bc-no-season: percent difference surface flux of SO2 – NH–sea surface concentration of BC – NH–sea surface concentration of SO4 – NH–sea surface flux of BC – NH–sea surface concentration of SO2 – NH–sea 0.3% 0% 0.2% 1.5% 3% -25% 0.1% ∆ emibc ∆ emiso2 ∆ mmrso4 ∆ mmrbc 1% 2% 0% -0.1% 0.5% -75% 0% -100% -0.3% 2001 2002 2003 2001 2002 2003 2001 2002 2003 2004 2001 2002 2003 2004 2001 2002 2003 Year Year Year Year Year incident shortwave flux at TOA – NH–sea clear-sky longwave flux at TOA - NH-sea longwave flux at TOA shortwave flux at TOA net radiative flux NH-sea NH-sea at TOA - NH-sea 0.05% 0.2% 6e-08% 0.025% 0% 0.1% ∆ (rlut + rsut) 0.1% -08% ∆ rsut ∆ rlut -0.01% 0% -0.025% 2e-08% -0.02% -0.05% -0.1% -0.1% 0% -0.03% -0.075% 2003 2001 2003 2001 2003 2001 2002 2003 2003 Year Year Year Year Year clear-sky shortwaveflux clear-sky net radiative implied cloud response dry deposition rate wet deposition rate at TOA - NH-sea flux at TOA - NH-sea at TOA - NH-sea of BC - NH-sea of BC - NH-sea 0.15% (rlut + rsut - rlutcs - rsutcs) 0.1% 0.15% -2 5% ∆ (rlutcs + rsutcs) 0.1% 0% 0.1% ∆ rsutcs △ wetbc △ drybc 0.05% 0.05% -6% 0% 0% -8% -0.05% -0.05 2003 2001 2003 2001 2003 2001 2003 2001 2002 2001 2002 2003 Year Year Year Year Year total deposition rate of BC – NH–sea dry deposition rate of SO4 – NH–sea dry deposition rate of SO2 – NH–sea wet deposition rate of SO4 – NH–sea wet deposition rate of SO2 - NH-sea 3% 0.4% ∆ (drybc + wetbc) 2% ∆ wetso2 ∆ wetso4 ∆ dryso4 0.2% -10% 0% -0.2% -15% -0.2% 0% -0.3% 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 ambient aerosol optical $\Delta \left(\text{dryso2} + \text{wetso2} \right) / 2 + \left(\text{dryso4} + \text{wetso4} \right) / 3$ total cloud cover convective cloud cover of S - NH-sea percentage - NH-sea percentage - NH-sea 2.5% 2% 0.2% -20% 0.1% ∆ od550aer 0.1% -40% 1% 0% 0.5% -60% -0.1% 0% -80% 2002 2003 2003 2002 2003 2002 2001 2004 2002 2004 2004 2003 2004 2001 2001 2001 Year Year Year Year

CFSM1

CESM2

F3SM

GEOS

GFDI

GISS

MIROC

NorESM2

OsloCTM3

UKESM