shp-60p-red-1950: absolute difference surface flux of BC – arctic surface flux surface concentration surface concentration of SO4 – arctic surface concentration of SO2 – arctic of SO2 - arctic 2 96-19 mmrbc (kg kg - 1) əmiso2 (kg m⁻² s⁻ 2.0e-19 nmrso4 (kg kgso2 (kg kg – 1) 1.2e-19 3.7e-20 2000 2001 2002 2003 2004 2002 2003 2004 2002 2003 2004 2000 2001 2002 2003 2004 2000 2001 2000 2001 2002 2003 2004 2000 2001 Year Year Year Year Year upwelling longwave flux at TOA – arctic upwelling shortwave flux at TOA – arctic net radiative flux at TOA – arctic incident shortwave flux at TOA – arctic upwelling clear-sky longway flux at TOA - arctic 4e+00 0e+00 rlutes (W m-2) rlut + rsut (W m 3e+00 E rsdt (W m--1e-01 rsut (W 1e+00 -9e-01 0e+00 0e+00 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 shortwav flux at TOA – arctic clear-sky net radiative flux at TOA - arctic implied cloud response dry deposition rate of BC – arctic wet deposition rate of BC – arctic rsutcs (W m^{-2}) at TOA – arctic 1 4e-14 rsutcs (W m^{-2}) 6e-01 vetbc $(kg m^{-2} s^{-1})$ 9.5e-15 drybc (kg m⁻² s⁻ 4e-01 4e-01 2e+00 rlutcs -2e-01 2e-01 0e+00rsut 0e+00 rlut + 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 – 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 1.3e-14 $drybc + wetbc (kg \ m^{-2} \ s^{-1})$ wetso2 (kg m^{-2} s⁻¹) wetso4 (kg m⁻² s⁻¹ 0e+00 dryso4 (kg m $^{-2}$ s $^{-1}$ dryso2 (kg m⁻² s⁻ 8.2e-15 3.1e-15 -3.5e-14 -1 0e-04 -2.1e-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 Year Year total deposition rate of S – arctic cloud cover Ice water path - arctic Dimethyl sulphide (DMS) mole fract ambient aerosol optical thickness at 550nm – arctic percentage - arctic 4e-01 _lom lom) smb clivi $(kg m^{-2})$ $(kg m^{-2} s^{-1})$ 양 0e+00 0.0e+00 0e+00 expression -4e-05 2e-01 -1e-03 -2e-03 -5.0e-13 20002001200220032004 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 load load load of so2 of so4 - arctic of bc - arctic arctic 0e+00 -1e-08 loadbc (kg m⁻²) oadso2 (kg m⁻²) -2e-08 0e+00 -4e-08-5e-10 -3e-08 2000 2001 2002 2003 2004 2000 2001 2002 2003 2004 2000 2001 2002 2003 2004 Year Year Year

CAM-ATRAS

CESM1

F3SM

GEOS

GISS modelE

NorESM2

emibc (kg $m^{-2} s^{-1}$)

rlut (Wm-2)

rsutcs (W m-2)

dryso2 + wetso2)/2 + (dryso4 + wetso4)/3

loadso4 (kg m⁻²)