## so2-at-height: percent difference surface flux surface flux surface concentration surface concentration of BC - NH-sea of SO2 - NH-sea of BC - NH-sea of SO4 - NH-sea of SO2 - NH-sea 1e+01 1.5e-05 2e+01 mmrso4 1.0e-05 5.0e+00 0e+00 5.0e-06 -1e+01 2.5e+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 Year upwelling longwave flux at TOA – NH–sea upwelling shortwave flux at TOA – NH–sea upwelling clear-sky longwav flux at TOA - NH-sea net radiative flux incident shortwave flux at TOA - NH-sea at TOA – NH-sea 5e-02 1e-02 rsut ∆ rlut + 0e+00 0e+00 2e-01 -1e-02 2e-01 -5e-02 -2e-02 00+00 -3e-02 2000 2001 2002 2003 2004 2000 2001 2002 2003 2004 2002 2003 2004 2000 2001 2002 2003 2004 2002 2003 2004 Year Year Year Year Year upwelling clear-sky shortwav flux at TOA - NH-sea clear-sky net radiative flux at TOA - NH-sea dry deposition rate of BC – NH–sea wet deposition rate of BC – NH–sea implied cloud response at TOA - NH-sea rsutcs) 2.0e+00 2.0e+00 5.0e-01 rlutcs -1.5e+00 1.5e+00 5e-01 rlutcs+ 1.0e+00 rsut -5e-01 1e+00 \_2 5e\_01 0.0e+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 Year total deposition rate of BC – NH–sea dry deposition rate of SO4 – NH–sea dry deposition rate wet deposition rate wet deposition rate of SO4 – NH–sea of SO2 - NH-sea of SO2 - NH-sea 2.5e+01 1e+01 2.0e+01 ∆ drybc + wetbc 2.0e+01 1.5e+01 0e+00 0e+00 1.0e+01 1.0e+01 -1e+00 5.0e+00 -5e+00 2000 2001 2002 2003 2004 2000 2001 2002 2003 2004 2000 2001 2002 2003 2004 2002 2003 2004 2000 2001 2002 2003 2004 Year Year Year Year Year $\frac{1}{3} dryso2 + wetso2)/2 + \frac{1}{3} dryso4 + wetso4)/3$ total deposition rate ambient aerosol optical total cloud cover - NH-sea convective cloud cover - NH-s surface cloud cover - NH-s of S - NH-sea thickness at 550nm - NH-se 2e-01 0.0e+00 1e-01 od550ae 4e+35 -2e+01 0e+00 -5.0e-01 4e+01-4e+01 2e+35 -1e-01-7.5e-01 2e+01 \_6e+01 -2e-01 -1.0e+00 0e+00 2000 2001 2002 2003 2004 20002001200220032004 2002 2003 2004 2002 2003 2004 2000 2001 2002 2003 2004 2000 2001 2000 2001 Year Year Year Year Year ice water path - NH-sea surface concentration column mass burden column mass burden column mass burden of DMS - NH-sea of SO2 - NH-sea of BC - NH-sea of SO4 - NH-sea 1e+00 3e+01 1e+00 5.0e-01 5e-01 ∆ clivi loadso2 2e+01 ∆ loadbc 0e+00 0e+00 1e+01 -5e-01 0.0e+0.0-5e-01 -1e+00 -1e+002000 2001 2002 2003 2004 2000 2001 2002 2003 2004 2000 2001 2002 2003 2004 2001 2002 2003 2004 2000 2001 2002 2003 2004 Year Year Year Year Year CAM5 E3SM **GISS** OsloCTM3 CESM1 **GEOS** MIROC **UKESM** CESM2 GFDL NorESM2