so2-at-height: percent difference surface concentration of BC – NH–pacific surface flux of BC – NH–pacific surface flux of SO2 – NH–pacific surface concentration of SO4 – NH–pacific surface concentration of SO2 – NH–pacific 0.4% 20% 0.2% ∆ emiso2 ∆ mmrbc ∆ mmrso4 0% 1e-05% 5% $\Delta so2$ 5e-06% 2.5% -10% -0.4% 5% 0% -0.6% 0% 2001 2002 2003 2001 2002 2003 2001 2002 2003 2001 2002 2003 2004 2001 2002 2003 Year Year Year Year Year net radiative flux at TOA – NH–pacific clear-sky longwave flux at TOA - NH-pacific longwave flux at TOA shortwave flux at TOA incident shortwave flux at TOA - NH-pacific NH-pacific NH-pacific 0.8% 5e-09% 0.6% 0.01% 0.04% 0.6% ∆ (rlut + rsut) 0.4% 0% ∆ rsut 0.4% 0% -5e-09% 0.2% 0.2% -1e-08% -0.01% -0.04% 0% -1.5e-08% 0% -0.02% 2001 2003 2001 2002 2003 2001 2003 2002 2003 2004 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 - NH-pacific flux at TOA - NH-pacific at TOA - NH-pacific of BC - NH-pacific of BC - NH-pacific 2% 2% Δ (rlut + rsut – rlutcs – rsutcs) Δ (rlutcs + rsutcs) 1.5% 1.5% △ wetbc △ drybc 0% -0.5% 1% 0% 0.5% 0.5% -0.5% -0.3%0% 0% -0.6% 2001 2003 2001 2003 2003 2001 2003 2001 2003 Year Year Year Year Year wet deposition rate of SO4 – NH–pacific total deposition rate of BC – NH–pacific dry deposition rate wet deposition rate dry deposition rate of SO2 - NH-pacific of SO2 - NH-pacific of SO4 - NH-pacific 15% 1% 20% 20% 10% Δ wetso2 0.5% ∆ dryso2 ∆ dryso4 ∆ wetso4 10% 10% 0% 0% 5% -0.5% 0% 2001 2002 2003 2004 2001 2002 2003 2004 2001 2002 2003 2004 2001 2002 2003 2004 2001 2002 2003 2004 Year Year Year total deposition rate of S – NH–pacific convective cloud cover ambient aerosol optical total cloud cover thickness at 550nm - NH-pac percentage - NH-pacific 0.2% 30% 6e+35% 0% 0.1 ∆ od550aer 4e+35% 20% -25% △ cltc 0% 2e+35% -50% 10% -0.1%

∆ emibc

∆ rlut

∆ rsutcs

∆ (drybc + wetbc)

 $\Delta (dryso2 + wetso2)/2 + (dryso4 + wetso4)/3$

2002

2003

Year

2004

2001

-75%

