NH-pacific: absolute difference surface flux of SO2 – high–so4 surface concentration of BC – high–so4 surface flux of BC – high–so4 surface concentration of SO4 – high–so4 surface concentration of SO2 – high–so4 1e-05 1.5e+00 0e+00 -2.0e+00 6e+00 -1e+00 1.0e+00 0e+00 -2e+00 ∆ emibc 4e+00 5.0e-01 3e+00 -3.5e+00 -4e+00 0.0e+00 2e+00 -2e-05 -4.0e+00 -5e+00 2001 2002 2004 2003 2003 2003 2002 2003 2003 2001 2002 2001 2002 2001 2002 2001 Year Year Year Year Year upwelling longwave flux at TOA – high–so4 upwelling shortwave flux at TOA – high–so4 net radiative flux at TOA – high–so4 upwelling clear-sky longwav flux at TOA - high-so4 incident shortwave flux at TOA - high-so4 4e-01 5e-02 1e-02 3e-01 3e-01 0e+00 2e-01 ∆ rlutcs 0e+00 ∆ rsut 2e-01 △ rlut + 2.5e-08 -02 1e-01 -1e-02 0.0e + 000e+00-1e-01 -2e-02 2002 2003 2001 2002 2003 2004 2001 2003 2004 2001 2002 2003 2004 2001 2002 2001 2002 2003 Year Year Year Year dry deposition rate of BC – high–so4 upwelling clear-sky shortwav clear-sky net radiative implied cloud response wet deposition rate flux at TOA - high-so4 flux at TOA - high-so4 at TOA - high-so4 of BC - high-so4 2.5e-01 2e+00 rsutcs 3e-01 2.0e-01 2.0e-01 1e+00 5e-01 2e-01 1.5e-01 rlut + rsut - rlutcs 1.5e-01 0e+00 ∆ wetbc 1e-01 ∆ rlutcs + 1.0e-01 1.0e-01 -1e+00 0e+00 0e+00 5 0e-02 5.0e-02 -2e+00 1e-01 -5e-01 0.0e+00 0.0e + 00-3e+00 2001 2002 2003 2004 2001 2002 2003 2004 2001 2002 2003 2004 2001 2002 2003 2001 2002 2003 Year Year Year Year Year dry deposition rate of SO2 – high–so4 dry deposition rate of SO4 – high–so4 wet deposition rate of SO4 – high–so4 total deposition rate of BC – high–so4 wet deposition rate of SO2 – high–so4 7e+00 -1e+00 2e+00 3e+00 6e+00 -2.5e+00drybc + wetbc -2e+00 ∆ wetso2 ∆ wetso4 ∆ dryso2 ∆ dryso4 0e+00 2e+00 -3.0e+00 -3e+00 3e+00 -2e+00 1e+00 2e+00 -4e+00 -4.0e+00 2003 2002 2003 2002 2003 2003 2003 Year Year total deposition rate of S – high–so4 ambient aerosol optical total cloud cover convective cloud cover (dryso2 + wetso2)/2 + (dryso4 + wetso4)/3thickness at 550nm - high-s percentage - high-so4 percentage - high-so4 0e+00 3e-01 1e+00 1e-01 2e-01 ∆ od550aeı 0e+00 ∆ct 1e-01 -4e+01 0e+00 -1e+00 -6e+01 -1e-01 -2e+00 2001 2002 2003 2004 2002 2003 2002 2003 2002 2003 Year Year Year Year

CESM1

E3SM

GISS

CESM2

MIROC

NorESM2

GFDI

OsloCTM3

UKESM

GEOS