## SH-land: absolute difference surface flux of SO2 – shp–atl–shift surface flux of BC – shp–atl–shift surface concentration of BC – shp-atl-shift surface concentration surface concentration of SO4 - shp-atl-shift of SO2 - shp-atl-shift 4e-13 7.5e-13 $\mathrm{emibc}\,(\mathrm{kg}\,\mathrm{m}^{-2}\,\mathrm{s}^{-1})$ nmrso4 (kg kg – 1) 5 0e-13 əmiso2 (kg m $^{-2}$ s $^{-1}$ mmrbc (kg kg-1) 5.3e-19 so2 (kg kg - 1) 0e+002.3e-19 0e+00 0.0e+0.0-6.6e-20 -2.5e-13 -2e-13 -3 6e-19 2000 2001 2002 2003 2004 2000 2001 2002 2003 2004 2000 2001 2002 2003 2004 2000 2001 2002 2003 2004 2002 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-01 1e-02 $rsut(W m^{-2})$ 0e+00 rlutes (W m-2) rlut (Wm-2)rsut (Wm-2)rsdt (Wm-2)0e+00 1e-01 0.0e + 0.0-5e-02 0e+00 -2 5e-02 -1e-02 0e+00 -1e-01 -1e-01 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 implied cloud response dry deposition rate wet deposition rate clear-sky net radiative flux at TOA - shp-atl-shift flux at TOA - shp-atl-shif at TOA - shp-atl-shift of BC - shp-atl-shift of BC - shp-atl-shift rsutcs (W m<sup>-2</sup>) 2.8e-16 2e-02 2e-01 ·lutcs + rsutcs (W m 1e-02 rsutcs (W m-2) wetbc (kg ${\sf m}^{-2}\,{\sf s}^{-1}$ 9.5e-16 drybc (kg $m^{-2} s^{-1}$ 1e-01 1e-02 rlutcs -0e+00 0e+00 0e+00 -1e-02 rsut – -5.9e-16 -1e-01 rlut + \_3 8e\_16 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 SO4 – shp–atl–shift total deposition rate of BC - shp-atl-shift dry deposition rate of SO2 – shp-atl-shift wet deposition rate of SO2 – shp-atl-shift wet deposition rate of SO4 – shp-atl-shift 1.8e-15 5.6e-15 1.4e-18 1.8e-15 $\mathrm{drybc} + \mathrm{wetbc} \, (\mathrm{kg} \, \mathrm{m}^{-2} \, \mathrm{s}^{-1})$ dryso2 (kg $m^{-2}$ s<sup>-1</sup>. wetso4 (kg $\mathrm{m}^{-2}~\mathrm{s}^{-1}$ vetso2 (kg m $^{-2}$ s $^{-1}$ dryso4 (kg m<sup>-2</sup> s<sup>-1</sup> 1.0e-15 3.3e-15 2.5e-16 1.1e-15 -2.4e-18 -3.0e-16 1e-14 -5.2e-16 0e+00 -3.3e-15 -6.3e-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 dryso2 + wetso2)/2 + (dryso4 + wetso4)/3Ice water path - shp-atl-shDimethyl 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-shif expression cltc (% 2.3e-15 2.5e-02 0e+00 0.0e+00 clivi (kg m<sup>-2</sup>) \_lom lom) smb $(kg m^{-2} s^{-1})$ od550aeı 0.0e+00 -2 5e-14 5.0e-16 -2 5e-02 -5.0e-14 -4.0e-16 20002001200220032004 2000 2001 2002 2003 2004 2000 2001 2002 2003 2004 2000 2001 2002 2003 2004 Year Year Year Year Year load load of so4 - shp-atl-shift of bc - shp-atl-shift 5e-09 $\log \log (\log \, m^{-2})$ loadbc (kg m<sup>-2</sup>) 0e+00 0e+00 -5e-09 -1e-08 2000 2001 2002 2003 2004 2000 2001 2002 2003 2004 Year