## shp-atl-shift: absolute difference surface flux surface concentration of BC – land surface flux surface concentration surface concentration of BC - land of SO2 - land of SO4 - land of SO2 - land $\mathrm{emibc}\,(\mathrm{kg}\,\mathrm{m}^{-2}\,\mathrm{s}^{-1})$ nmrbc (kg kg – 1) emiso2 (kg m $^{-2}$ s $^{-1}$ 1.8e-19 3.8e-14 so2 (kg kg – 1) nmrso4 (kg kg 2e-13 4.6e-20 0e+00 8.0e--8.8e-20 2.5e -2e-2 8e-14 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 upwelling longwave flux at TOA – land upwelling shortwave flux at TOA – land net radiative flux at TOA – land upwelling clear-sky longway flux at TOA - land incident shortwave flux at TOA – land 5.0e-02 4e-02 -lut + rsut $(W m^{-2})$ 5e-03 rlut (Wm-2)rsut (Wm-2)rsdt (Wm-2)rlutcs (W m -2e-02 0e+00 0e+00 0.0e + 0.00e+00 0e+00 -3e-02 -2 5e-02 \_2e\_02 -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 shortwav clear-sky net radiative implied cloud response dry deposition rate wet deposition rate flux at TOA - land flux at TOA - land at TOA - land of BC - land of BC - land rsutcs $(W m^{-2})$ 3.1e-16 1.7e-15 1e-02 ·lutcs + rsutcs (W m<sup>-2</sup>) 1e-01 rsutcs (W m-2) 1e-02 1.9e-16 vetbc (kg $\mathrm{m}^{-2}\,\mathrm{s}^{-1}$ 1.0e-15 drybc (kg $m^{-2} s^{-1}$ 0e+00 7.8e-0e+00 rlutcs -1e-02 0e+00 rsut – -1e-02 -5e-∩2 -2e-02 -8.1e-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 – land dry deposition rate of SO2 – land wet deposition rate of SO2 – land dry deposition rate of SO4 – land wet deposition rate of SO4 – land 1.6e-15 2.1e-14 1.4e-14 $\mathrm{drybc} + \mathrm{wetbc} \, (\mathrm{kg} \, \mathrm{m}^{-2} \, \mathrm{s}^{-1})$ wetso2 $(kg m^{-2} s^{-1})$ dryso2 (kg m $^{-2}$ s $^{-1}$ dryso4 (kg $\mathrm{m}^{-2} \mathrm{s}^{-1}$ 1.0e-15 wetso4 (kg m<sup>-2</sup> : 4e-14 4.6e-16 1.8e-14 9.2e-18 3.3e-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 - land Dimethyl sulphide (DMS) mole fracti total deposition rate cloud cover ambient aerosol optical of S - land thickness at 550nm - land 1e-04 2e-02 0e+00 16\_02 clivi (kg m<sup>-2</sup>) \_lom lom) smb $(kg m^{-2} s^{-1})$ 당 0e+00 od550aeı 2.2e -3e-04 20002001200220032004 2002 2003 2004 2002 2003 2004 2000 2001 2002 2003 2004 2000 2001 2000 2001 Year Year Year Year Year load load of so2 - land of bc - land 2.5e-11 4e-08 $\log \log (kg m^{-2})$ loadbc (kg m<sup>-2</sup>) 0.0e+00 3e-08 -2.5e-11 2e-08 -5 0e-11 1e-08 2000 2001 2002 2003 2004 2000 2001 2002 2003 2004 Year Year