## NH-land: absolute difference surface flux of SO2 – shp–atl–shift surface flux of BC – shp–atl–shift surface concentration surface concentration surface concentration of BC - shp-atl-shift of SO4 - shp-atl-shift of SO2 - shp-atl-shift 1.8e-19 $\mathrm{emibc}\,(\mathrm{kg}\,\mathrm{m}^{-2}\,\mathrm{s}^{-1})$ nmrbc (kg kg-1) emiso2 (kg m<sup>-2</sup> s<sup>-′</sup> 8.8e-20 5.6e-14 so2 (kg kg – 1) mmrso4 (kg kg 0e+00 1.5e-1 5e-12 -8.7e-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 – shp-atl-shift upwelling shortwave flux at TOA – shp–atl–shift net radiative flux at TOA – shp–atl–shift upwelling clear-sky longway flux at TOA - shp-atl-shif incident shortwave flux at TOA – shp-atl-shift 5 0e=02 2e-02 0.0e + 00 $rsut(W m^{-2})$ rlutes (W m-2) rlut (Wm-2)rsut (Wm-2)rsdt (Wm-2)2.5e-02 -2.5e-02 0.0e + 0.00.00+00 0e+00 0.0e+00 -2 5e-02 \_2 5e\_02 -2.5e-02 -1e-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 shortway implied cloud response dry deposition rate wet deposition rate clear-sky net radiative flux at TOA - shp-atl-shif flux at TOA - shp-atl-shif rsutcs (W $m^{-2}$ ) at TOA - shp-atl-shift of BC - shp-atl-shift of BC - shp-atl-shift 1.7e-15 6e-02 lutcs + rsutcs (W m $^{-2}$ ) 2e-02 rsutcs (Wm-2)2.6e-16 wetbc (kg ${\sf m}^{-2}\,{\sf s}^{-1}$ 1.0e-15 drybc (kg $m^{-2} s^{-1}$ 0e+00 3e-02 1e-02 rlutcs – -1e-02 1.0e-0e+00 0e+00 -2e-02 rsut – -1e-02 -3e-02 -3e-02 \_2 1e\_16 rit + 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 total deposition rate of BC - shp-atl-shift dry deposition rate of SO2 – shp-atl-shift wet deposition rate of SO2 – shp-atl-shift dry deposition rate of SO4 – shp-atl-shift wet deposition rate of SO4 – shp-atl-shift 1.5e-15 2.8e-14 2.2e-14 $\mathrm{drybc} + \mathrm{wetbc} \, (\mathrm{kg} \, \mathrm{m}^{-2} \, \mathrm{s}^{-1})$ wetso2 $(kg m^{-2} s^{-1})$ dryso2 (kg m $^{-2}$ s $^{-1}$ 9.3e-16 dryso4 (kg m<sup>-2</sup> s<sup>-′</sup> wetso4 (kg m<sup>-2</sup> 3.2e-16 1.6e-17 1.6e-14 5e-14 4e-14 -2.9e-16 3e -8.8e 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 dryso2 + wetso2)/2 + (dryso4 + wetso4)/3Ice water path - shp-atl-sDimethyl sulphide (DMS) mole fraction total deposition rate cloud cover ambient aerosol optical thickness at 550nm - shp-atl-shift of S - shp-atl-shift percentage - shp-atl-shift 4e - 028 2e-02 clivi (kg m<sup>-2</sup>) \_lom lom) smp $(kg m^{-2} s^{-1})$ 당 0e+00 od550aeı 3.2e expression 0.0e+00 -2e-02 -2.5e-04 -4e-02 20002001200220032004 2002 2003 2004 2000 2001 2002 2003 2004 2000 2001 2002 2003 2004 2000 2001 Year Year Year Year Year load load of so4 - shp-atl-shift of bc - shp-atl-shift 7e-08 6e-08 $loadso4 (kg m^{-2})$ loadbc (kg m $^{-2}$ ) 0e+00 5e-08 4e-08 3e-08 2e-08 -1e-10 2000 2001 2002 2003 2004 2000 2001 2002 2003 2004 Year