## NH-pacific: absolute difference surface flux of SO2 – so2–at–height surface concentration surface concentration of SO2 – so2–at–height surface flux surface concentration of BC - so2-at-height of SO4 – so2–at–height 1.0e-20 2.0e-13 2.0e-10 $\mathrm{emibc}\,(\mathrm{kg}\,\mathrm{m}^{-2}\,\mathrm{s}^{-1})$ emiso2 $(kg m^{-2} s^{-1})$ mmrso4 (kg kg – 1) mmrbc (kg kg-1) 00+00 so2 (kg kg-1) 0e+00 4.6e-21 1.0e-13 -1e-13 1.8e-21 5.0e-14 -2e-13 0.0e+00 2002 2003 2002 2003 2002 2003 2002 2003 2001 2002 2003 2001 2001 2001 2001 Year Year Year Year Year upwelling longwave flux at TOA – so2–at–height upwelling shortwave flux at TOA – so2–at–height upwelling clear-sky longway flux at TOA - so2-at-heigl net radiative flux incident shortwave flux at TOA - so2-at-height at TOA - so2-at-height 6e-02 0e+00 1e-01 rlut + rsut $(W m^{-2})$ rlutcs (W m-2) -2e-0 rsut (W m-2) rlut (W m – 2) rsdt(Wm-2)\_2e\_01 2e-02 0e+00 -4e-01 0e+00 -4e-01 -2e-02 -6e-01 -5.0e-08 -1e-01 4e-02 2003 2003 2002 2003 2001 2002 2003 2001 2002 2001 2002 2001 2001 2002 2003 Year Year Year Year Year upwelling clear-sky shortway clear-sky net radiative implied cloud response dry deposition rate wet deposition rate flux at TOA – so2-at-heigh flux at TOA - so2-at-heigh at TOA - so2-at-height of BC - so2-at-height of BC - so2-at-height rlut + rsut – rlutcs – rsutcs (W $m^{-2}$ ) 0e+00 0e+00 rlutcs + rsutcs (W $m^{-2}$ 8.4e-16 wetbc $(kg m^{-2} s^{-1})$ drybc (kg $m^{-2} s^{-1}$ ) rsutcs (W m-2) -2e-01 0e+00 -4e-01 -4e-01 -2e-01 -6e-01 4e-0 -8e-01 2001 2002 2003 2001 2002 2003 2001 2002 2003 2001 2002 2003 2001 2002 2003 Year Year Year Year Year dry deposition rate of SO4 – so2–at–height total deposition rate dry deposition rate wet deposition rate wet deposition rate of BC - so2-at-height of SO2 - so2-at-height of SO2 - so2-at-height of SO4 - so2-at-height 1.3e-15 $drybc + wetbc (kg m^{-2} s^{-1})$ 4e-13 wetso2 $(kg m^{-2} s^{-1})$ 5.5e-16 $dryso2 (kg m^{-2} s^{-1})$ $dryso4 (kg m^{-2} s^{-1})$ wetso4 $(kg m^{-2} s^{-1})$ 2e-12 2e-13 -2.3e-16 0e+00 0e+00 -1.8e-15 2001 2003 2002 2003 2002 2003 2002 2003 2002 2003 Year Year total deposition rate ambient aerosol optical total cloud cover convective cloud cover (dryso2 + wetso2)/2 + (dryso4 + wetso4)/3of S - so2-at-height percentage - so2-at-heigh percentage - so2-at-height 1.2e-12 0e+00 expression(clt~(%) $(kg m^{-2} s^{-1})$ 2e+35 -3e-02 0e+00 -6e-02 5.0e-13 -5e-02 0e+00 2001 2002 2003 2004 2002 2003 2002 2003 2003 Year Year Year Year

CESM1

E3SM

GISS

CESM2

MIROC

NorESM2

**GFDI** 

OsloCTM3

**UKESM** 

**GEOS**