## so2-at-height: percent difference surface flux of BC – land surface flux surface concentration surface concentration surface concentration of SO2 - land of BC - land of SO4 - land of SO2 - land 4e-05 30+01 4e+00 0e+00 -3e+01 3e+00 ∆ emibc 2e+01 -4e+01 2e+00 0e+00 -5e+01 1e+00 -2e+00 0e+00 -6e+01 -2e-05 -7e+∩1 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 upwelling longwave flux at TOA – land upwelling shortwave flux at TOA – land upwelling clear-sky longwa flux at TOA - land net radiative flux incident shortwave flux at TOA – land at TOA - land 5.0e-02 5e-01 2.5e-02 1e-07 3e-01 rlut+ 0.0e+00 2e\_01 26-01 -2 5e-02 1e-01 -2 5e-02 -1e-07 -5.0e-02 0e+00 -5.0e-02 2000 2001 2002 2003 2004 2001 2002 2003 2004 2002 2003 2004 2000 2001 2002 2003 2004 2000 2001 2002 2003 2004 Year Year Year Year upwelling clear-sky shortwave flux at TOA - land clear-sky net radiative implied cloud response dry deposition rate wet deposition rate flux at TOA - land at TOA - land of BC - land of BC - land rsutcs) 0e+00 9e-01 rlutcs -7.5e-01 -2e-01 △ wetbc 6e -01 rlutcs + 5.0e-01 rsut--4e-01 0.00+00 -2.5e-01 -6e-01 0e+00 0.0e+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 dry deposition rate of SO4 – land wet deposition rate wet deposition rate total deposition rate dry deposition rate of BC - land of SO2 - land of SO2 - land of SO4 - land 2.5e-01 3e+01 -3e+010.0e+00 3e+01 ∆ wetso4 2e+01 2e+0 -2.5e-01 1e+01 -5.0e-01 \_5e+01 2000 2001 2002 2003 2004 2000 2001 2002 2003 2004 2000 2001 2002 2003 2004 2000 2001 2002 2003 2004 2002 2003 2004 Year Year Year Year $\frac{1}{3} dryso2 + wetso2)/2 + \frac{1}{3} dryso4 + wetso4)/3$ Year total deposition rate of S – land ambient aerosol optical total cloud cover - land convective cloud cover - lan surface cloud cover - land thickness at 550nm - land 2.0e+36 2e-01 0.0e+001e-01 ∆ od550ae. ㅎ <u>\</u> 1.0e+36 2.5e+01 -2.5e+01-1e-01 -5e-01 0.0e+00 -5.0e+01 -2e-01 -1e+00 0.0e+0020002001200220032004 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 ice water path - land surface concentration column mass burden column mass burden column mass burden of DMS - land of BC - land of SO2 - land of SO4 - land 3e-01 1.5e+00 4e+013e+01 0e+00 1.0e+00 ∆ clivi 3e+01 -3e-01 0e+00 2e+01 0.0e+0.01e+01 -6e-01 -3e-01 1e+01 0e+00 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 CAM5 E3SM **GISS** OsloCTM3 CESM1 **GEOS** MIROC **UKESM** CESM2 GFDL NorESM2