so2-at-height: absolute difference surface flux surface flux surface concentration surface concentration of BC - SH-sea of SO2 - SH-sea of BC - SH-sea of SO4 - SH-sea of SO2 - SH-sea 5.3e-21 Δ emibc (kg m⁻² s⁻¹) ∆ mmrso4 (kg kg −1) Δ emiso2 (kg m $^{-2}$ s $^{-1}$ ∆ mmrbc (kg kg − 1) 0.0e+00 kg -1e-14 kg (-2.5e-2 -1.0eso₂ (0e+00 _1 5e_11 -6.3e-21 -2.0e-1 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 upwelling longwave flux at TOA – SH–sea upwelling shortwave flux at TOA – SH-sea upwelling clear–sky longwa flux at TOA – SH–sea net radiative flux incident shortwave flux at TOA – SH-sea at TOA - SH-sea Δ rlut + rsut (W m⁻²) 2.5e-02 Δ rlutcs (W m-2) Δ rlut (W m – 2) rsut (W mrsdt (W m-0.0e+00 -1e-01 -1e-01 _2e_01 -2e-07 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 upwelling clear–sky shortwa flux at TOA – SH–sea clear-sky net radiative flux at TOA - SH-sea dry deposition rate of BC – SH–sea wet deposition rate of BC – SH–sea rsutcs (W m⁻²) implied cloud response at TOA - SH-sea 1.8e-16 8.2e-16 Δ rsutcs (W m – 2) 0.0e+00 0.0e+00 drybc (kg m^{-2} s⁻¹ wetbc (kg m⁻² s⁻¹ rsutcs (W -5.0e-02 -5.0e-02 rlutcs -1e-01 -1.0e-01 -1.0e-01 -9.0e-17 rsut -1.5e-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 total deposition rate of BC – SH–sea dry deposition rate of SO4 – SH–sea dry deposition rate wet deposition rate of SO2 – SH-sea wet deposition rate of SO4 – SH-sea of SO2 - SH-sea Δ drybc + wetbc (kg m⁻² s⁻¹ 7.6e-16 Δ wetso2 (kg m⁻² s⁻ wetso4 (kg m $^{-2}$ s $^{-}$ dryso2 (kg m⁻² s⁻ $_{ m \Delta}$ dryso4 (kg m $^{-2}$ 0.0e + 006.7e-17 2e-13 _2 5e_14 0e+00 -6.3e-16 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 Yea Year Year dryso2 + wetso2)/2 + (dryso4 + wetso4)/3total deposition rate ambient aerosol optical total cloud cover - SH-sea convective cloud cover - SH-s surface cloud cover - SH-se of S - SH-sea thickness at 550nm - SH-se 0e+00 (percent) ∆ clt (percent) ∆ cl (percent) 0e+00 $(kg m^{-2} s^{-1})$ 0e+00 -2e-02∆ cltc (-4e-021e+35 -2e-02 -6e-02 0e+00 20002001200220032004 2000 2001 2002 2003 2004 2000 2001 2002 2003 2004 2002 2003 2004 2000 2001 2002 2003 2004 2000 2001 Year Year Year Year Year ice water path - SH-sea surface concentration column mass burden column mass burden column mass burden of BC - SH-sea of SO2 - SH-sea of SO4 - SH-sea Δ loadso2 (kg m $^{-2}$) Δ loadso4 (kg m⁻²) Δ clivi (kg m⁻²) $loadbc (kg m^{-2})$ ∆ dms (kg kg –1) 2e-04 1e-04 5.0e-08 1e-07 0e+00 2.5e-08 -1e-04 0.0e+00 -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

CESM1

CESM2

E3SM

GEOS

GFDL

GISS

MIROC

NorESM2

OsloCTM3

UKESM