## shp-ind-shift-1950: absolute difference surface flux of BC – SH–land surface flux surface concentration surface concentration of SO4 – SH-land surface concentration of SO2 – SH–land 8.1e-19 emibc $(kg m^{-2} s^{-1})$ nmrbc (kg kg-1) əmiso2 (kg $\mathrm{m}^{-2} \mathrm{s}^{-1}$ 4 0e-19 \_2 8e\_16 so2 (kg kg – 1) mmrso4 (kg kg -3.1e-21 00+00 -1 0e-15 -8e-13 2000 2001 2002 2003 2004 2000 2001 2002 2003 2004 2002 2003 2004 2002 2003 2004 2000 2001 2000 2001 2002 2003 2004 2000 2001 Year Year Year Year Year upwelling longwave flux at TOA – SH–land upwelling shortwave flux at TOA – SH–land net radiative flux at TOA – SH–land incident shortwave flux at TOA – SH-land upwelling clear-sky longway flux at TOA - SH-land 2e-07 5e-02 $lut + rsut (W m^{-2})$ 1e-02 rlutcs (Wm-2)rlut (Wm-2)sut (W m - 2)5e-02 -sdt (W m-0e+00 0e+00 -2e-07 -1e-01 -1e-01 -1e-01-3e-07 2000 2001 2002 2003 2004 2002 2003 2004 2002 2003 2004 2000 2001 2002 2003 2004 2000 2001 2000 2001 2002 2003 2004 2000 2001 Year Year Year Year Year upwelling clear-sky shortway flux at TOA - SH-land clear-sky net radiative flux at TOA - SH-land implied cloud response at TOA – SH-land dry deposition rate of BC – SH–land wet deposition rate of BC – SH–land rsutcs (W $\mathrm{m}^{-2}$ ) 5.2e-16 2e-02 1e-01 rlutcs + rsutcs (W $m^{-2}$ ) 1e-02 rsutcs (W m-2) 3.1e-16 vetbc (kg m<sup>-2</sup> s<sup>-</sup> drybc (kg m<sup>-2</sup> s<sup>-</sup> 5e-02 0e+00 0e+00 rlutcs --2e-02 -2e-02 -5e-02rsut--3e-02 r H H 2000 2001 2002 2003 2004 2000 2001 2002 2003 2004 2002 2003 2004 2000 2001 2002 2003 2004 2000 2001 2002 2003 2004 2000 2001 Year Year Year Year Year total deposition rate of BC – SH–land dry deposition rate of SO2 – SH-land wet deposition rate of SO2 – SH-land dry deposition rate of SO4 – SH-land wet deposition rate of SO4 – SH-land 2.5e-15 3.3e-15 3 1e-15 $drybc + wetbc (kg m^{-2} s^{-1})$ dryso2 (kg $m^{-2}$ s<sup>-1</sup>. $\rm wetso2~(kg~m^{-2}~s^{-1}$ dryso4 (kg $m^{-2} s^{-1}$ wetso4 (kg $m^{-2}$ s<sup>-1</sup> 1.5e-15 4.1e-16 5.1e-16 0.0e+00 1.1e-15 5.0e-15 -6.5e-16 -9.0e-16 -2 5e-05 3.1e-1 0.0e+00 -9.9e 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 dyso2 + wetso2)/2 + (dryso4 + wetso4)/3Ice water path - SH-land Dimethyl sulphide (DMS) mole fraction total deposition rate cloud cover ambient aerosol optical thickness at 550nm - SH-la of S – SH–land percentage - SH-land 1e-03 2e-05 expression cltc (% clivi (kg m<sup>-2</sup>) \_lom lom) smb 0e+00 $(kg m^{-2} s^{-1})$ 0e+00 0e+00 -5e-02 -1e-03 20002001200220032004 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 load load load of so2 - SH-land of so4 - SH-land of bc - SH-land 7.5e-09 $\log \log (\log \, m^{-2})$ loadso2 (kg m<sup>-2</sup>) oadbc (kg m<sup>-2</sup> 5.0e-09 0.0e+00 2.5e-09 -2.5e-10 -1e-09 0.0e+00 -3e-09 2000 2001 2002 2003 2004 2000 2001 2002 2003 2004 2000 2001 2002 2003 2004 Year Year Year CAM-ATRAS F3SM GISS modelE

CESM1

**GEOS** 

NorESM2