bc-no-season: percent difference surface flux of BC – global surface flux of SO2 – global surface concentration of BC – global surface concentration of SO4 – global surface concentration of SO2 – global 0% 6% 0.15% -25% ∆ emiso2 ∆ mmrbc ∆ mmrso4 0.1% ∆ emibc 0% 2% 0.05% -75% -0.1% 0% -100% 2001 2003 2001 2002 2003 2001 2002 2003 2004 2001 2002 2003 2001 2002 2003 Year Year Yea Year Year incident shortwave flux at TOA – global clear-sky longwave flux at TOA - global longwave flux at TOA shortwave flux at TOA net radiative flux at TOA - global global global 0.03% 0.1% 0.02% 0.025% 0% 0% 1.5e-08% ∆ (rlut + rsut) ∆ rlutcs 0.01% ∆ rlut -0.1% 0% -0.2% 5e-09% -0.2% -0.01% -0.3%0% 2003 2001 2003 2001 2003 2001 2002 2003 2004 2001 2002 2003 Year Year Year Year Year clear-sky shortwaveflux clear-sky net radiative implied cloud response dry deposition rate wet deposition rate at TOA - global flux at TOA - global at TOA - global of BC - global of BC - global 0.2% rsutcs 0% 0% ∆ (rlutcs + rsutcs) ∆ (rlut + rsut - rlutcs -0% △ wetbc △ drybc 0.1% -0.2% -2% 0% -0.4%-0.4% -3% 2003 2001 2003 2001 2003 2001 2003 2001 2002 2001 2002 2003 Year Year Year Year Year dry deposition rate of SO4 – global wet deposition rate of SO4 – global total deposition rate dry deposition rate wet deposition rate of BC - global of SO2 – global of SO2 – global 0.1% 3% 0.25% ∆ (drybc + wetbc) 0.05% 0% ∆ dryso2 ∆ wetso2 ∆ dryso4 ∆ wetso4 0% -4% -0.25% -0.05% -0.5% 0% -6% 2001 2002 2003 2001 2002 2003 2004 2001 2002 2003 2004 2001 2002 2003 2004 2001 2002 2003 2004 Year ambient aerosol optical convective cloud cover $\Delta \left(\text{dryso2} + \text{wetso2} \right) / 2 + \left(\text{dryso4} + \text{wetso4} \right) / 3$ total deposition rate total cloud cover of S - global percentage - global percentage - global 0.1% -20% ∆ od550aer △ cltc -40% -0.1% -60% -0.2% 2002 2003 2002 2003 2002 2001 2003 2004 2002 2004 2001 2004 2001 2003 2004 2001 Year Year Year Year OsloCTM3 CFSM1 F3SM **GFDI** MIROC

CESM2

GEOS

GISS

NorESM2

UKESM