so2-at-height: absolute difference surface flux surface flux surface concentration surface concentration of BC - SH-land of SO2 - SH-land of BC - SH-land of SO4 - SH-land of SO2 - SH-land 7.7e-19 Δ emibc (kg m⁻² s⁻¹) Δ emiso2 (kg m $^{-2}$ s $^{-1}$ kg-1 △ mmrbc (kg kg – (kg kg-(kg 0.0e+00 -3.9e-19 ∆ so2 (_9 7e_19 0.0e+00 -5.0e-13 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 – SH–land upwelling shortwave flux at TOA – SH–land upwelling clear-sky longwa flux at TOA - SH-land net radiative flux incident shortwave flux at TOA - SH-land at TOA - SH-land 5.0e-02 1e-01 m^{-2} 0.0e + 0.0 Δ rlutcs (W m-2) Δ rlut (W m – 2) 0.0e+00 0e+00 ∆ rsut (W m – rsut (W -5.0e-02 rsdt (W m-0e+00 -5.0e-02 -1e-01 ∆ rlut + -2e-01 -2.0e -3e-01 -2e-012000 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 upwelling clear-sky shortway flux at TOA - SH-land clear-sky net radiative flux at TOA - SH-land dry deposition rate of BC – SH–land wet deposition rate of BC – SH–land $(W \, m^{-2})$ implied cloud response at TOA - SH-land 2.9e-15 1.7e-15 m^{-2} rsutcs Δ rsutcs (W m – 2) drybc (kg $m^{-2} s^{-1}$ rsutcs (W 0.0e+00wetbc (kg m⁻² 0e+00 0e+00 rlutcs --1.0e-01 -1e-01 -1e-0 rsut -2e-01 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 Year Year total deposition rate of BC – SH–land dry deposition rate of SO4 – SH-land wet deposition rate of SO4 – SH-land dry deposition rate wet deposition rate of SO2 - SH-land of SO2 - SH-land Δ drybc + wetbc (kg m⁻² s⁻¹ 3.0e-15 Δ wetso2 (kg m⁻² s⁻ wetso4 (kg m⁻² s⁻ dryso2 (kg m⁻² s⁻ dryso4 (kg m--4.0e-16 -9.0e-13 5.0e-14 -1.2e-12 0.0e+00 -3.8e-15 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 Year dryso2 + wetso2)/2 + (dryso4 + wetso4)/3total deposition rate ambient aerosol optical total cloud cover - SH-land convective cloud cover - SH-Ia surface cloud cover - SH-la of S - SH-land thickness at 550nm - SH-lai ∆ cltc (percent) (percent) (percent) 1e-01 $(kg m^{-2} s^{-1})$ ∆ od550ae -2e-02 0e+00 0.0e + 00^ clt ۷ دا ($-1e-0^{\circ}$ 1e+35 -4e-02 -2e-01 -5.0e-02 0e+00 -6e-02 2002 2003 2004 20002001200220032004 2000 2001 2002 2003 2004 2002 2003 2004 2000 2001 2002 2003 2004 2000 2001 2000 2001 Year Year Year Year Year ice water path - SH-land column mass burden column mass burden column mass burden surface concentration of DMS - SH-land of BC - SH-land of SO2 - SH-land of SO4 - SH-land Δ loadso4 (kg m⁻²) Δ loadso2 (kg m $^{-2}$) Δ clivi (kg m $^{-2}$) $loadbc (kg m^{-2})$ 4e-07 ∆ dms (kg kg −1 0e+00 1.5e-07 0e+00 2e-07 -5e-04 1.0e-07 1e-07 0e+00 -1e-03 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

CESM2

GEOS

GFDL

MIROC

NorESM2

UKESM