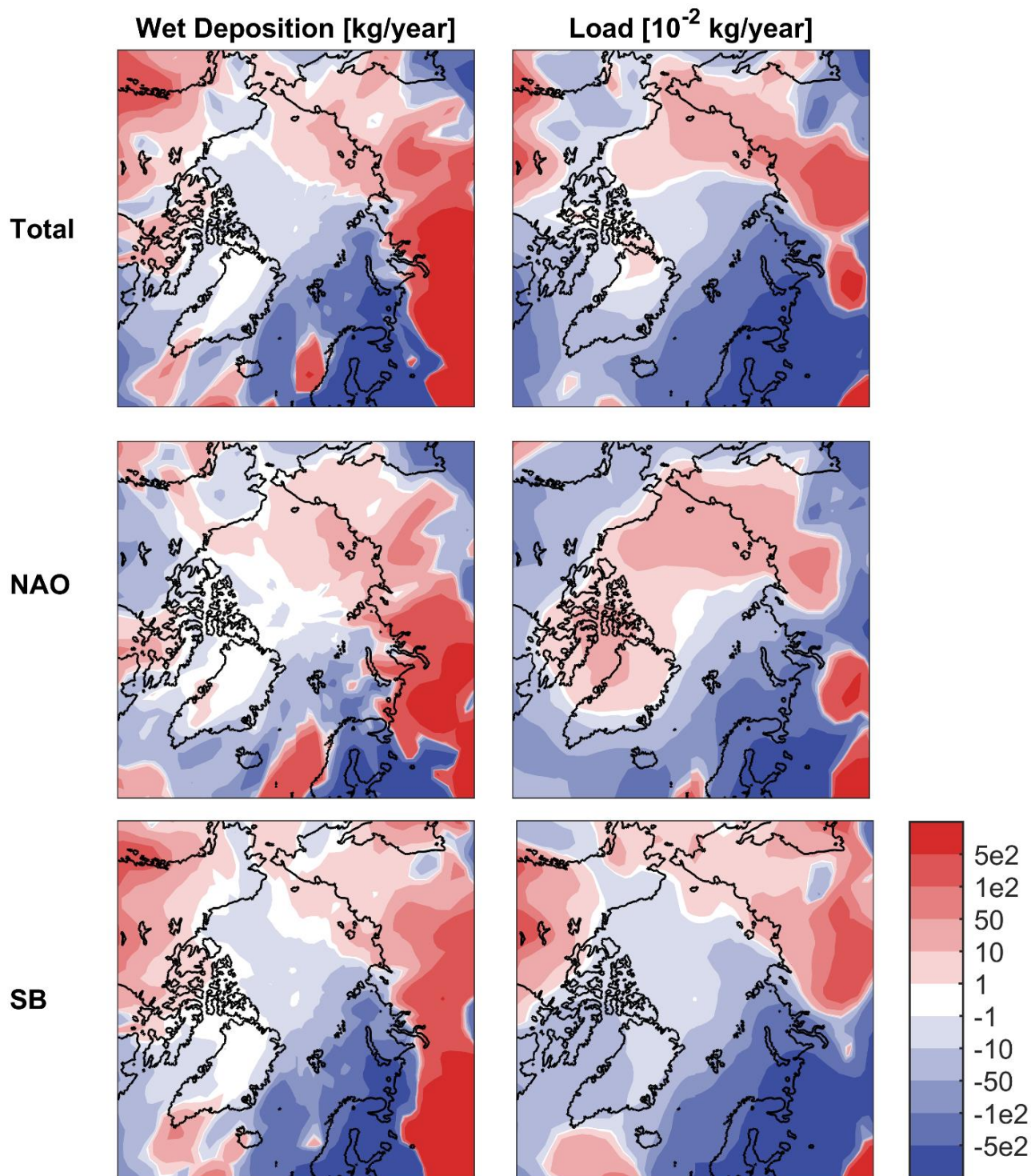
Figure S5 Differences between trend of MLE of BC wet deposition and load from the FIX2000 and FIX1980 chemistry-climate model simulations.