global: absolute difference surface concentration of SO4 – no–so4 surface flux surface flux surface concentration surface concentration of BC - no-so4 of SO2 - no-so4 of BC - no-so4 of SO2 - no-so4 2.1e-19 Δ emibc (kg m⁻² s⁻¹) (kg kg - 1) Δ emiso2 (kg m $^{-2}$ s $^{-}$ $\Delta \cos (kg kg - 1)$ △ mmrbc (kg kg – 1.2e 0.0e+0.02.3e-20 ∆ mmrso4 0.0e+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 upwelling longwave flux at TOA – no-so4 upwelling shortwave flux at TOA – no-so4 upwelling clear-sky longwa flux at TOA - no-so4 net radiative flux incident shortwave flux at TOA - no-so4 at TOA - no-so4 ∆ rlut + rsut (W m Δ rlutcs (W m – 2) Δ rlut (W m – 2) 0.0e+00 00+00 0e+00 E ∆ rsut (W m – 0e+00 ∆ rsdt (W 0e+00 -2e-01 -1e-01 -2e-01 -4e-0 -1.2e-01 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 upwelling clear–sky shortwa flux at TOA – no–so4 clear-sky net radiative flux at TOA - no-so4 dry deposition rate of BC – no-so4 rsutcs (W m⁻²) implied cloud response wet deposition rate at TOA - no-so4 of BC - no-so4 1.5e-15 1.4e-15 Ē 0e+00 wetbc (kg m⁻² s⁻¹ $\Delta \operatorname{rsutcs} (\operatorname{Wm} - 2)$ 0.0e+00 drybc (kg $m^{-2} s^{-1}$ rlutcs + rsutcs (W 1e-01 _5 0e_02 rlutcs --1 0e-01 -2e-01 -1e-01 -1.5e-01 rsut -2.0e-0 rlut + 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 dry deposition rate of SO2 – no–so4 dry deposition rate of SO4 – no–so4 wet deposition rate of SO4 – no-so4 total deposition rate of BC – no–so4 wet deposition rate of SO2 – no-so4 Δ drybc + wetbc (kg m⁻² s⁻¹ 1.3e-15 Δ wetso2 (kg m⁻² s⁻ wetso4 (kg m⁻² s⁻ ∆ dryso2 (kg m⁻² s⁻ 8.6e-16 dryso4 (kg m⁻ 4.0e-16 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 Yea Year Year dryso2 + wetso2)/2 + (dryso4 + wetso4)/3total deposition rate ambient aerosol optical total cloud cover - no-soconvective cloud cover - nosurface cloud cover - no-so of S - no-so4 thickness at 550nm - no-s 0.0e+00 percent 0.0e + 0.00e+00 (percent) (percent) $(kg m^{-2} s^{-1})$ -2.5e-02 -2.5e-020.0e+00 △ cltc ^ clt) | | | -2e-02 -1.0e-01 -5.0e-02 -3e-02 -1.5e-0 -1.0e-14 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 - no-so4 surface concentration column mass burden column mass burden column mass burden of DMS - no-so4 of BC - no-so4 of SO2 - no-so4 of SO4 - no-so4 2e-04 Δ loadso4 (kg m⁻²) Δ loadso2 (kg m $^{-2}$) Δ clivi (kg m $^{-2}$) Δ dms (kg kg-1) loadbc (kg m⁻²) 0e+005e-10 1e-04 2e-07 -4e-13 0e+00 1e-07 0e+00 -1e-04 -8e-13 -2e-04 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