## arctic: absolute difference surface flux surface flux surface concentration surface concentration surface concentration of BC - shp-atl-shift-1950 of SO2 - shp-atl-shift-195 of BC - shp-atl-shift-195 of SO4 - shp-atl-shift-1950 of SO2 - shp-atl-shift-195 3e-01 5.0e-05 0.0e+0.02e-01 $\Delta so2$ 5.0e-03 0e+00 2.5e-05 1e-01 -2.5e-01 2.5e-03 0.0e+00 0e+00 0.0e + 00-1e+00 2002 2003 2004 2002 2003 2004 2002 2003 2004 2000 2001 2000 2001 2002 2003 2004 2000 2001 2002 2000 2001 Year Year Year Year Year upwelling longwave flux at TOA – shp-atl-shift-195 upwelling shortwave flux at TOA – shp–atl–shift–195 upwelling clear-sky longwav flux at TOA - shp-atl-shift-19 incident shortwave flux net radiative flux at TOA - shp-atl-shift-195 at TOA - shp-atl-shift-195 5 0e-02 2e-02 2e-01 2e-02 2e-01 1e-02 rsut 1e-01 ∆ rlut 0.0e + 0.0e +∆ rlut -0e+00 0e+00 0e+00 00+00 -2 5e-02 -1e-02 -1e-01 -1e-0 -2e-02 2000 2001 2002 2003 2004 2000 2001 2002 2003 2004 2000 2001 2002 2003 2004 2000 2001 2002 2003 2004 2000 2001 2002 2003 2004 Year Year Year Year Year clear-sky net radiative implied cloud response dry deposition rate upwelling clear-sky shortway wet deposition rate flux at TOA - shp-atl-shift-19 flux at TOA - shp-atl-shift-19 at TOA - shp-atl-shift-195 of BC - shp-atl-shift-1950 of BC - shp-atl-shift-195 rsutcs) 3e-02 2e-01 2e-02 2e-01 5.0e-01 2e-02 rlutcs + rsutcs rlutcs-1e-02 1e-01 2.5e-01 ∆ rsutcs ∆ wetbc Δ drybα 0e+00 0e+00 0.0e+00 rsut 0e+00 -2e-01 -2e-02 ij 1e-01 -4e-02 2000 2001 2002 2003 2004 2000 2001 2002 2003 2004 2000 2001 2002 2003 2004 2000 2001 2002 2003 2004 2000 2001 2002 2003 2004 Year Year Year Year Year total deposition rate of BC – shp-atl-shift-1950 dry deposition rate of SO2 – shp-atl-shift-195 wet deposition rate of SO2 – shp-atl-shift-1950 dry deposition rate of SO4 – shp-atl-shift-1950 wet deposition rate of SO4 – shp-atl-shift-195 2.4e - 0.18e-01 7.5e-0° 4e-01 drybc + wetbc 2.2e-01 3e-01 ∆ dryso2 0e+00 4e-01 2e-01 2.0e-01 -01 2 50 0e+00 -4e-01 1.8e-01 0e+00 -8e-0 0.0e + 002000 2001 2002 2003 2004 2000 2001 2002 2003 2004 2000 2001 2002 2003 2004 2000 2001 2002 2003 2004 2000 2001 2002 2003 2004 Year Year Year $\frac{dryso2 + wetso2}{2 + (dryso4 + wetso4)/3}$ Ice water path - shp-atl-shiftnethyl sulphide (DMS) mole fraction - sh total deposition rate cloud cover ambient aerosol optical of S - shp-atl-shift-195 percentage - shp-atl-shift-1 thickness at 550nm - shp-atl-shif 5.0e-01 8 1e+00 0e+00 2.5e-01 clivi (kg $m^{-2}$ ) \_lom lom) smb 당 ∆ od550ae 0.0e+00 4e-01 \_3e\_01 2e-01 0e+00 -2.5e-01 -6e-01 3e-01 1e-01 -5.0e-01 -1e+00-7 5e-01 20002001200220032004 2000 2001 2002 2003 2004 2000 2001 2002 2003 2004 2002 2003 2004 2000 2001 2003 2004 2000 2001 2002 Year Year Year Year Year load load of so4 - shp-atl-shift-1950 of bc - shp-atl-shift-1950 6e-01 1e-01 $loadso4 (kg m^{-2})$ oadbc (kg m<sup>-2</sup> 4e-01 0e+00 2e-01 -1e-01

0e+00

2000 2001

2002 2003 2004

Year

-2e-01

2000 2001 2002 2003 2004