## NH-land: absolute difference surface flux of SO2 – shp–80p–red surface flux of BC – shp–80p–red surface concentration surface concentration surface concentration of BC - shp-80p-red of SO4 - shp-80p-red of SO2 - shp-80p-red $\mathrm{emibc}\,(\mathrm{kg}\,\mathrm{m}^{-2}\,\mathrm{s}^{-1})$ emiso2 (kg m<sup>-2</sup> s<sup>-′</sup> nmrbc (kg kg-1) so2 (kg kg – 1) nmrso4 (kg kg 0e+00 -9.0e-12 3.2e-20 -1.3e-13 -4.6e-20 -1 2e-19 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 – shp–80p–red upwelling shortwave flux at TOA – shp-80p-red net radiative flux at TOA – shp–80p–red upwelling clear-sky longway flux at TOA - shp-80p-red incident shortwave flux at TOA – shp–80p–red 5 0e=02 5e-02 0.0e+00 $rsut(W m^{-2})$ rlut (Wm-2)rsut (Wm-2)(Wm-2)0e+00 rlutcs (W m -0e+00 0e+00 0.0e + 0.0-5e-02 -1e-02 rsdt rlut + -5e-02 -2.5e-02 -2e-02 -1.5e-0 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 clear-sky net radiative implied cloud response dry deposition rate wet deposition rate flux at TOA - shp-80p-red flux at TOA - shp-80p-red at TOA - shp-80p-red of BC - shp-80p-red of BC - shp-80p-red rsutcs (W m<sup>-2</sup>) 6.8e-16 1.8e-15 lutcs + rsutcs (W m<sup>-2</sup>) -2e-02 rsutcs (W m-2) -3e-02 4.6e-16 8.0e-16 drybc (kg $m^{-2} s^{-1}$ vetbc (kg m<sup>-2</sup> s<sup>-</sup> 0e+00 2.4e-16 rlutcs -4e-02 -4e-02 -5e-02 rsut – 2.1e-17 -5e-02 -5e-02 -1e-01 \_2 Oe\_16 + <u>+</u> 10. 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–80p–red wet deposition rate of SO4 – shp–80p–red total deposition rate of BC – shp–80p–red dry deposition rate of SO2 – shp–80p–red wet deposition rate of SO2 – shp–80p–red 1.6e-15 -7.6e-14 -3.2e-14 $\mathrm{drybc} + \mathrm{wetbc} \, (\mathrm{kg} \, \mathrm{m}^{-2} \, \mathrm{s}^{-1})$ wetso4 $(kg m^{-2} s^{-1})$ dryso2 (kg m $^{-2}$ s $^{-1}$ wetso2 (kg m<sup>-2</sup> s<sup>-</sup> 7.3e-16 dryso4 (kg m<sup>-2</sup> s<sup>-</sup> -2 0e-13 -1.2e-16 -8.4e-14 -3.9e-14 -9.8e-16 -9.1e-14 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-80p-Dimethyl sulphide (DMS) mole fraction total deposition rate cloud cover ambient aerosol optical of S - shp-80p-red percentage - shp-80p-red thickness at 550nm - shp-80p-red 4e - 028 2e-02 clivi (kg m<sup>-2</sup>) 0.0e+0.0\_lom lom) smp $(kg m^{-2} s^{-1})$ expression cltc 0e+00 -6.8e-15 od550aer -2e-02 -1.2e-13 -4e-02 -5.0e-04 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-80p-red of bc - shp-80p-red -9.0e-08 5e-11 loadso4 (kg m<sup>-2</sup>) -1.2e-07 oadbc (kg m<sup>-2</sup>) 0e+00 -1.5e-07 -1.8e-07-1e-10 2000 2001 2002 2003 2004 2000 2001 2002 2003 2004 Year Year