shp-60p-red: absolute difference surface flux of SO2 – NH–atlantic surface flux BC – NH–atlantic surface concentration surface concentration of SO4 – NH–atlantic surface concentration of SO2 – NH–atlantic (kg kg-1)əmiso2 (kg m $^{-2}$ s $^{-1}$ nmrbc (kg kg-1) (kg kg - 1)-2 0e-11 mmrso4 302 -3.0e-1 2000 2001 2002 2003 2004 2000 2001 2002 2003 2004 2000 2001 2002 2003 2004 2000.02002.52005.02007.5 2000.02002.52005.02007.5 Year Year Year Year upwelling longwave flux at TOA – NH–atlantic upwelling shortwave flux at TOA – NH-atlantic net radiative flux at TOA – NH–atlantic incident shortwave flux at TOA – NH–atlantic upwelling clear–sky longwa flux at TOA – NH–atlanti 0e+00 5.0e-02 $rsut (W m^{-2})$ rlutcs (Wm-2)rsut (W m-2) sdt (Wm-2)-2e-01 2.5e-02 -2e-01 0.00+00 -3e-0° -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 upwelling clear-sky shortway flux at TOA - NH-atlantic implied cloud response at TOA – NH–atlantic clear-sky net radiative flux at TOA - NH-atlantic dry deposition rate of BC – NH-atlantic wet deposition rate of BC – NH-atlantic rsutcs (W m^{-2}) 0e+00 3 9e-15 rlutcs + rsutcs (W m⁻²) 0e+00 wetbc (kg m^{-2} s⁻¹) 2.8e-15 drybc (kg m⁻² s⁻ -1e-01 rlutcs -1.8e-15 -2e-01 6.8e-16 rsut--3e-0 2000 2001 2002 2003 2004 2002 2003 2004 2002 2003 2004 2002 2003 2004 2000 2001 2002 2003 2004 2000 2001 2000 2001 Year Year Year Year total deposition rate of BC - NH-atlantic dry deposition rate of SO2 – NH-atlantic wet deposition rate of SO2 – NH-atlantic dry deposition rate of SO4 – NH-atlantic wet deposition rate of SO4 – NH-atlantic $dryso2 (kg m^{-2} s^{-1})$ wetso2 (kg m⁻² s⁻¹. wetso4 (kg $\mathrm{m}^{-2}\,\mathrm{s}^{-1}$ 2e-02 dryso4 (kg 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 Ice water path - NH-atlantDimethyl sulphide (DMS) mole fraction total deposition rate of S – NH–atlantic cloud cover ambient aerosol optical thickness at 550nm – NH-atl percentage - NH-atlantic 1.2e-03 expression cltc (%) -2.0e-03 -5.0e-14 clivi (kg m⁻²) _lom lom) smp 2e-02 4.0e-04 -3.0e-03 0e+00 -3.5e-03 0.0e+00 -2e-02 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 load of so2 – NH–atlantic load - NH-atlantic of bc - NH-atlantic 1e-09 oadso2 (kg m⁻²) oadbc (kg m⁻²) 5e-10 0e+00 -1e-07

1.2e-20

5.3e-2°

-1.4e-21

-8.1e-21

3e-01

2e-01

1e-01

0e+00

-1e-01

-5e-02

_1e_01

3 4e-15

2.1e-15

8.4e-16

-4.3e-16

2000 2001

rlut (Wm-2)

rsutcs (W m-2)

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

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

loadso4 (kg m⁻²)

-1.0e-07

-1.5e-07

-2.0e-07 -2.5e-07

 $(kg m^{-2} s^{-1})$ 1.0e-02

5.0e-03

0.0e + 0.0

Year

Year

Year

Year

Year

load

2000 2001 2002 2003 2004

Year

2000 2001

2002 2003 2004

Year

CESM1

CAM-ATRAS

2000 2001 2002 2003 2004

Year

GFDI -FSM4

GISS-E2.1

F3SM

GEOS

NorESM2

of so4

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