## global: absolute difference surface flux of SO2 – no–so4 surface flux of BC – no-so4 surface concentration surface concentration of SO4 – no–so4 surface concentration of SO2 – no–so4 of BC - no-so4 1e-05 2.8e+00 2e+00 2.5e-01 -5e+00 ∆ emibc 5e-06 ∆ mmrso4 ∆ mmrbc 2.4e+00 0.0e+00 -2.5e-01 2.0e+00 -5e-06 -8e+00 -5 0e-01 2001 2002 2003 2003 2002 2003 2002 2003 2002 2003 2001 2002 2001 2001 2001 Year Year Year Year Year upwelling longwave flux at TOA – no-so4 upwelling shortwave flux at TOA – no–so4 upwelling clear-sky longwav flux at TOA - no-so4 net radiative flux incident shortwave flux at TOA - no-so4 at TOA - no-so4 0.0e+00 0.0e + 0.06e-02 5e-03 -5.0e-02 $\Delta$ rsut ∆ rsdt -1.0e-01 0e+00 -1 0e-01 2e-02 -1.5e-01 0e+00 -1.5e-01 -01 -5e-03 2003 2003 2003 2002 2003 2001 2002 2003 2004 2001 2002 2001 2002 2001 2002 2001 Year Year Year Year dry deposition rate of BC – no-so4 upwelling clear-sky shortway clear-sky net radiative implied cloud response wet deposition rate flux at TOA - no-so4 flux at TOA - no-so4 at TOA - no-so4 of BC - no-so4 rlut + rsut - rlutcs - rsutcs 5e-01 0e+00 ∆ rlutcs + rsutcs 0e+00 0e+00 -5e-02 -4e-02 1e-01 -2e-01 -4e-02 2001 2002 2003 2001 2002 2003 2001 2002 2003 2001 2002 2003 2001 2002 2003 Year Year Year Year Year total deposition rate of BC – no–so4 dry deposition rate of SO2 – no–so4 wet deposition rate of SO2 – no–so4 dry deposition rate of SO4 – no-so4 wet deposition rate of SO4 – no–so4 6e-01 -4e+00 -5.0e-01 3e-01 2.2e+00 2.0e+00 -6e+00drybc + wetbc ∆ dryso2 ∆ wetso2 ∆ wetso4 ∆ dryso4 0e+00 2.0e+00 1.5e+00 -1.5e+00 -3e-01 1.8e+00 1.0e+00 -1e+01 -2.0e+00 5.0e-01 2003 2002 2003 2003 2002 2003 2002 2003 Year Year total deposition rate of S – no–so4 ambient aerosol optical total cloud cover convective cloud cover (dryso2 + wetso2)/2 + (dryso4 + wetso4)/3thickness at 550nm - no-so percentage - no-so4 percentage - no-so4 0e+00 0.0e+00 -2e+01 -5.0e-01 -4e+01 -1.0e+00-1e-01 -6e+01 -1.5e+00 -2e-01 2001 2002 2003 2004 2002 2003 2002 2003 2003 Year Year Year Year **UKESM** CESM1 GISS MIROC **GFDI** E3SM CESM2 NorESM2 OsloCTM3 **GEOS**