## arctic: absolute difference surface flux of BC – shp–20p–red surface flux of SO2 – shp–20p–red surface concentration of BC – shp–20p–red surface concentration surface concentration of SO4 - shp-20p-red of SO2 - shp-20p-red 0e+00 $\mathrm{emibc}\,(\mathrm{kg}\,\mathrm{m}^{-2}\,\mathrm{s}^{-1})$ nmrso4 (kg kg – 1) -2e-12 əmiso $2 (kg m^{-2} s^$ nmrbc (kg kg-1) 4.5e-20 0e+00 so2 (kg kg – 1) 2.2e-20 -2.4e-22 -4.0e-14 -2.3e-20 2002 2003 2004 2000 2001 2002 2003 2004 2000 2001 2002 2003 2004 2000 2001 2000 2001 2002 2003 2004 2002 2003 2004 2000 2001 Year Year Year Year Year upwelling longwave flux at TOA – shp–20p–red upwelling shortwave flux at TOA – shp–20p–red upwelling clear–sky longwa flux at TOA – shp–20p–re incident shortwave flux at TOA – shp–20p–red net radiative flux at TOA - shp-20p-red 5 0e=02 1e-01 rlut + rsut $(W m^{-2})$ 5 rlut (Wm-2)rsut (Wm-2)rsdt (Wm-2)0e+00 rlutcs (W m -0e+00 0.0e+00 0.0e + 0.00e+00 -1e-01 -2.5e-02 -1e-01 -2 5e-02 -4e-02 -2e-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 shortway implied cloud response dry deposition rate wet deposition rate clear-sky net radiative flux at TOA - shp-20p-red flux at TOA - shp-20p-re at TOA - shp-20p-red of BC - shp-20p-red of BC - shp-20p-red rsutcs (W m<sup>-2</sup>) 5.0e-02 1e-01 lutcs + rsutcs (W $m^{-2}$ ) rsutcs (W m-2) 2.5e-02 drybc (kg $m^{-2} s^{-1}$ vetbc (kg $m^{-2}$ 5e-02 0.0e+00 rlutes -1e-01 0e+00 -2.5e-02 rsut – -5e-02 -5 0e-02 rt H 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 SO2 – shp–20p–red dry deposition rate of SO4 – shp–20p–red total deposition rate of BC – shp–20p–red wet deposition rate of SO2 – shp–20p–red wet deposition rate of SO4 – shp–20p–red 4.8e-16 -3.0e-14 -3.4e-18 $drybc + wetbc \left( kg \ m^{-2} \ s^{-1} \right)$ dryso2 (kg m $^{-2}$ s $^{-1}$ -2.8ewetso2 (kg m<sup>-2</sup> s<sup>-</sup> dryso4 (kg $m^{-2}$ s<sup>-</sup> wetso4 (kg m<sup>-2</sup> -5.4e-16 -3.2e-14 -5.6e-18 -4.9e-15 -5e-14 -1.0e-15 -3.4e--8.6e-15 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-20p-Demethyl sulphide (DMS) mole fraction total deposition rate cloud cover ambient aerosol optical of S - shp-20p-red percentage - shp-20p-red thickness at 550nm - shp-20p 1e-01 8 clivi (kg m<sup>-2</sup>) dms (mol mol $(kg m^{-2} s^{-1})$ -1e-04 expression cltc 3e-13 0e+00 2e-13 -2e-04 0e+00 -2.6e-14 0e+00 20002001200220032004 2002 2003 2004 2000 2001 2002 2003 2004 2000 2001 2002 2003 2004 2002 2003 2004 2000 2001 2000 2001 Year Year Year Year Year load load of so4 - shp-20p-red of bc - shp-20p-red loadso4 (kg m<sup>-2</sup>) -1e-08 loadbc (kg m<sup>-2</sup>) 0e+00 -3e-08 2000 2001 2002 2003 2004 2000 2001 2002 2003 2004 Year