## shp-atl-shift: absolute difference surface flux of SO2 – SH–land surface flux of BC – SH–land surface concentration surface concentration of SO4 – SH-land surface concentration of SO2 – SH–land 0e+00 (kg kg - 1)əmiso2 (kg m $^{-2}$ s $^{-1}$ nmrbc (kg kg-1) (kg kg - 1)2.5e-13 0.0e+00 2000 2001 2002 2003 2004 2000 2001 2002 2003 2004 2002 2003 2004 2002 2003 2004 2000 2001 2002 2003 2004 2000 2001 2000 2001 Year Year Year Year Year upwelling longwave flux at TOA – SH–land upwelling shortwave flux at TOA – SH–land net radiative flux at TOA – SH–land incident shortwave flux at TOA – SH-land upwelling clear-sky longway flux at TOA - SH-land 2.5e-01 rlut + rsut $(W m^{-2})$ rlutcs (Wm-2)rsut (W m-2) rsdt (Wm-2)0.0e+00 -6e-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 flux at TOA – SH–land implied cloud response at TOA – SH-land clear-sky net radiative flux at TOA - SH-land dry deposition rate of BC – SH–land wet deposition rate of BC – SH–land rlutcs - rsutcs (W m<sup>-2</sup>) 2 6e-15 rsutcs (W m<sup>-2</sup> 5e-02 wetbc (kg $\,\mathrm{m}^{-2}\,\mathrm{s}^{-1}$ 1.8e-15 drybc (kg m<sup>-2</sup> s<sup>-</sup> 0e+00 1.0e-15 -5e-02 -2e-01 rsut – 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 total deposition rate of BC – SH–land dry deposition rate of SO2 – SH-land wet deposition rate of SO2 – SH-land dry deposition rate of SO4 – SH-land wet deposition rate of SO4 – SH-land $dryso2 (kg m^{-2} s^{-1})$ 2.0e-02 $dryso4 (kg m^{-2} s^{-1})$ wetso4 $(kg m^{-2} s^{-1}$ vetso2 (kg m $^{-2}$ s $^{-1}$ 1.0e-02 0.0e + 0.0e +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 cloud cover percentage – SH-land total deposition rate of S – SH–land Ice water path - SH-land Dimethyl sulphide (DMS) mole fractio ambient aerosol optical thickness at 550nm - SH-la cltc (%) 2.5e-02 clivi (kg ${\sf m}^{-2}$ ) 0e+00 \_lom lom) smb 0.0e+00 expression 0.0e+00 -3e-03-2.5e-02 -4e-03 20002001200220032004 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 load of so2 - SH-land load load of so4 - SH-land of bc - SH-land 2.5e-09 1e-09 oadso2 (kg m<sup>-2</sup>) loadbc (kg m<sup>-2</sup>) -2 5e-09 0e+00 -5e-10 -7.5e-09

2000 2001 2002 2003 2004

Year

GFDI -FSM4

GISS modelE

F3SM

**GEOS** 

NorESM2

8.8e-19

2 76-19

-3.5e-19

-9.6e-19

4e-01

3e-01

2e-01

1e-01 0e+00

0.0e+00

-1.0e-0

-1.5e-01

2 9e-15

1.2e-15 -4.9e-16

-2.2e-15

rlut (Wm-2)

rsutcs (W m-

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

dyso2 + wetso2)/2 + (dryso4 + wetso4)/3

oadso4 (kg m<sup>-2</sup>)

0e+00

2000 2001 2002 2003 2004

Year

2000 2001

2002 2003 2004

Year

CESM1

CAM-ATRAS

 $(kg m^{-2} s^{-1})$ 6.0e-03

3.0e-03

0.0e + 0.0

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