## NH-land: absolute difference surface flux of SO2 – shp–10p–red surface flux of BC – shp–10p–red surface concentration surface concentration surface concentration of BC - shp-10p-red of SO4 - shp-10p-red of SO2 - shp-10p-red 1e-01 1e-05 -1e-01 -5 5e-02 2e-01 5e-06 $\Delta$ emibc △ mmrbc $\Delta so2$ 1e-01 0e+00 0e+00 -1e-01 -5e-06 -6.5e-02 -1e-01 -1e-05 -2e-01 2000 2001 2000 2001 2002 2003 2004 2002 2003 2004 2002 2003 2004 2002 2003 2004 2000 2001 2002 2003 2004 2000 2001 2000 2001 Year Year Year Year Year upwelling longwave flux at TOA – shp–10p–red upwelling shortwave flux at TOA – shp–10p–red net radiative flux at TOA – shp–10p–red incident shortwave flux at TOA – shp–10p–red upwelling clear–sky longwav flux at TOA – shp–10p–red 5 0e-02 5e-02 5e-02 3e-02 1e-02 2e-02 rlut + rsut 0e+00 00+00 0.0e + 0.0e +1e-02 -5e-02 0e+00 -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 clear-sky net radiative implied cloud response dry deposition rate wet deposition rate flux at TOA - shp-10p-red flux at TOA - shp-10p-red at TOA - shp-10p-red of BC - shp-10p-red of BC - shp-10p-red rsutcs) 0e+00 -1e-02 rsutcs 5e-02 rlutcs -0e+00 ∆ rsutcs △ drybc △ wetbc -2e-02 -1e-01 00+00 rsut -3e-02 -2e-01 (rlut + -5e-02 -4e-02 -3e-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 total deposition rate of BC – shp–10p–red dry deposition rate of SO2 – shp–10p–red wet deposition rate of SO2 – shp–10p–red dry deposition rate of SO4 – shp–10p–red wet deposition rate of SO4 – shp–10p–red 2e-01 drybc + wetbc 0e+00 ∆ dryso2 wetso4 -1e-01 -1.2e-01 -2e-0 -1.4e-01 -4e-01 -3e-01 -3e-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 $\frac{dryso2 + wetso2}{2 + (dryso4 + wetso4)/3}$ Ice water path - shp-10p-Dimethyl sulphide (DMS) mole fraction total deposition rate cloud cover ambient aerosol optical of S - shp-10p-red percentage - shp-10p-red thickness at 550nm - shp-10p-red 5e-01 -1e-01 expression cltc (%) 1e-01 clivi (kg m<sup>-2</sup>) \_lom lom) smb 0e+00 0e+00 ∆ od550ae -2e-01 0e+00 -5e-0-5e-0 -3e-01 -1e-01 -1e+00-4e-01 -2e-01 2002 2003 2004 2002 2003 2004 2000 2001 2002 2003 2004 20002001200220032004 2000 2001 2000 2001 Year Year Year Year Year load load of so4 - shp-10p-red of bc - shp-10p-red 1e-01 -1e-01 loadso4 (kg m<sup>-2</sup>) oadbc (kg m $^{-2}$ ) -2e-01 -1e-01 -3e-01 -4e-01 -2e-01 -5e-01 -3e-01 2000 2001 2002 2003 2004 2000 2001 2002 2003 2004 Year Year