shp-60p-red: absolute difference surface flux of BC – sea surface flux of SO2 – sea surface concentration surface concentration of SO4 – sea surface concentration of SO2 – sea mmrso4 (kg kg – 1) nmrbc (kg kg-1) əmiso2 (kg m $^{-2}$ s $^{-1}$ so2 (kg kg – 1) -1.0e-10 2000 2001 2002 2003 2004 2000 2001 2002 2003 2004 2002 2003 2004 2000.02002.52005.02007.5 2000.02002.52005.02007.5 2000 2001 Year Year Year Year Year upwelling longwave flux at TOA – sea upwelling shortwave flux at TOA – sea net radiative flux at TOA – sea incident shortwave flux at TOA – sea upwelling clear-sky longway flux at TOA - sea 0.0e + 0.0 $rsut (W m^{-2})$ 7.5e-06 rlutcs (Wm-2)1e-02 sdt (Wm-2)-sut (W m -00+00 rlut + -2.0e-01 -1.5e-01 -1e-02 _2 5e_01 2002 2003 2004 2000 2001 2002 2003 2004 2000 2001 2002 2003 2004 2000 2001 2002 2003 2004 2000 2001 2000 2001 2002 2003 2004 Year Year Year Year Year upwelling clear-sky shortway flux at TOA - sea clear-sky net radiative flux at TOA - sea implied cloud response at TOA – sea dry deposition rate of BC – sea wet deposition rate of BC – sea rsutcs $(W m^{-2})$ 3 2e-16 0e+00 0.0e+00 m^{-2} wetbc (kg m^{-2} s⁻¹) 3.1e-15 drybc (kg m⁻² s⁻ rsutcs (W 2.0e-15 rlutcs -_3e_02 8.3e-16 rsut--4e-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 total deposition rate of BC – sea dry deposition rate of SO2 – sea wet deposition rate of SO2 – sea dry deposition rate of SO4 – sea wet deposition rate of SO4 – sea -1.5e-13 dryso4 (kg m⁻² s⁻¹) wetso2 (kg m^{-2} s⁻¹ wetso4 $(kg m^{-2} s^{-1}$ dryso2 (kg m $^{-2}$ s $^{-1}$ 1e-02 -2.0e-13 -3 0e-13 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 cloud cover total deposition rate of S – sea Ice water path - sea Dimethyl sulphide (DMS) mole frac ambient aerosol optical thickness at 550nm - sea percentage - sea 5.0e-14 2e-04 1e-02 m^{-2} mol mol 양 0e+00 clivi (kg ı expression -9.0e-04 0e+00 -2e-04 -1.1e-03 20002001200220032004 2002 2003 2004 2002 2003 2004 2000 2001 2002 2003 2004 2000 2001 2002 2003 2004 2000 2001 2000 2001 Year Year Year Year Year load load load of so2 of so4 - sea of bc - sea sea 3e-10 -10 oadso2 (kg m⁻²) oadbc $(kg m^{-2})$ 1e-10 -1e-10 2000 2001 2002 2003 2004 2002 2003 2004 2000 2001 2002 2003 2004

Year

GFDI -FSM4

GISS modelE

F3SM

GEOS

NorESM2

7.6e-21

4 20-21

8.7e-22

-2.5e-21

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

rlut (Wm-2)

rsutcs (W m-2)

 $drybc + wetbc (kg m^{-2} s^{-1})$

dyso2 + wetso2)/2 + (dyso4 + wetso4)/3

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

-2e-08

-6e-08

-8e-08

Year

Year

CESM1

CAM-ATRAS

loadso4 (kg m⁻²)

-4e-02

4 2e-15

3.0e-15 1.7e-15

4.5e-16

5e-02

0e+00