## shp-ind-shift-1950: absolute difference surface flux of BC – NH–atlantic surface flux surface concentration surface concentration of SO2 – NH-atlantic surface concentration of SO2 - NH-atlantic of SO4 – NH–atlantic 8.6e-21 emibc $(kg m^{-2} s^{-1})$ nmrbc (kg kg-1) emiso2 (kg m<sup>-2</sup> s<sup>-</sup> 5 20-21 so2 (kg kg – 1) -2 0e-13 호 1.8e-2 mmrso4 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 – NH–atlantic upwelling shortwave flux at TOA – NH-atlantic net radiative flux at TOA – NH–atlantic upwelling clear-sky longway flux at TOA - NH-atlantic incident shortwave flux at TOA – NH–atlantic 1e-06 1e-01 1e-01 $rsut (W m^{-2})$ rlutcs (W m-2) rlut (Wm-2)rsut (W m-2) rsdt (W m-2) 5e-07 0e+00 0e+000e+00 -1e-01 -1e-01 -5e-02-2e-02 -2e-01 2000 2001 2002 2003 2004 2002 2003 2004 2000 2001 2002 2003 2004 2000 2001 2002 2003 2004 2000 2001 2000 2001 2002 2003 2004 Year Year Year Year Year upwelling clear-sky shortway flux at TOA - NH-atlantic clear-sky net radiative implied cloud response dry deposition rate of BC – NH-atlantic wet deposition rate $' m^{-2}$ ) flux at TOA – NH–atlantic at TOA - NH-atlantic of BC – NH–atlantic 2 0e-15 rsutcs (W 1e-01 rlutcs + rsutcs (W $m^{-2}$ ) rsutcs (W m-2) $\mathrm{vetbc}~(\mathrm{kg}~\mathrm{m}^{-2}~\mathrm{s}^{-1}$ drybc (kg m<sup>-2</sup> s<sup>-</sup> 2e-02 5e-02 -1e-02 rlutcs -0e+00 -2e-02 -2e-02 rsut – -1e-01 rlut + 2000 2001 2002 2003 2004 2002 2003 2004 2002 2003 2004 2000 2001 2002 2003 2004 2000 2001 2002 2003 2004 2000 2001 2000 2001 Year Year Year Year Year total deposition rate of BC - NH-atlantic dry deposition rate of SO2 – NH–atlantic wet deposition rate of SO2 – NH-atlantic dry deposition rate of SO4 – NH–atlantic wet deposition rate of SO4 – NH-atlantic 2 2e-15 -6 9e-15 $drybc + wetbc (kg m^{-2} s^{-1})$ wetso2 (kg m<sup>-2</sup> s<sup>-1</sup> $(kg m^{-2} s^{-1}$ dryso2 (kg m $^{-2}$ s $^{-1}$ 1.2e-15 wetso4 (kg m $^{-2}$ -1.0e-13 dryso4 -3e-04 -8.1e-16 -4e-04 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 – NH-atlantic cloud cover Ice water path - NH-atlan@imethyl sulphide (DMS) mole fraction ambient aerosol optical thickness at 550nm – NH-atl percentage - NH-atlantic 0.0e+00 4e-14 0.0e+00 dms (mol mol¯ 2e-02 clivi (kg m<sup>-2</sup>) $(kg m^{-2} s^{-1})$ expression cltc 0e+00 0e+00 -1.5e-04 -5.0e-04 -2.0e-04 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 SO4 lifetime SO2 lifetime load load load of so2 NH-atlantic of so4 - NH-atlantic of bc - NH-atlantic NH–atlantic - NH-atlantic wetso4) (days loadso2/emiso2 (days) 4e-10 loadso4 (kg m<sup>-2</sup>) oadso2 (kg m<sup>-2</sup>) oadbc $({\sf kg}\ {\sf m}^{-2})$ (dryso4 + -2e-08 -3e-082000 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