## shp-atl-shift: absolute difference surface flux of SO2 – NH–sea surface flux of BC – NH–sea surface concentration surface concentration of SO4 – NH–sea surface concentration of SO2 – NH–sea 9.9e-21 0e+00 $emiso2 (kg m^{-2} s^{-1})$ $\mathrm{emibc}\,(\mathrm{kg}\,\mathrm{m}^{-2}\,\mathrm{s}^{-1})$ nmrbc (kg kg-1) (kg kg-1)2 6e-21 so2 (kg kg – 1) 0e+00 mmrso4 -1 2e-20 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 longwave flux at TOA – NH-sea upwelling shortwave flux at TOA – NH-sea net radiative flux at TOA – NH–sea incident shortwave flux at TOA – NH–sea upwelling clear-sky longwav flux at TOA - NH-sea $rsut (W m^{-2})$ rlutcs (Wm-2)rsdt (Wm-2)rsut (Wm-2)-2e-01 00+00 5.0e-01 4e-01 2.5e-01 \_2e\_07 + in: -6e-01 0e+00 2000 2001 2002 2003 2004 2000 2001 2002 2003 2004 2002 2003 2004 2002 2003 2004 2000 2001 2002 2003 2004 2000 2001 2000 2001 Year Year Year Year Year upwelling clear-sky shortway flux at TOA - NH-sea implied cloud response at TOA – NH–sea clear-sky net radiative flux at TOA - NH-sea dry deposition rate of BC – NH–sea wet deposition rate of BC – NH–sea $\rm rsutcs \, (W \, m^{-2})$ 8 9e-15 0e+00 rlutcs + rsutcs (W m<sup>-2</sup>) 0e+00 wetbc (kg $m^{-2}$ s<sup>-1</sup>) 6.3e-15 drybc (kg m<sup>-2</sup> s<sup>-</sup> -1e-01-1e-01 -2e-01 rlutcs --2e-0° 3.6e-15 3.8e-15 -2e-01 1 6e-15 rsut--4e-01 -4e-01 rlut + 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 total deposition rate of BC – NH–sea dry deposition rate of SO2 – NH-sea wet deposition rate of SO2 – NH-sea dry deposition rate of SO4 – NH-sea wet deposition rate of SO4 - NH-sea 1 6e-14 $drybc + wetbc (kg m^{-2} s^{-1})$ 0.0e+0.03e-02 $dryso2 (kg m^{-2} s^{-1})$ $^{2}$ vetso2 (kg m $^{-2}$ s $^{-1}$ ) $dryso4 (kg m^{-2} s^{-1})$ wetso4 $(kg m^{-2} s^{-1})$ 1.2e-14 2e-02 7.2e-15 1e-02 2.7e-15 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 Year Year cloud cover percentage – NH–sea total deposition rate of S – NH–sea Ice water path - NH-sea Dimethyl sulphide (DMS) mole fraction ambient aerosol optical thickness at 550nm – NH-se 4e-02 1.5e-02 2e-04 cltc (%) $^{-}$ m $^{-2}$ ) **g** 1.0e-02 **u** 5.0e-03 \_lom lom) smp 2e-02 clivi (kg expression -2e-04 -6e-03 0e+00 -9e-03 0.0e + 0.020002001200220032004 2002 2003 2004 2000 2001 2002 2003 2004 2002 2003 2004 2000 2001 2000 2001 2002 2003 2004 2000 2001 Year Year Year Year Year load load load of so2 - NH-sea of so4 - NH-sea of bc - NH-sea 1.5e-08 0.0e + 0.02e-10 $loadso4 (kg m^{-2})$ oadso2 (kg m<sup>-2</sup>) oadbc $({\sf kg}\ {\sf m}^{-2})$ 0e+00 0.0e+00 -8.0e-09 -5.0e-09 2000 2001 2002 2003 2004 2002 2003 2004 2000 2001 2002 2003 2004 Year Year Year

CAM-ATRAS

CESM1

F3SM

**GEOS** 

GFDI -FSM4

GISS modelE

NorESM2

rsutcs (W m-2)

dyso2 + wetso2)/2 + (dryso4 + wetso4)/3