NH-pacific: absolute difference surface concentration of BC – bc–no–season surface flux of BC – bc–no–season surface flux of SO2 – bc–no–season surface concentration of SO4 – bc–no–season surface concentration of SO2 – bc–no–season 1.2e+00 0.0e+00 4e-01 3e+00 -2e+00 9.0e-01 -2.5e+01 2e+00 ∆ emibc ∆ mmrso4 ∆ mmrbc -4e+006.0e-01 -5.0e+01 0e+00 -6e+00 3.0e-01 _7 5e+01 -2e-01 0e+00 0.0e+00 2003 2002 2003 2003 2003 2001 2002 2003 2001 2002 2001 2001 2002 2002 2001 Year Year Year Year Year upwelling longwave flux at TOA – bc–no–season upwelling shortwave flux at TOA – bc–no–season upwelling clear-sky longwar flux at TOA - bc-no-seaso net radiative flux incident shortwave flux at TOA - bc-no-season at TOA - bc-no-season 6e-08 4e-01 3e-01 4e-08 0e+00 2e-01 0.0e+00 ∆ rlut + rsut 2e-01 Δ rlutcs ∆ rsut 1e-01 -5e-02 0e+00 0e+00 0e+00 -2e-08 -1e-01 -1e-01 -2e-0 -5.0e-02 2003 2003 2003 2001 2002 2004 2001 2002 2003 2001 2003 2004 2001 2002 2001 2002 Year Year Year Year dry deposition rate of BC – bc–no–season upwelling clear-sky shortwa clear-sky net radiative implied cloud response wet deposition rate flux at TOA - bc-no-seaso flux at TOA - bc-no-seaso at TOA - bc-no-season of BC - bc-no-season 2.0e-01 0.0e+00 2e-01 rsutcs 1.5e-01 1e-01 -2.5e+00 1.0e-01 ∆ rlutcs + rsutcs rlut + rsut - rlutcs 1.0e-01 ∆ rsutcs 0e+00 5.0e-02 -5.0e+005.0e-02 -1e-01 0.0e+000.0e+00 -7.5e+00 -7.5e+00-2e-01 -5.0e-02 -5 0e-02 2001 2002 2003 2004 2001 2002 2003 2001 2003 2001 2002 2003 2004 2002 2003 Year Year Year Year Year dry deposition rate of SO4 – bc–no–season wet deposition rate of SO4 – bc–no–season total deposition rate dry deposition rate wet deposition rate of BC - bc-no-season of SO2 - bc-no-season of SO2 - bc-no-season 3e+00 2e+00 2e-01 -8.0e+00 drybc + wetbc 5e-01 2e+00 ∆ dryso2 0e+00 ∆ wetso2 ∆ dryso4 1e+00 1e+00 0e+00 0e+00 -1.6e+01 0e+00 -5e-01 2002 2003 2002 2003 2002 2003 2003 2003 Year Year convective cloud cover percentage – bc-no-season total deposition rate ambient aerosol optical total cloud cover (dryso2 + wetso2)/2 + (dryso4 + wetso4)/3of S - bc-no-season percentage - bc-no-seaso 0e+00 2.0e+00 2e-01 1.5e+00 -2e+01 1e-01 1e-01 ∆ clt 1.0e+00 0e+00 -4e+01 5.0e-01 0e+00 -1e-01 -6e+01 0.0e+00 -1e-01 -2e-01 2001 2002 2003 2004 2002 2003 2002 2003 Year Year Year Year

CESM1

E3SM

GISS

CESM2

MIROC

NorESM2

GFDI

OsloCTM3

UKESM

GEOS