## land: percent difference surface flux surface flux surface concentration surface concentration of BC - so2-no-season of SO2 - so2-no-season of BC - so2-no-season of SO4 - so2-no-season of SO2 - so2-no-season 00+00 -1e+00 -1e-02 mmrso4 ∆ mmrbc ∆ emibc -2e-02 -2e-01 -3e+00 0e+00 0e+00 -3e-024e+00 -4e-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 upwelling shortwave flux at TOA – so2–no–season upwelling clear-sky longway flux at TOA - so2-no-seaso net radiative flux upwelling longwave flux incident shortwave flux at TOA – so2–no–season at TOA - so2-no-season at TOA - so2-no-season 2e-02 0e+00 3e-01 ∆ rlut rlut+ 2e-01 16-01 \_5e\_08 2000 2001 2002 2003 2004 2002 2003 2004 2002 2003 2004 2002 2003 2004 2002 2003 2004 2000 2000 2001 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-no-seaso flux at TOA - so2-no-seaso at TOA - so2-no-seasor of BC - so2-no-season of BC - so2-no-season rsutcs) 3e-01 5.0e-01 5e-01 5.0e-02 rsutcs 4e-01 rlutcs -2.5e-01 4e-01 2.5e-02 3e-01 2e-01 ∆ rlutcs + 00+00 2e-01 rsut -2e-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 dry deposition rate of SO2 – so2–no–season wet deposition rate of SO2 – so2–no–season dry deposition rate of SO4 – so2–no–season wet deposition rate of SO4 – so2–no–season total deposition rate of BC - so2-no-season 2e+00 2.5e-01 2.5e+00 ∆ dryso4 2.0e+00 0e+00 0.0e + 0.0e +-2e+00 -1e+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 $\frac{1}{3} dryso2 + wetso2)/2 + \frac{1}{3} dryso4 + wetso4)/3$ total deposition rate ambient aerosol optical total cloud cover - so2-no-sea convective cloud cover - so2-nosurface cloud cover - so2-no-s of S - so2-no-seaso thickness at 550nm - so2-no-s 2e-01 0e+00 1e-01 -2e+01 ∆ od550ae ∆ c# ∇C 5.0e+00 -1e-01 2.5e-01 2.5e+00 -1e-01 -6e+01 -2e-01 0.0e+00 0.0e+00 2000 2001 2002 2003 2004 20002001200220032004 2000 2001 2002 2003 2004 2000 2001 2002 2003 2004 2000 2001 2002 2003 2004 Year Year Year Year Year ice water path - so2-no-seas surface concentration column mass burden column mass burden column mass burden - so2-no-season of BC - so2-no-season of SO2 - so2-no-season of SO4 - so2-no-season 1e+00 1e+00 1e+00 5e-01 ∆ clivi oadso<sub>4</sub> 5e-01 -1e+005.0e+00 0e+000e+00 -2e+00 -5e-01 -3e+00 2000 2001 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 Year CAM5 E3SM **GISS** OsloCTM3

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