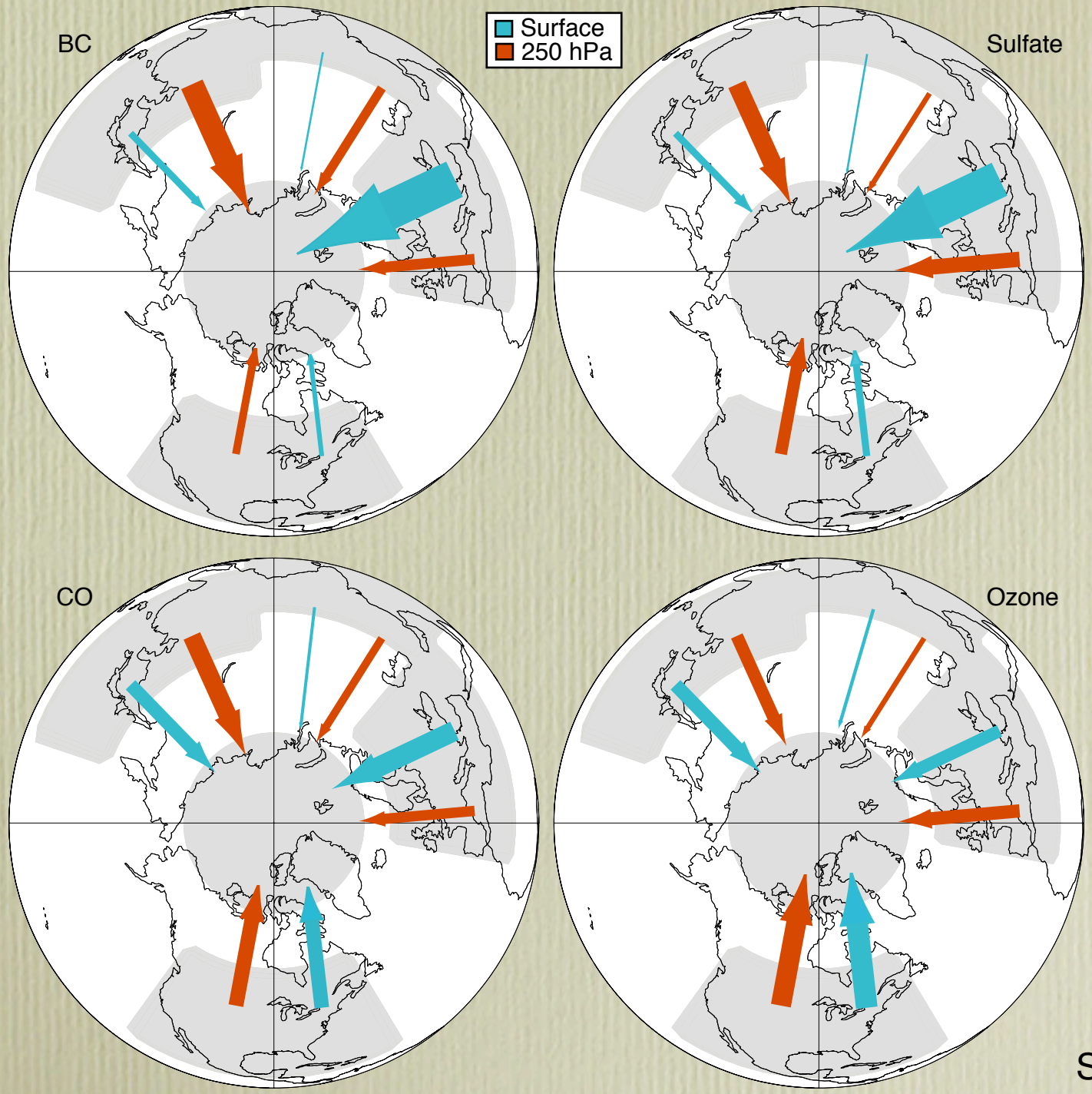
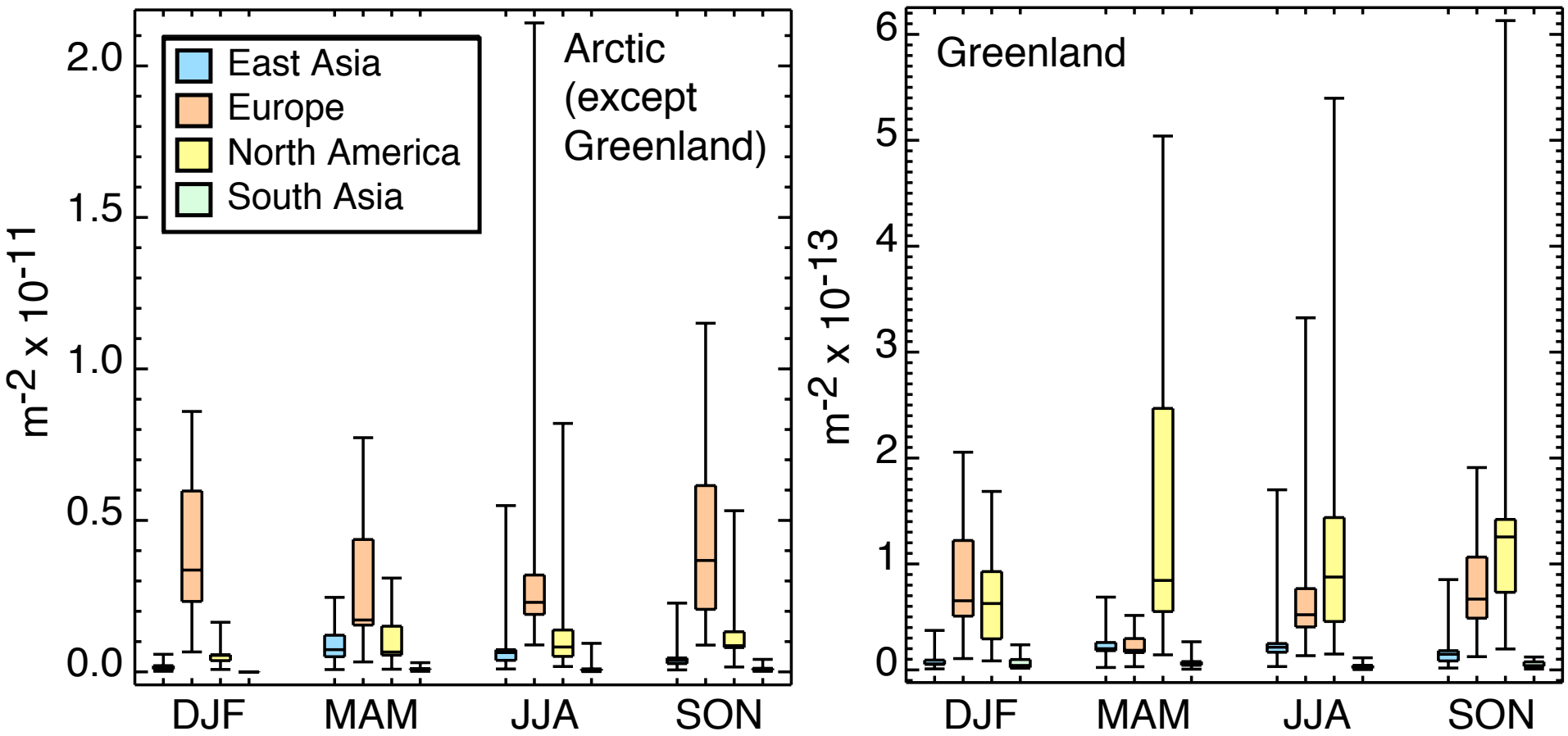
Arctic Pollutants



Shindell et al, ACPD, 2008

Arctic Pollutants

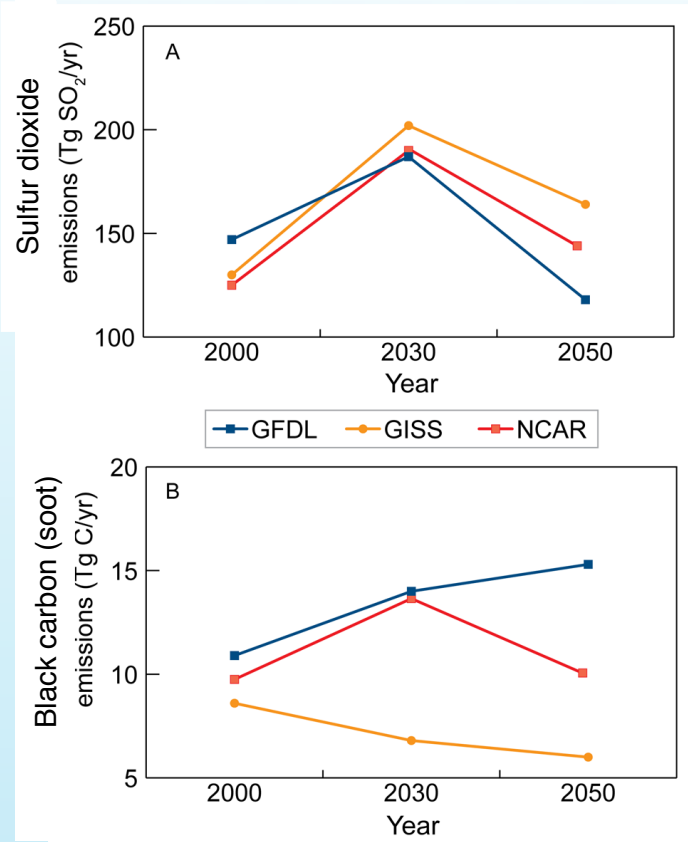
Sensitivity of BC deposition to regional emissions



Shindell et al, ACPD, 2008

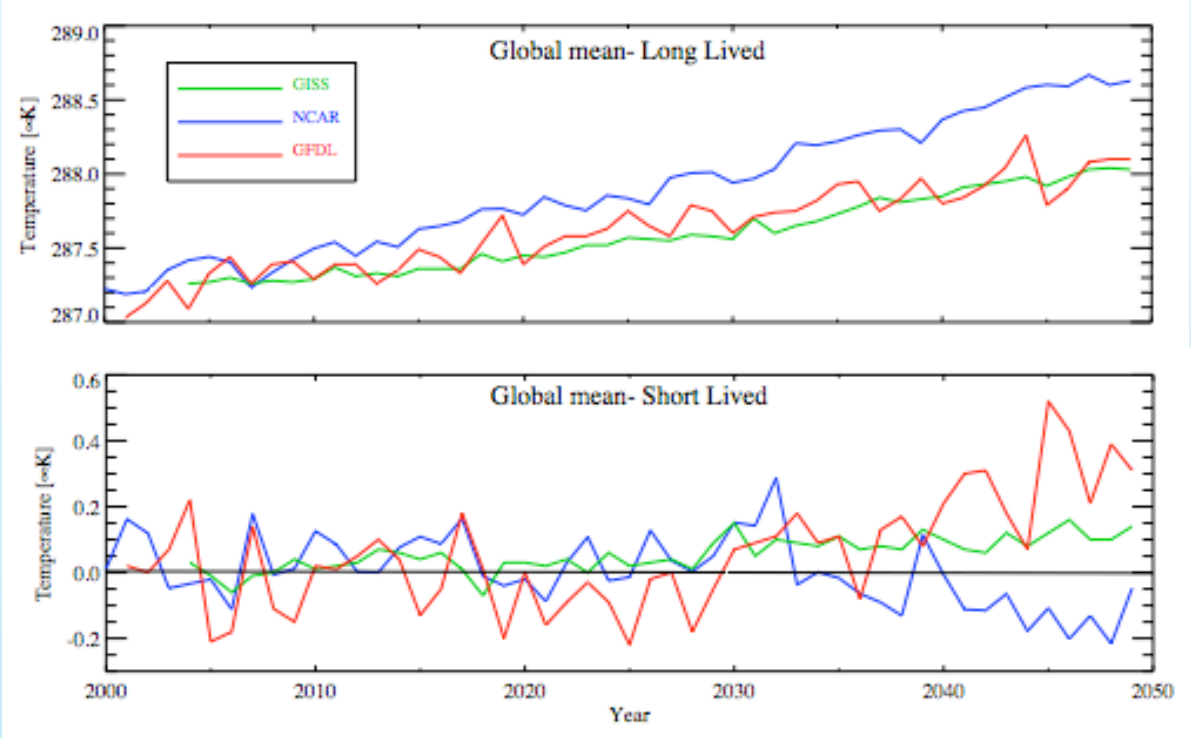
Climate change due to short-lived pollutants

Aerosol precursor emission projections for a single socio-economic storyline not well-defined



Models include different physics as well

Transient ensemble climate from US climate models (for CCSP SAP 3.2)



soot
ozone

ozone indirect

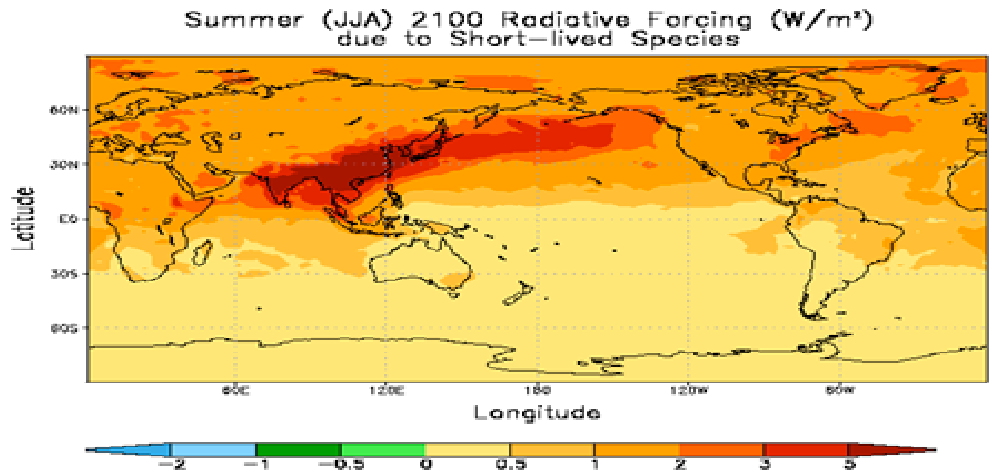
sulfate

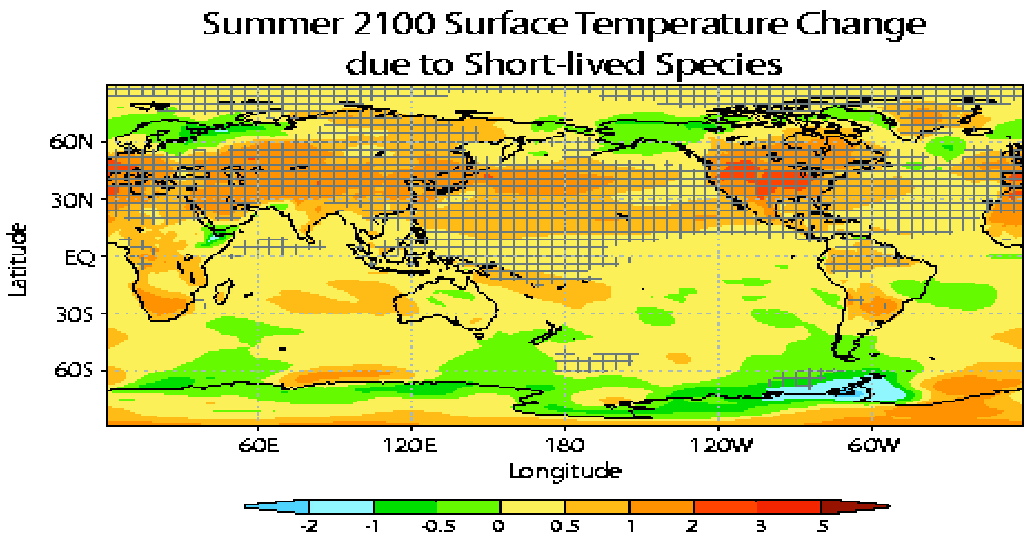
Short-lived species enhance projected warming by ~20-25% in NOAA GFDL and NASA GISS models, near zero effect in NCAR model.

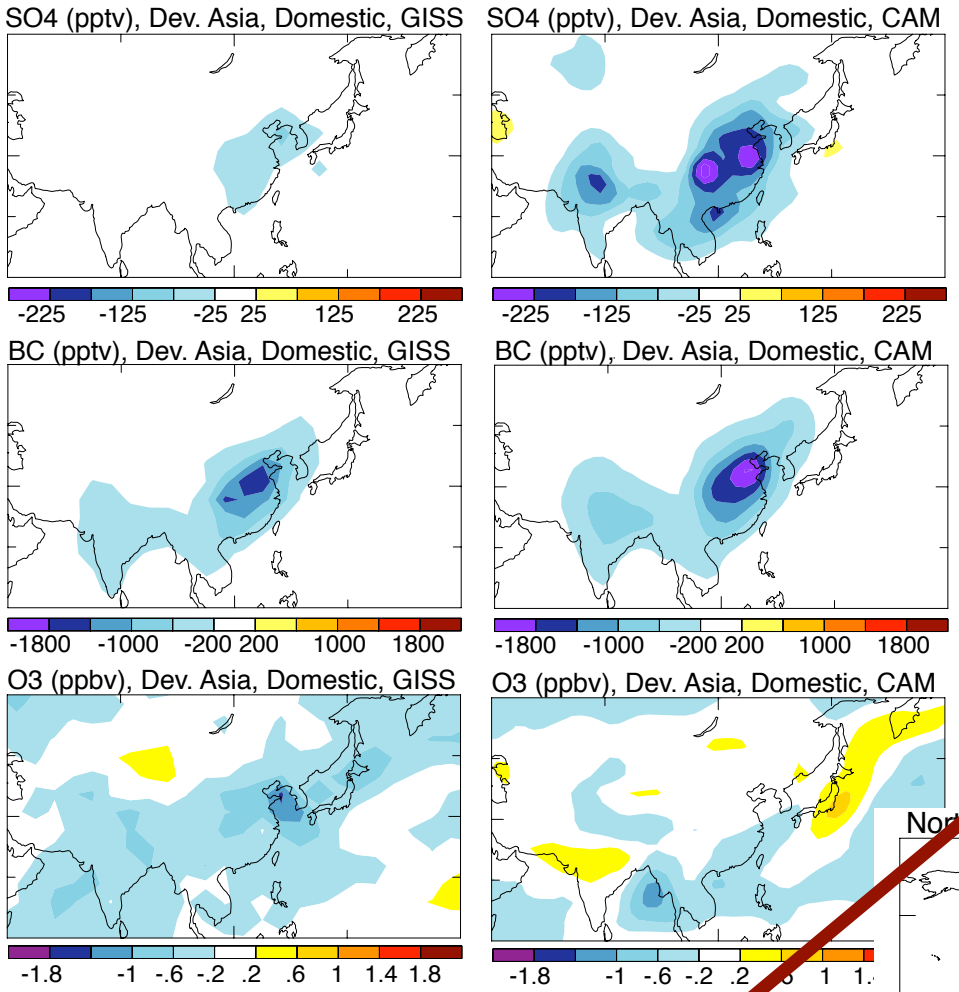
Shindell et al. (2008), Journal of Geophysical Research

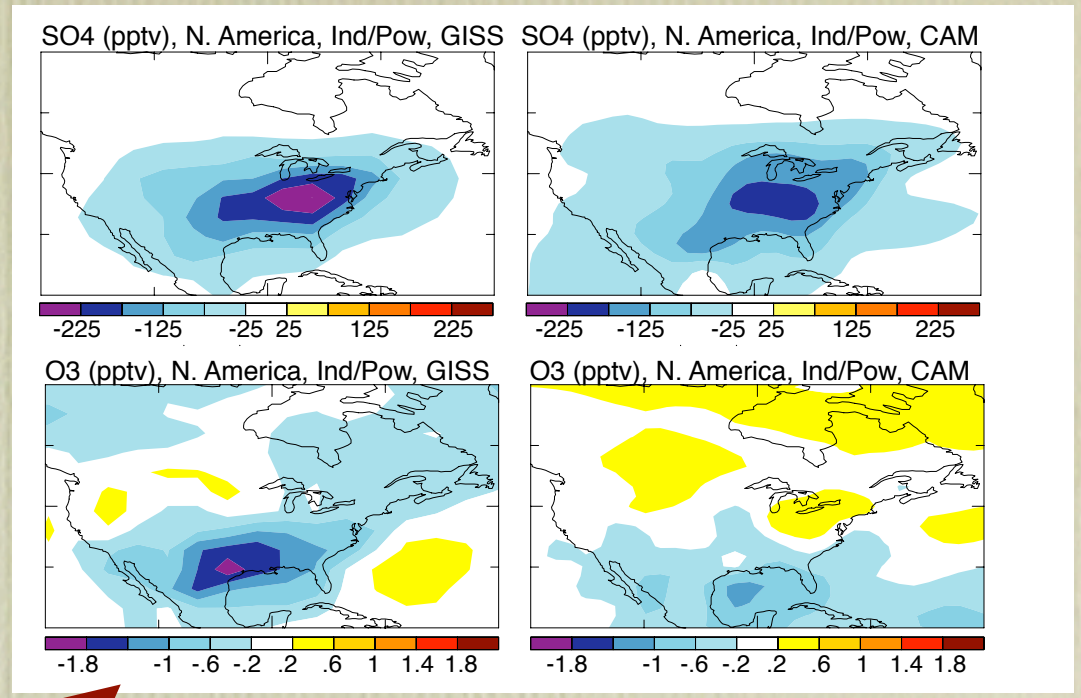
Main causes of differences: emissions, aerosol physics, stratosphere-troposphere ozone interactions

Forcing & Response

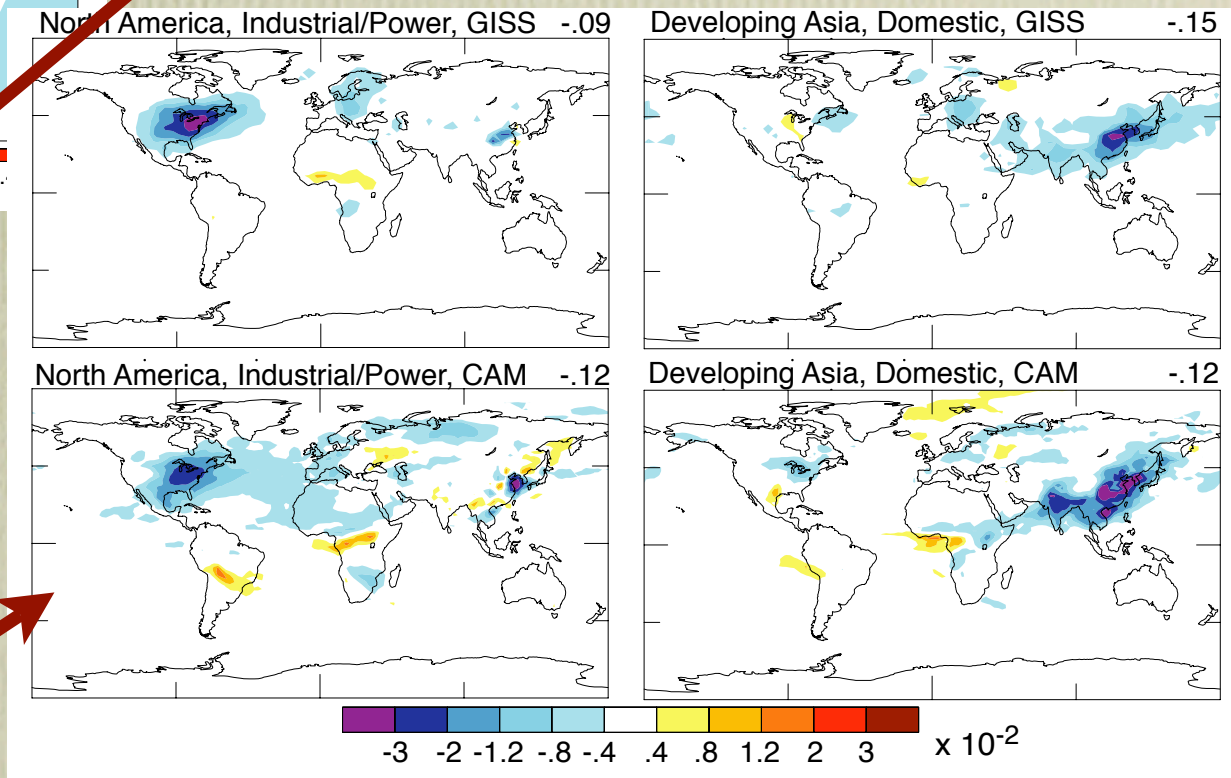




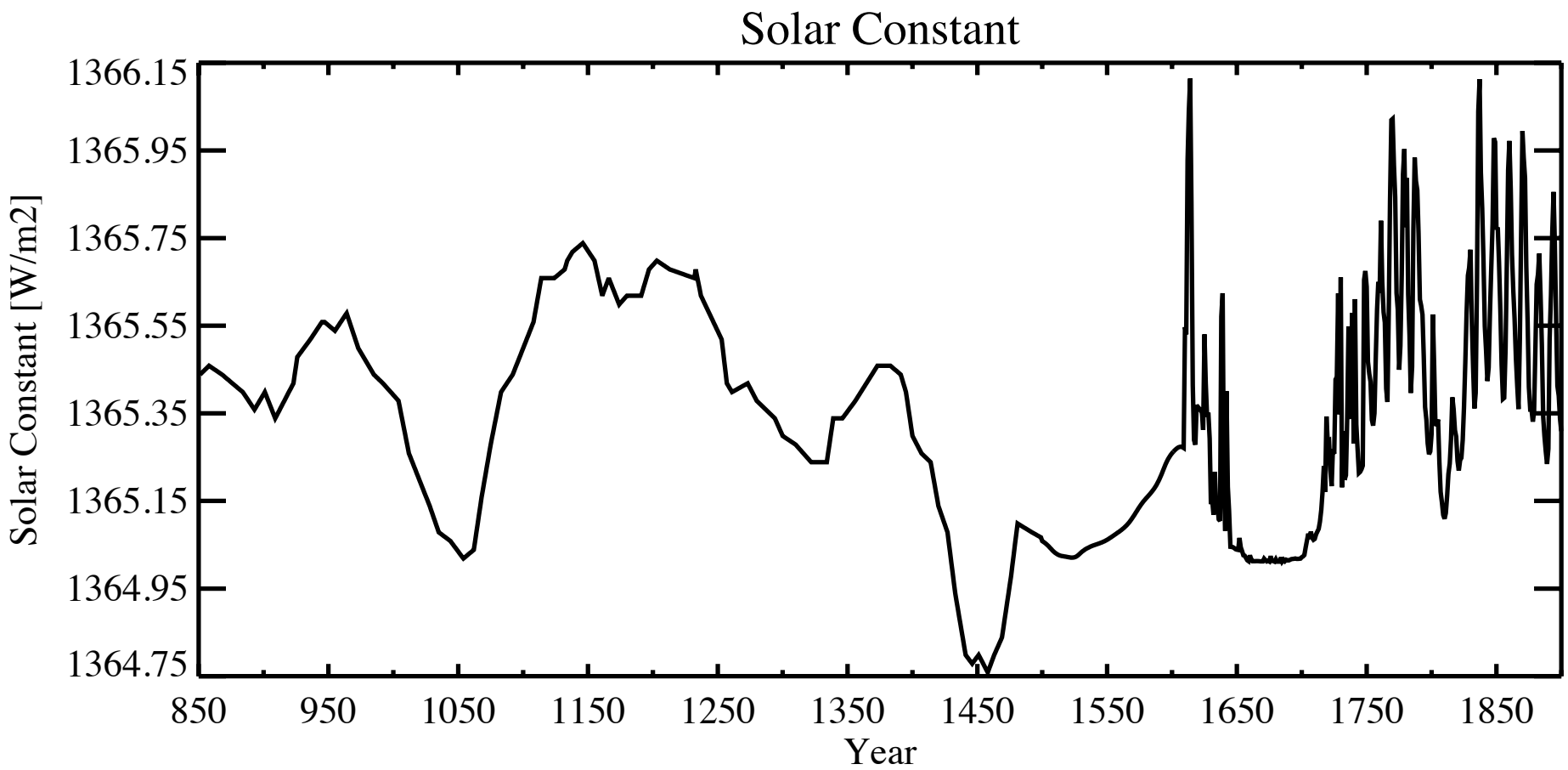


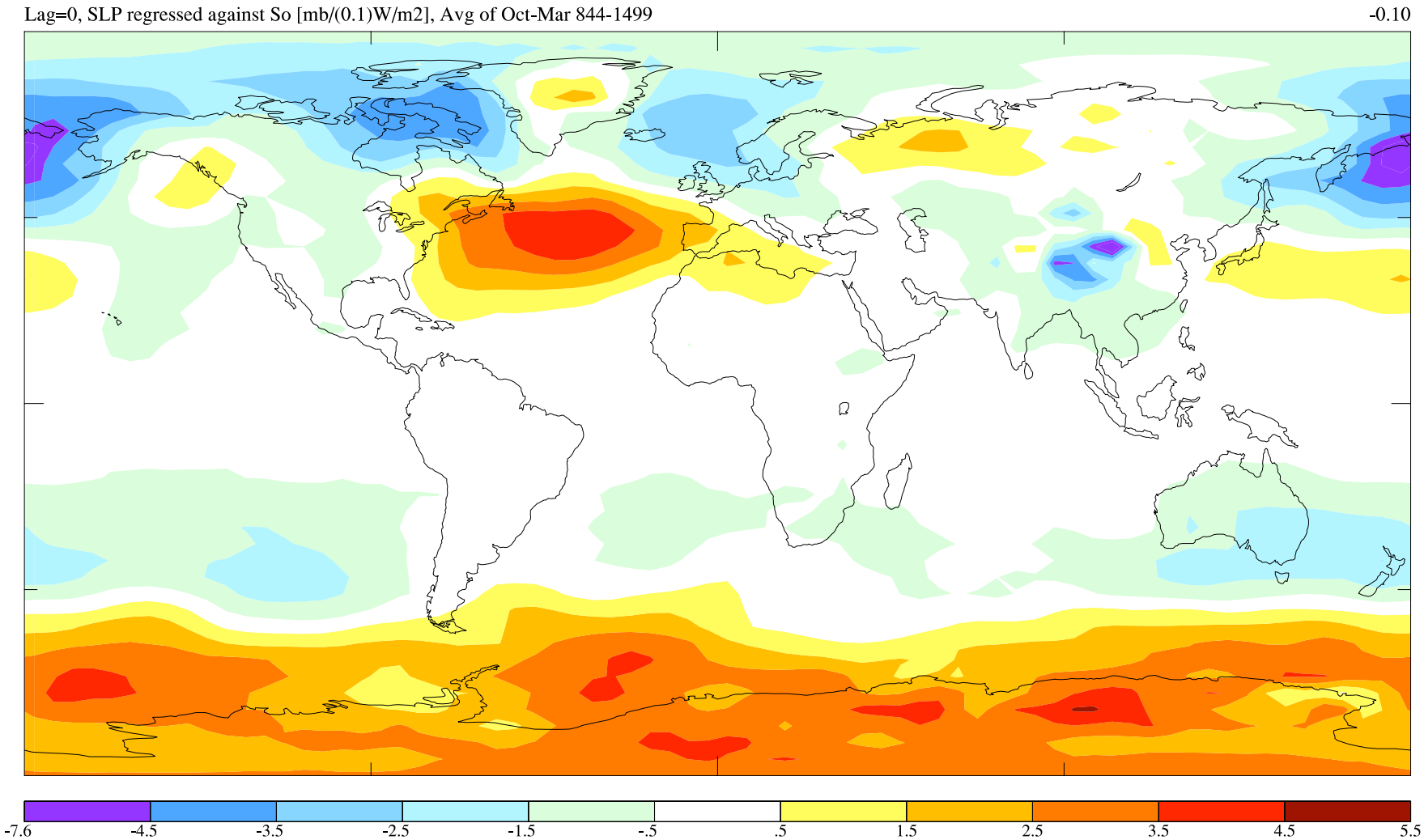


Surface Pollutants

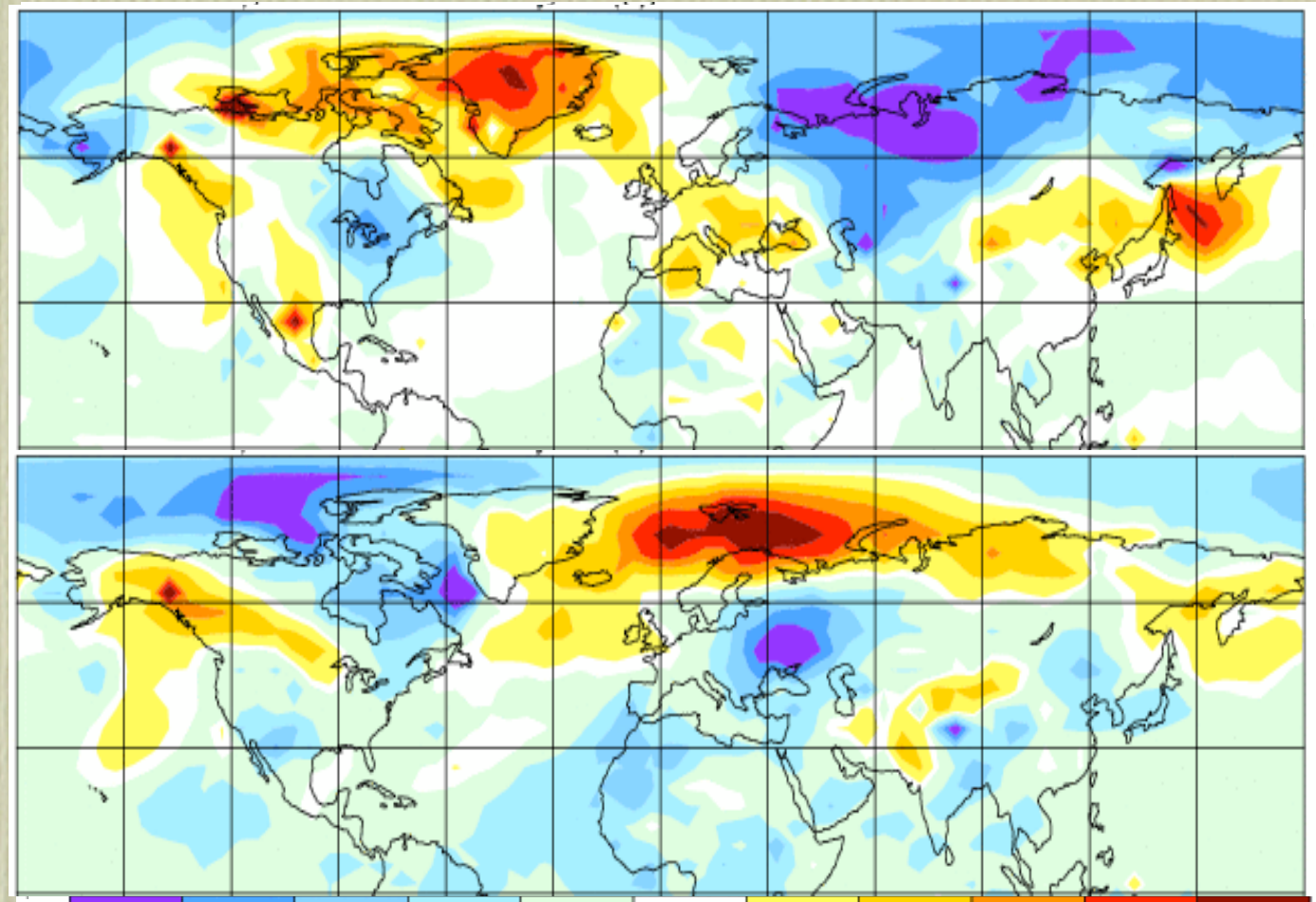


Aerosol Optical Depths


Solar Constant
Solar Constant [W/m2]
1366.15
1365.95
1365.75
1365.55
1365.35
1365.15
1364.95
1364.75
850
950
1050
1150
1250
1350
1450
1550
1650
1750
1850
Year

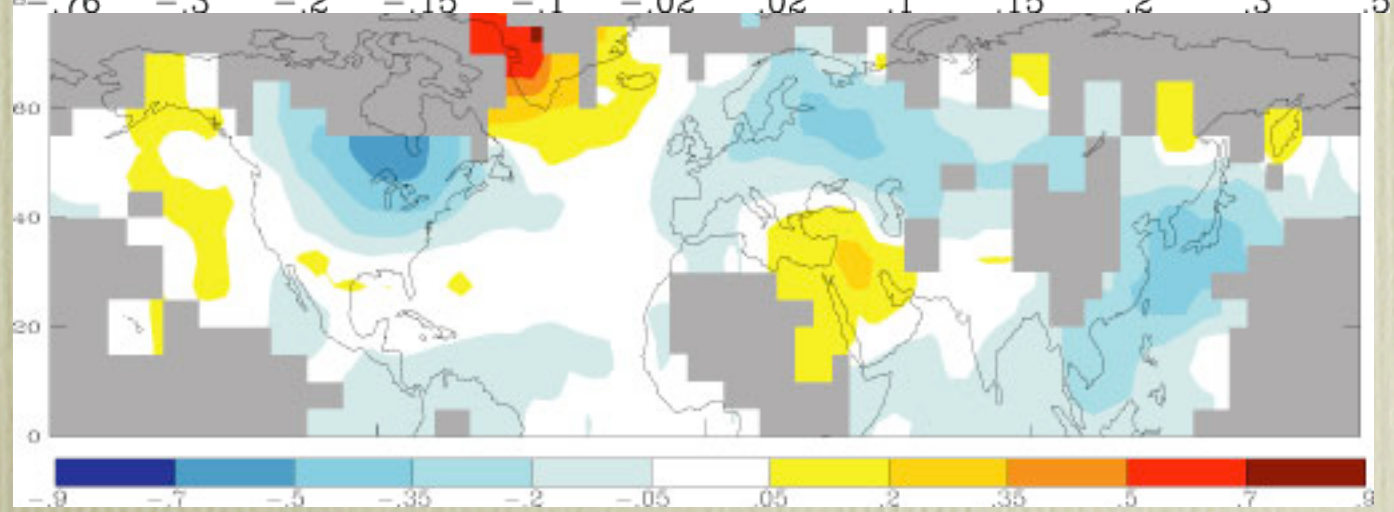

Lag=0, SLP regressed against So [mb/(0.1)W/m2], Avg of Oct-Mar 844-1499
-0.10
-7.6
-4.5
-3.5
-2.5
-1.5
-.5
.5
1.5
2.5
3.5
4.5
5.5

ge



Early Maunder

Late Maunder



Proxy temperature/proxy solar correlation (20 yr lag)