## global: absolute difference surface concentration of SO4 – so2–at–height surface flux of BC – so2–at–height surface flux surface concentration surface concentration of SO2 – so2–at–height of SO2 - so2-at-height of BC - so2-at-height 1.5e-05 4e+00 0.0e+00 3e+00 1.0e-05 -2e+01 -5.0e-01 2e+00 ∆ emibc 1.5e+01 5.0e-06 -1.0e+00 .4e+01 1e+00 1.0e + 0.10.0e+00 -1.5e+00 0e+00 5.00+00 -5.0e-06 -2.0e+00 2002 2003 2002 2003 2002 2003 2003 2002 2003 2001 2001 2001 2001 2002 2001 Year Year Year Year Year upwelling longwave flux at TOA – so2–at–height upwelling shortwave flux at TOA – so2–at–height upwelling clear-sky longwav flux at TOA - so2-at-heigh net radiative flux incident shortwave flux at TOA - so2-at-height at TOA - so2-at-height 2e-02 4e-01 36\_01 0e+00 1e-08 rsut ∆ rsut -1e-02 2e-01 ∆ rlut + 0e+00 -2e-02 1e-01 1e-01 -1e-08 -2e-02 -4e-02 0e+00 -2e-08 2003 2002 2004 2003 2003 2001 2002 2004 2001 2002 2003 2001 2003 2001 2002 2001 2002 Year Year Year Year Year upwelling clear-sky shortwave clear-sky net radiative implied cloud response dry deposition rate wet deposition rate flux at TOA - so2-at-height flux at TOA - so2-at-height at TOA - so2-at-height of BC - so2-at-height of BC - so2-at-height 5.0e-01 rsutcs 0e+00 9e-01 rsutcs 2.5e-01 -2e-01 rsut - rlutcs ∆ rsutcs ∆ wetbc ∆ drybc 6e-01 6e-01 ∆ rlutcs + -4e-01 0.0e+00 0.00+00 3e-01 rlut + r 3e-01 -6e-01 0e+00 0e+00 2001 2002 2003 2004 2001 2002 2003 2001 2002 2003 2004 2001 2002 2003 2001 2002 2003 Year Year Year Year Year total deposition rate dry deposition rate wet deposition rate dry deposition rate wet deposition rate of BC - so2-at-height of SO2 - so2-at-height of SO2 - so2-at-height of SO4 - so2-at-height of SO4 - so2-at-height 2.0e+01 2e+01 2e+01 drybc + wetbc -2e+01 ∆ dryso2 ∆ wetso2 ∆ dryso4 1e+0 1.0e+01 -3e+01 1e+01 00+00 5.0e+00 2003 2002 2003 2003 2001 2003 2003 Year total deposition rate ambient aerosol optical total cloud cover convective cloud cover (dryso2 + wetso2)/2 + (dryso4 + wetso4)/3of S - so2-at-height thickness at 550nm - so2-at-h percentage - so2-at-heigh percentage - so2-at-height 8e+35 1e-01 0e+00 6e+35 5e-02 ∆ od550ae -2e+01 1e+01 0e+00 4e+35 -4e+01 -5e-02 0e+00 2e+35 -6e+01 -1e-01 0e+00 2002 2003 2002 2003 2002 2003 2003 Year Year Year Year

CESM1

E3SM

GISS

CESM2

MIROC

NorESM2

**GFDI** 

OsloCTM3

**UKESM** 

**GEOS**