arctic: absolute difference surface flux surface flux surface concentration surface concentration surface concentration of SO2 – shp-ind-shift-19 of BC - shp-ind-shift-19 of BC - shp-ind-shift-195 of SO4 - shp-ind-shift-195 of SO2 - shp-ind-shift-198 $\mathrm{emibc}\,(\mathrm{kg}\,\mathrm{m}^{-2}\,\mathrm{s}^{-1})$ nmrso4 (kg kg – 1) nmrbc (kg kg-1) əmiso2 (kg m $^{-2}$ s $^{-1}$ 4.8e-2 1.3e-16 5e-13 0e+00 so2 (kg kg – 1) 0e+00 1.5e-21 -1.8e-21 -3.2e-16 -2e-12 -1e-12 -4e-14 -5 1e-2 -5.5e-16 2002 2003 2004 2000 2001 2002 2003 2004 2000 2001 2002 2003 2004 2002 2003 2004 2002 2003 2004 2000 2001 2000 2001 2000 2001 Year Year Year Year Year upwelling longwave flux at TOA – shp-ind-shift-195 upwelling shortwave flux at TOA – shp-ind-shift-195 upwelling clear–sky longwa flux at TOA – shp–ind–shift– incident shortwave flux at TOA – shp-ind-shift-19 net radiative flux at TOA - shp-ind-shift-19 5.0e-02 2e - 0'2e-02 -lut + rsut $(W m^{-2})$ 2.5e-02 rlut (Wm-2)sut (Wm-2)1e-01 rsdt (Wm-2)rlutcs (W m – 1e-01 0e+00 0.0e + 0.00.0e+0.00e+00 -2.5e-02 -2e-02 -2 5e-02 -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 shortwa implied cloud response dry deposition rate wet deposition rate clear-sky net radiative flux at TOA - shp-ind-shiftflux at TOA - shp-ind-shift-1! $\rm rsutcs \ (W \ m^{-2})$ at TOA - shp-ind-shift-19 of BC - shp-ind-shift-19 of BC - shp-ind-shift-19 1.2e-16 lutcs + rsutcs (W m $^{-2}$) rsutcs (W m-2) 1.0e-01 6.5e-17 vetbc (kg ${\rm m}^{-2}\,{\rm s}^{-1}$ drybc (kg $m^{-2} s^{-1}$ 5e-02 0e+00 5.0e-02 rlutcs --5e-02 0.0e+00 0e+00 -1e-01 rsut -5.0e-02 _1 0e_16 _2 6e_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 dry deposition rate of SO4 – shp–ind–shift–19 wet deposition rate of SO4 – shp–ind–shift–19 total deposition rate BC – shp-ind-shift-19 dry deposition rate of SO2 – shp–ind–shift–19 wet deposition rate of SO2 – shp-ind-shift-19 of BC 2.4e 3.0e-15 $drybc + wetbc \left(kg \ m^{-2} \ s^{-1} \right)$ wetso4 $(kg m^{-2} s^{-1})$ dryso2 (kg m $^{-2}$ s $^{-1}$ dryso4 (kg m⁻² s⁻¹ 9.2evetso2 (kg m⁻² s⁻ 0e+00 -5.9e-17 -2.0e-15 -2.3e-18 -3.7e-16 -2.1e-16 -3.6e-16 -3.8e-15 -5.1e-15 -4.2e-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 dryso2 + wetso2)/2 + (dryso4 + wetso4)/3Ice water path - shp-ind-Diffethyl sulphide (DMS) mole fraction - sh total deposition rate cloud cover ambient aerosol optical of S - shp-ind-shift-1 percentage - shp-ind-shift-19 thickness at 550nm - shp-ind-shi 1e-01 2e-13 1e-04 8 5e-05 clivi (kg m^{-2}) _lom lom) smp $(kg m^{-2} s^{-1})$ 0e+00 expression cltc od550aer 0e+00 0e+00 0e+00 -2e-13 -1e-04 -4.9e-15 -4e-13 -1e-04 20002001200220032004 2002 2003 2004 2002 2003 2004 2000 2001 2002 2003 2004 2002 2003 2004 2000 2001 2000 2001 2000 2001 Year Year Year Year Year load load of so4 - shp-ind-shift-195 of bc - shp-ind-shift-1950 1e-11 1e-08 $\log \log (\log \, m^{-2})$ 5e-12 loadbc (kg m⁻²) 5e-09 0e+00 0e+00 -5e-12 -5e-09 -1e-11 -1e-08

2000 2001 2002 2003 2004

2000 2001 2002 2003 2004

Year