## high-so4: percent difference surface flux surface flux surface concentration surface concentration surface concentration of BC - sea of SO2 - sea of BC - sea of SO4 - sea of SO2 - sea 5.0e=06 8e-01 -2.0e+00 00+00 6e+00 -1e+00 0.0e+00 4e-01 ∆ mmrbc 5e+00 \_20+00 -5.0e-06 4e+00 -3e+00 0e+00 -1.0e-05 -4e+00 3e+00 -1.5e-05 -5e+00 2000 2001 2002 2003 2004 2000 2001 2002 2003 2004 2000 2001 2002 2003 2004 2000 2001 2002 2003 2004 2000 2001 2002 2003 2004 Year upwelling longwave flux at TOA – sea upwelling shortwave flux at TOA – sea upwelling clear-sky longwav flux at TOA - sea net radiative flux incident shortwave flux at TOA – sea at TOA - sea 4e-08 4e-01 3e-02 0.0e + 00\_01 2e-08 3e-01 2e-02 2e-01 2e-01 -2.5e-02 1e-02 0e+001e-01 00+00 -5.0e-02 -2e-08 0e+00 -1e-02 2000 2001 2002 2003 2004 2001 2002 2003 2004 2000 2001 2002 2003 2004 2000 2001 2002 2003 2004 2002 2003 2004 Year Year Year Year upwelling clear-sky shortwave flux at TOA - sea clear-sky net radiative implied cloud response dry deposition rate wet deposition rate flux at TOA - sea at TOA - sea of BC - sea of BC - sea rsutcs) 3e-01 1e+00 36\_01 rlutcs -2e-01 2e-01 1e-01 2.5e ∆ rlutcs rsut – 1e-01 1e-01 -1e+00 0.0e+00 r Hut 00+00 2002 2003 2004 2000 2001 2002 2003 2004 2000 2001 2002 2003 2004 2000 2001 2002 2003 2004 2000 2001 2002 2003 2004 2000 2001 dry deposition rate of SO4 – sea dry deposition rate of SO2 – sea wet deposition rate wet deposition rate total deposition rate of BC - sea of SO2 - sea of SO4 - sea -2.0e+00 ∆ drybc + wetbc 1e+00 -2e+00 ∆ wetso2 ∆ wetso4 2e+00 0e+00 -3.0e+00 -1e+00 -2e+00 2000 2001 2002 2003 2004 2000 2001 2002 2003 2004 2002 2003 2004 2000 2001 2002 2003 2004 2002 2003 2004 Year Year Yea Year $\frac{1}{3} dryso2 + wetso2)/2 + \frac{1}{3} dryso4 + wetso4)/3$ Year total deposition rate ambient aerosol optical total cloud cover - sea convective cloud cover - se surface cloud cover - sea of S - sea thickness at 550nm - sea 1e+00 2e-01 1.0e-01 5e-01 4e+00 -2e+01 2e+00 ㅎ 0e+00 ا کا کا 0e+00 -4e+010.0e+00 0e+00 -1e-01 -5e-01 -6e+01 -5.0e-02 -2e+00 -1e+002000 2001 2002 2003 2004 2000 2001 2002 2003 2004 20002001200220032004 2000 2001 2002 2003 2004 2000 2001 2002 2003 2004 Year Year Year Year Year ice water path - sea surface concentration column mass burden column mass burden column mass burden of DMS - sea of BC - sea of SO2 - sea of SO4 - sea 1.0e+00 5.0e-01 1.5e+0.11.5e+00 ∆ loadso2 0e+00 2.5e-0 1.0e+00 5.0e-01 5.0e+00 0.0e+00 -2e+00 0.0e+00 0.0e+00-2.5e-01 2000 2001 2002 2003 2004 2000 2001 2002 2003 2004 2000 2001 2002 2003 2004 2000 2001 2002 2003 2004 2000 2001 2002 2003 2004 Year Year Year Year Year

CAM5

CESM1

CESM2

E3SM

**GEOS** 

GFDL

**GISS** 

MIROC

NorESM2

OsloCTM3

**UKESM**