so2-at-height: percent difference surface flux of SO2 – SH–sea surface concentration of BC – SH–sea surface flux of BC – SH–sea surface concentration of SO4 – SH–sea surface concentration of SO2 – SH–sea 0.25% 6% 0% ∆ emiso2 1% ∆ mmrso4 -5e-06% -5% ∆ emibc $\Delta so2$ -0.25% -1e-05%0% -1.5e-05% -0.5% 2001 2002 2003 2001 2002 2003 2004 2001 2002 2003 2001 2002 2003 2004 2001 2002 2003 Year Year Year Year Year clear-sky longwave flux at TOA - SH-sea longwave flux at TOA shortwave flux at TOA net radiative flux incident shortwave flux SH-sea SH-sea at TOA - SH-sea at TOA - SH-sea 0.3% 0.01% 0.2% 0.02% 0.2% 0.005% 2e-08% ∆ (rlut + rsut) ∆ rsut ∆ rsdt ∆ rlut 0.1% 0% 0.1% 0% -0.005% 0% 0% -0.02% -0.01% -2e-08% -0.1 2001 2003 2001 2003 2001 2003 2002 2003 2003 Year Year Year Year Year dry deposition rate of BC – SH–sea clear-sky shortwaveflux clear-sky net radiative implied cloud response wet deposition rate at TOA - SH-sea flux at TOA - SH-sea at TOA - SH-sea of BC - SH-sea 0.1% 0.4% 0.4% Δ (rlut + rsut - rlutcs - rsutcs) 0.2% 0.3% 0.3% ∆ (rlutcs + rsutcs) 0% 0.5% 0% ∆ rsutcs △ wetbc △ drybc 0.2 0.2% 0.1% 0.1% -0.2% -0.4% 0% -0.5% -0.6% 2001 2003 2001 2003 2003 2001 2003 2001 2003 Year Year Year Year Year total deposition rate of BC – SH–sea dry deposition rate of SO4 – SH–sea dry deposition rate wet deposition rate wet deposition rate of SO2 - SH-sea of SO2 - SH-sea of SO4 - SH-sea 8% 0.5% ∆ (drybc + wetbc) 0.25% ∆ dryso2 ∆ wetso2 ∆ dryso4 ∆ wetso4 0% 4% -0.25%2.5% -0.5% -4% 2001 2002 2003 2004 2001 2002 2003 2004 2001 2002 2003 2004 2001 2002 2003 2004 2001 2002 2003 2004 Year Year total deposition rate of S – SH–sea ambient aerosol optical $\Delta (dryso2 + wetso2)/2 + (dryso4 + wetso4)/3$ total cloud cover convective cloud cover percentage - SH-sea percentage - SH-sea 0% 6e+35% 0.1% -20% ∆ od550aer 4e+35% 0.05% 2e+35% -60% 0% -80% 0% _0.05% 2002 2002 2003 2001 2003 2001 2003 2004 2002 2003 2004 2004 2002 2004 2001 2001 Year Year Year Year

OsloCTM3

UKESM

CFSM1

E3SM

GFOS

GISS

MIROC

NorESM2