## shp-60p-red-1950: absolute difference surface flux of SO2 – global surface flux of BC – global surface concentration surface concentration of SO4 – global surface concentration of SO2 – global of BC - global 1.8e-19 emibc $(kg m^{-2} s^{-1})$ emiso2 (kg $\mathrm{m}^{-2}\,\mathrm{s}^{-1}$ <u>k</u>g – 1 nmrbc (kg kg-1) 1.0e-19 0.0e + 0.0so2 (kg kg – 1) ķ -5.0e-2.7e-20 -4 7e-20 0e+00 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 upwelling longwave flux at TOA – global upwelling shortwave flux at TOA – global net radiative flux at TOA – global upwelling clear-sky longway flux at TOA - global incident shortwave flux at TOA – global 5.0e-02 0e+00 $rsut (W m^{-2})$ rlutcs (W m-2) 2 5e-02 rlut (Wm-2)rsut (W m-2) 2e+00 1.5e+00 rsdt (Wm-2)-2e-01 -1e-01 1.0e+00 0.0e+00 -4e-01 1e+00 th: 5.0e-01 -2 5e-02 -6e-01 0e+00 0.0e+00 -5.0e-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 upwelling clear-sky shortwav flux at TOA - global clear-sky net radiative flux at TOA - global implied cloud response at TOA – global dry deposition rate of BC – global wet deposition rate of BC – global rsutcs $(W m^{-2})$ 1 7e-15 2.5e-16 2.0e-01 4e-01 $^{-2} \, \mathrm{s}^{-1}$ rsutcs (W m-2) 1.5e+00 drybc (kg $\mathrm{m}^{-2}~\mathrm{s}^{-1}$ 1.3e-15 -3.0e-16 3e-01 1.5e-01 rsutcs (W 1.0e+00 rlutcs – 2e-01 7.9e-16 5.0e-02 5.0e-01 1e-01 3.1e-16 rsut 0.0e+00 0e+00 0.0e+00 ± E 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 dry deposition rate of SO2 – global total deposition rate of BC – global wet deposition rate of SO2 – global wet deposition rate of SO4 – global dry deposition rate of SO4 – global 1.5e-16 $drybc + wetbc (kg m^{-2} s^{-1})$ wetso2 (kg $m^{-2}$ s<sup>-1</sup>. wetso4 (kg m $^{-2}$ s $^{-1}$ dryso4 (kg m<sup>-2</sup> s<sup>-1</sup>) dryso2 (kg $\mathrm{m}^{-2}\,\mathrm{s}^{-1}$ 1.7e-17 2e-12 4e-13 -1.2e-16 1e-12 -2.5e-16 2002 2003 2004 2002 2003 2004 2000 2001 2002 2003 2004 2000 2001 2002 2003 2004 2000 2001 2002 2003 2004 2000 2001 2000 2001 Year Year Year Year Year dyso2 + wetso2)/2 + (dyso4 + wetso4)/3cloud cover total deposition rate Ice water path - global Dimethyl sulphide (DMS) mole fracti ambient aerosol optical thickness at 550nm – globa of S - global percentage - global 1 0e-02 0.0e+00 0.0e + 0.0dms (mol mol<sup>-</sup> clivi (kg m<sup>-2</sup>) 1e-04 $(kg m^{-2} s^{-1})$ 양 0e+00 5.0e-03 expression 0e+00 -1.0e-04 -1e-02 2 5e=03 -1e-04 -1.5e-04 20002001200220032004 2002 2003 2004 2000 2001 2002 2003 2004 2000 2001 2002 2003 2004 2000 2001 2002 2003 2004 2000 2001 Year Year Year Year Year SO4 lifetime SO2 lifetime load load load of so2 – global of so4 - global of bc - global - global - alobal wetso4) (days -1e-08 loadso2/emiso2 (days) 2e-10 loadso4 (kg m<sup>-2</sup>) loadso2 (kg m<sup>-2</sup>) loadbc (kg m<sup>-2</sup>) -2e-08\_00 oadso4/(dryso4+ 0e+00 -3e-08 -4e-08 -2e-10 -1 6e-08 2000 2001 2002 2003 2004 2000 2001 2002 2003 2004 2000 2001 2002 2003 2004 2001 2002 2003 2004 2000 2001 2002 2003 Year Year Year Year Year CAM-ATRAS F3SM GISS modelE CESM1 **GEOS** NorESM2