NH-pacific: absolute difference surface flux of SO2 – no–so4 surface flux of BC – no-so4 surface concentration surface concentration of SO4 – no–so4 surface concentration of SO2 – no–so4 1.1e-20 1.0e-13 5e-12 6.5e-2 $\mathrm{emibc}\,(\mathrm{kg}\,\mathrm{m}^{-2}\,\mathrm{s}^{-1})$ $emiso2 (kg m^{-2} s^{-1})$ mmrso4 (kg kg – 1) mmrbc (kg kg-1) so2 (kg kg-1) 2.0e-21 0e+00 -2.4e-2 16-12 0.0e+00 -6.8e-2 2002 2003 2002 2003 2002 2003 2002 2003 2002 2003 2001 2001 2001 2001 2001 Year Year Year Year Year upwelling longwave flux at TOA – no-so4 upwelling shortwave flux at TOA – no–so4 upwelling clear–sky longwa flux at TOA – no–so4 net radiative flux incident shortwave flux at TOA - no-so4 at TOA - no-so4 1e-07 2e-01 2e-01 5.0e-02 1e-01 rlut + rsut $(W m^{-2})$ 0e+00rlutcs (W m-2) sut (W m-2) rsdt (W m-2) rlut (Wm-2)1e-01 0e+00 1e-01 0.0e + 0.00e+00 -1e-01 -2e-07 -1e-01 -01 -5.0e-02 2003 2002 2003 2003 2001 2002 2003 2001 2002 2003 2001 2002 2001 2001 2002 Year Year Year Year Year wet deposition rate of BC – no–so4 upwelling clear-sky shortwav clear-sky net radiative implied cloud response dry deposition rate flux at TOA - no-so4 flux at TOA - no-so4 at TOA - no-so4 of BC - no-so4 $+ rsut - rlutcs - rsutcs (W m^{-2})$ 2e-01 2e-02 lutcs + rsutcs (W m⁻²) 1.6e-15 $drybc (kg m^{-2} s^{-1})$ wetbc $(kg m^{-2} s^{-1})$ 1.3e-15 rsutcs (W m-2) 1e-01 0e+00 0e+00 8.0e-16 -2e-02 0e+00 -5e-02 -4e-02 2001 2002 2003 2004 2001 2002 2003 2004 2001 2002 2003 2001 2002 2003 2001 2002 2003 Year Year Year Year Year dry deposition rate of SO2 – no-so4 total deposition rate of BC – no–so4 wet deposition rate of SO2 – no-so4 dry deposition rate of SO4 – no–so4 wet deposition rate of SO4 – no-so4 4.9e-15 $drybc + wetbc (kg m^{-2} s^{-1})$ 3.1e-15 wetso2 $(kg m^{-2} s^{-1})$ wetso4 $(kg m^{-2} s^{-1})$ $dryso2 (kg m^{-2} s^{-1})$ dryso4 (kg $\mathrm{m}^{-2} \mathrm{s}^{-1}$ 1.2e-15 2e-14 0e+00 2002 2003 2002 2003 2002 2003 2001 2002 2003 2002 2003 Year Year Year Year total deposition rate of S – no–so4 ambient aerosol optical total cloud cover convective cloud cover (dryso2 + wetso2)/2 + (dryso4 + wetso4)/3thickness at 550nm - no-se percentage - no-so4 percentage - no-so4 2e-02 0.0e+00 2e-14 expression(clt~(%) 0e+00 $(kg m^{-2} s^{-1})$ 1e-01 1e-14 0e+00 -5.0e-02 0e+00 -7 5e-02 -1e-14 -2e-01 2001 2002 2003 2004 2002 2003 2002 2003 2003 Year Year Year Year **UKESM** CESM1 GISS MIROC **GFDL**

E3SM

CESM2

NorESM2

OsloCTM3

GEOS