## shp-ind-shift-1950: absolute difference surface flux of SO2 – SH–sea surface flux of BC – SH–sea surface concentration surface concentration of SO4 – SH–sea surface concentration of SO2 – SH–sea 1.2e-19 7.66-16 $\mathrm{emibc}\,(\mathrm{kg}\,\mathrm{m}^{-2}\,\mathrm{s}^{-1})$ mmrso4 (kg kg – 1) nmrbc (kg kg – 1) emiso2 (kg m<sup>-2</sup> s<sup>-</sup> 6.0e-20 \_2 7e\_16 so2 (kg kg-1) 0.0e+00 0e+00 -6.0e-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 – SH–sea upwelling shortwave flux at TOA – SH-sea incident shortwave flux at TOA – SH–sea upwelling clear-sky longway flux at TOA - SH-sea net radiative flux at TOA - SH-sea 5.0e-02 5.0e-02 $rsut (W m^{-2})$ 1e-02 rlutcs (Wm-2)2 5e-02 rsdt (Wm-2)rsut (Wm-2)2.5e-02 0.0e+00 0.0e+00 0.0e + 00-2 5e-02 -1e-02 -5 0e-02 -5.0e-02 2000 2001 2002 2003 2004 2000 2001 2002 2003 2004 2000 2001 2002 2003 2004 2000 2001 2002 2003 2004 2002 2003 2004 2000 2001 Year Year Year Year Year upwelling clear-sky shortway flux at TOA - SH-sea clear-sky net radiative flux at TOA - SH-sea implied cloud response dry deposition rate of BC – SH–sea wet deposition rate of BC – SH–sea rsutcs $(W m^{-2})$ at TOA – SH–sea 1 8e-16 rlutcs + rsutcs (W $m^{-2}$ ) 1e-02 rsutcs (W m-2) 2e-02 vetbc (kg m<sup>-2</sup> s<sup>-'</sup> drybc (kg m<sup>-2</sup> s<sup>-</sup> 0e+00 0e+00 rlutcs -0e+00-5e-03 -1e-02 -2e-02 rsut – rlut + 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–sea dry deposition rate of SO2 – SH-sea wet deposition rate of SO2 – SH-sea dry deposition rate of SO4 – SH-sea wet deposition rate of SO4 – SH-sea 9.5e-17 9 9e-16 2 1e-15 1 0e-14 $drybc + wetbc (kg m^{-2} s^{-1})$ dryso4 (kg m<sup>-2</sup> s<sup>-1</sup>) wetso4 $(kg m^{-2} s^{-1}$ dryso2 (kg $\mathrm{m}^{-2}\,\mathrm{s}^{-1}$ $^{-2}$ s<sup>-1</sup> 5.5e-17 3e-05 1.5e-1 3.0e-15 2e-05 -2.5e-1 -5.1e-15 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 dyso2 + wetso2)/2 + (dyso4 + wetso4)/3total deposition rate of S – SH–sea cloud cover Ice water path - SH-sea Dimethyl sulphide (DMS) mole fraction ambient aerosol optical percentage - SH-sea thickness at 550nm – SH–se 1e-02 1e-04 2e-04 8 clivi (kg $m^{-2}$ ) \_lom lom) smp $(kg m^{-2} s^{-1})$ expression cltc 0e+00 0e+00 0e+00 -1e-02 -2e-04 0e+0020002001200220032004 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 of so2 load load - SH-sea of so4 - SH-sea of bc - SH-sea 1.2e-08 4e-10 loadso4 (kg m<sup>-2</sup>) loadso2 (kg m<sup>-2</sup>) 9.0e-09 oadbc (kg m<sup>-2</sup>) 2e-10 6.0e-09 0e+00 3.0e-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