shp-atl-shift: absolute difference surface flux of BC – land surface flux of SO2 – land surface concentration surface concentration of SO4 – land surface concentration of SO2 – land 7.6e-19 emibc $(kg m^{-2} s^{-1})$ nmrbc (kg kg-1) mmrso4 (kg kg – 1) əmiso2 (kg m $^{-2}$ s $^{-1}$ 4 66-19 so2 (kg kg-1) 1.6e-19 -5.0e-12 0e+00 -7.5e-12 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 – land upwelling shortwave flux at TOA – land net radiative flux at TOA – land incident shortwave flux at TOA – land upwelling clear-sky longwav flux at TOA - land $lut + rsut (W m^{-2})$ rlutcs (Wm-2)4e-01 rsdt (Wm-2)rsut (W m - 2)-2e-0 -4e-01 2000 2001 2002 2003 2004 2000 2001 2002 2003 2004 2002 2003 2004 2002 2003 2004 2002 2003 2004 2000 2001 2000 2001 2000 2001 Year Year Year Year Year upwelling clear-sky shortway flux at TOA - land clear-sky net radiative flux at TOA – land implied cloud response at TOA – land dry deposition rate of BC – land wet deposition rate of BC – land rsutcs (W m^{-2}) 1 6e-14 1e-01 rlutcs + rsutcs (W m⁻²) 0e+00 0e+00wetbc $(kg m^{-2} s^{-1})$ rsutcs (W m-2) 1.2e-14 drybc (kg m⁻² s⁻ -1e-01 0e+00 -1e-01 rlutcs --2e-01 -1e-0-3e-01 -2e-01 3.3e-15 rsut -4e-01 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 – land dry deposition rate of SO2 – land wet deposition rate of SO2 – land dry deposition rate of SO4 – land wet deposition rate of SO4 – land 2.5e-15 4e-02 $drybc + wetbc (kg m^{-2} s^{-1})$ 0.0e+00 0.0e+00 wetso2 (kg $\mathrm{m}^{-2}\,\mathrm{s}^{-1}$ wetso4 $(kg m^{-2} s^{-1}$ dryso4 (kg $\mathrm{m}^{-2}\,\mathrm{s}^{-1}$ -2.8e-15 3e-02 2e-02 -8.0e-15 -1.3e-14 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 + (dyso4 + wetso4)/3total deposition rate of S – land cloud cover Ice water path - land Dimethyl sulphide (DMS) mole fracti ambient aerosol optical percentage - land thickness at 550nm - land 1e-04 2e-02 0.0e+00 1.5e-02 1e-02 clivi (kg m⁻²) _lom lom) smp 양 -4.0e-03 0e+00 -1e-02 (kg 5.0e-03 -2e-02 -3e-04 0.0e + 0.020002001200220032004 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 SO4 lifetime SO₂ lifetime load load load of so2 of so4 - land of bc - land land land land wetso4) (days 1e-08 6e-08 loadso2/emiso2 (days) $loadso4 (kg m^{-2})$ 2.5e-10 loadso2 (kg m⁻²) oadbc (kg m⁻²) 4e-08 0.0e+00 (dryso4 2e-08 2000 2001 2002 2003 2004 2000 2001 2002 2003 2004 2000 2001 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