## global: percent difference surface flux surface flux surface concentration surface concentration surface concentration of BC - so2-at-height of SO2 - so2-at-height of BC - so2-at-height of SO4 - so2-at-height of SO2 - so2-at-height 2.5e+01 40+00 5.0e-01 2e-05 3e+00 2.0e+0 1e-05 -1.0e+00 1e+00 .4e+01 -1.5e+000e+00 -1e-05 -2 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 upwelling longwave flux at TOA – so2–at–height upwelling clear-sky longwav flux at TOA - so2-at-heigh net radiative flux upwelling shortwave flux incident shortwave flux at TOA – so2–at–height at TOA - so2-at-height at TOA - so2-at-height 4e-02 4e - 082e-02 4e-01 2e-02 3e-01 0e+00 rsut ∆ rlut + 0e+00 2e-0 0e+00 -2e-021e-01 1e-01 -4e-02 -2e-08 2000 2001 2002 2003 2004 2001 2002 2003 2004 2002 2003 2004 2002 2003 2004 2002 2003 2004 2000 2001 2000 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 rsutcs) 6e-01 5.0e-01 rlutcs --2e-01 6e-01 rlutcs 0.0e+0.0rsut 0e+00 3e-01 -2e-01 00+00 2002 2003 2004 2002 2003 2004 2000 2001 2002 2003 2004 2000 2001 2002 2003 2004 2000 2001 2002 2003 2004 2000 2001 2000 2001 Year dry deposition rate of SO2 – so2–at–height wet deposition rate of SO2 – so2–at–height dry deposition rate of SO4 – so2–at–height wet deposition rate of SO4 – so2–at–height total deposition rate of BC - so2-at-height 4e-01 ∆ drybc + wetbc 2e+01 2e+01 ∆ dryso2 1.0e+01 5.00+00 2002 2003 2004 2000 2001 2002 2003 2004 2002 2003 2004 2000 2001 2002 2003 2004 2000 2001 2002 2003 2004 Year Year Year Year $\frac{1}{3} dryso2 + wetso2)/2 + \frac{1}{3} dryso4 + wetso4)/3$ total deposition rate ambient aerosol optical total cloud cover - so2-at-hei convective cloud cover - so2-at-l surface cloud cover - so2-at-h of S - so2-at-height thickness at 550nm - so2-at-h 1e-01 0e+00 0e+00 5e-02 4e+01 ∆ od550ae -2e-01 4e+35 2e+01 -4e+01 -5e-02 2e+35 -01 0e+00 -1e-01 0e+00 20002001200220032004 2000 2001 2002 2003 2004 2000 2001 2002 2003 2004 2002 2000 2001 2002 2003 2004 2000 2001 2003 2004 Year Year Year Year Year ice water path - so2-at-heig surface concentration column mass burden column mass burden column mass burden of DMS - so2-at-height of BC - so2-at-height of SO2 - so2-at-height of SO4 - so2-at-height 2e-01 3e+01 2e+01 0e+00 ∆ loadso2 ∆ loadso4 2e-01 1e+01 0e+00 0e+00 2000 2001 2002 2003 2004 2000 2001 2002 2003 2004 2000 2001 2002 2003 2004 2000 2002 2003 2004 2000 2001 2002 2003 2004 Year Year Year Year Year CAM5 E3SM **GISS** OsloCTM3

CESM1

CESM2

**GEOS** 

**GFDL** 

MIROC

NorESM2

**UKESM**