shp-atl-shift: absolute difference surface flux of BC – arctic surface flux of SO2 – arctic surface concentration of SO4 – arctic surface concentration surface concentration of SO2 – arctic 1.9e-19 0.0e+00 $\mathrm{emibc}\,(\mathrm{kg}\,\mathrm{m}^{-2}\,\mathrm{s}^{-1})$ əmiso2 (kg $\mathrm{m}^{-2}\,\mathrm{s}^{-1}$ nmrbc (kg kg-1) 1 36-19 (kg kg-7.5e-20 mmrso4 -1 0e-12 1.6e-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 – arctic upwelling shortwave flux at TOA – arctic upwelling clear-sky longway flux at TOA - arctic net radiative flux incident shortwave flux at TOA – arctic at TOA – arctic 1.2e-01 2e-01 8.0e-02 rlut + rsut $(W m^{-2})$ rlutcs (W m-2) 00+00 sut (W m-2)rsdt (Wm-2)0.0e+00 -2e-01 -2.5e-07 -1e-01 -4.0e-02 _4e_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 implied cloud response at TOA – arctic upwelling clear-sky shortway flux at TOA - arctic clear-sky net radiative flux at TOA - arctic dry deposition rate of BC – arctic wet deposition rate of BC – arctic rsutcs (W m^{-2}) 8 4e-15 1e-01 rsutcs (W m⁻² vetbc (kg m^{-2} s⁻¹) 5.0e-16 6.1e-15 drybc (kg m⁻² s⁻ rsutcs (W m--1e-01 1e-01 rlutcs --2e-01 2.5e-16 3.8e-15 -2e-01 -3e-01 0e+00 -4e-01 rsut – -4e-0 -5e-01 2000 2001 2002 2003 2004 2000 2001 2002 2003 2004 2000 2001 2002 2003 2004 2002 2003 2004 2000 2001 2002 2003 2004 2000 2001 Year Year Year Year Year total deposition rate of BC – arctic dry deposition rate of SO2 – arctic wet deposition rate of SO2 – arctic dry deposition rate of SO4 – arctic wet deposition rate of SO4 – arctic 9 0e-15 $drybc + wetbc (kg m^{-2} s^{-1})$ $dryso2 (kg m^{-2} s^{-1})$ $dryso4 (kg m^{-2} s^{-1})$ $\rm wetso2~(kg~m^{-2}~s^{-1}$ wetso4 (kg $\mathrm{m}^{-2}\,\mathrm{s}^{-1}$ 6.5e-15 6e-03 4.1e-15 4e-03 1.6e-15 0e+002000 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 dyso2 + wetso2)/2 + (dryso4 + wetso4)/3cloud cover total deposition rate of S – arctic Ice water path - arctic Dimethyl sulphide (DMS) mole fractic ambient aerosol optical percentage - arctic thickness at 550nm - arctic 1e-01 expression cltc (%) clivi (kg ${\sf m}^{-2}$) _lom lom) smp $(kg m^{-2} s^{-1})$ 5e-05 0e+00 2e-03 0e+00 -1e-01 0e+0020002001200220032004 2002 2003 2004 2000 2001 2000 2001 2002 2003 2004 2000 2001 2002 2003 2004 2000 2001 2002 2003 2004 Year Year Year Year Year SO4 lifetime SO2 lifetime load load load of so2 of so4 - arctic of bc - arctic - arctic arctic - arctic wetso4) (days oadso2/emiso2 (days) $loadso4 (kg m^{-2})$ 0e+00 oadso2 (kg m⁻²) loadbc (kg m⁻²) 1e-08 -2e-08(dryso4+ 0e+00 2e-10 4e-08 -1e-08 -6e-08 2000 2001 2002 2003 2004 2000 2001 2002 2003 2004 2002 2003 2004 2001 2002 2004 2000 2001 2002 2003 Year Year Year Year Year NorESM2 CAM-ATRAS F3SM GFDI -FSM4

CESM1

GEOS

GISS modelE