arctic: absolute difference surface flux of BC – shp–ind–shift surface flux of SO2 – shp–ind–shift surface concentration surface concentration surface concentration of BC - shp-ind-shift of SO4 - shp-ind-shift of SO2 - shp-ind-shift $\mathrm{emibc}\,(\mathrm{kg}\,\mathrm{m}^{-2}\,\mathrm{s}^{-1})$ (kg kg-1)əmiso2 (kg m $^{-2}$ s $^{-1}$ 2.1e-20 6.5e-16 so2 (kg kg – 1) 0e+00 mmrso4 (kg kg 1.0e-20 4.0e-16 0e+00 nmrbc -5.5e-22 1.4e-16 -2.0e-12 -1.1e-20 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–ind–shift upwelling shortwave flux at TOA – shp-ind-shift upwelling clear-sky longwa flux at TOA - shp-ind-sh net radiative flux incident shortwave flux at TOA – shp-ind-shift at TOA - shp-ind-shift 5 0e=02 5.0e-02 1e-01 -lut + rsut $(W m^{-2})$ 5.0e-02 5 sut (W m-2) rlut (Wm-2)rsdt (Wm-2)lutcs (W m-0e+002.5e-02 0.0e + 0.00.0e+00 -1e-01 -1e-010.0e + 0.0-2 5e-02 -2e-01 -2e-01 _2 5e_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 implied cloud response dry deposition rate wet deposition rate clear-sky net radiative flux at TOA - shp-ind-shif flux at TOA - shp-ind-sh at TOA - shp-ind-shift of BC - shp-ind-shift of BC - shp-ind-shift rsutcs (W m^{-2}) 7.5e-02 1e-01 lutcs + rsutcs $(W m^{-2})$ 5.0e-02 rsutcs (W m-2) 1.6e-16 5.8e-17 drybc (kg $m^{-2} s^{-1}$ vetbc (kg m⁻² s⁻ 0e+00 0e+00 2.5e-02 rlutcs -0.0e+00 -5e-02 -1e-0 -2.5e-02 rsut -1e-01 rt H _1 6e_16 -5.0e-16 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-ind-shift dry deposition rate of SO2 – shp-ind-shift wet deposition rate of SO2 – shp-ind-shift dry deposition rate of SO4 – shp–ind–shift wet deposition rate of SO4 – shp-ind-shift 3.1e-16 -3.1e-15 4.3e-16 -9.6e-15 $\mathrm{drybc} + \mathrm{wetbc} \, (\mathrm{kg} \, \mathrm{m}^{-2} \, \mathrm{s}^{-1})$ dryso2 (kg m $^{-2}$ s $^{-1}$ dryso4 (kg m⁻² s⁻ 7.3ewetso2 (kg m⁻² s⁻ wetso4 $(kg m^{-2})$ -1.7e-16 -5.4e-15 -3.1e-18 -4.0e-16 -2.9e-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-ind-spimethyl sulphide (DMS) mole fraction total deposition rate cloud cover ambient aerosol optical of S - shp-ind-shift percentage - shp-ind-shift thickness at 550nm - shp-ind-1e-01 1e-04 8 clivi (kg m⁻²) _lom lom) smp 2e-13 $(kg m^{-2} s^{-1})$ expression cltc 0e+00 -1e-04 1e-04 1e-13 -2e-04 0e+00 0e+00 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 of bc - shp-ind-shift 5.0e-11 3e-08 $loadso4 (kg m^{-2})$ 2e-08 oadbc (kg m⁻² 1e-08 0.0e+00 0e+00 -2.5e-11 -1e-08 -2e-08 2000 2001 2002 2003 2004 2000 2001 2002 2003 2004

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