## global: percent difference surface flux surface flux surface concentration surface concentration surface concentration of BC - high-so4 of SO2 - high-so4 of BC - high-so4 of SO4 - high-so4 of SO2 - high-so4 -3.8e+00 00+00 1.5e + 0.12e-05 -1e+00 4e-01 \_2e+00 -3e+00 -4 5e+00 9.0e+00 -4e+00 -4.8e+00 -5e+00 0e+00 -5.0e+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 upwelling longwave flux at TOA – high–so4 upwelling shortwave flux at TOA – high–so4 net radiative flux at TOA – high–so4 upwelling clear–sky longwave flux at TOA – high–so4 incident shortwave flux at TOA - high-so4 4e-01 4e-02 2.5e-02 26-08 3e-01 rsu 2e-02 0.0e+00 rsut 2e-01 ∆ rlut + 0e+00 2e-01 -2 5e-02 1e-01 0e+00 -5.0e-02 00+00 2000 2001 2002 2003 2004 2001 2002 2003 2004 2000 2001 2002 2003 2004 2002 2003 2004 2002 2003 2004 2000 2001 2000 Year Year Year Year clear-sky net radiative flux at TOA - high-so4 dry deposition rate of BC – high–so4 wet deposition rate of BC – high–so4 upwelling clear-sky shortwave implied cloud response flux at TOA - high-so4 at TOA - high-so4 rsutcs) 4e-01 4e-01 rlutcs -5e-01 3e-01 rsu 26-01 3e-01 1e-01 2e-01 ∆ rlutcs 2e-01 rsut -5e-01 -1e+00 r L L 0e+00 -4e-01 2002 2003 2004 2000 2001 2002 2003 2004 2000 2001 2000 2001 2002 2003 2004 2000 2001 2002 2003 2004 wet deposition rate of SO4 – high–so4 total deposition rate of BC – high–so4 wet deposition rate of SO2 – high–so4 dry deposition rate dry deposition rate of SO2 - high-so4 of SO4 - high-so4 5e+00 2.0e+01 -2e+00-3.6e+00 ∆ drybc + wetbc 1.5e+01 wetso4 -4.0e+00-3e+000e+00 1.0e + 0.12e+00 -5e-01 1e+00 -4.8e + 002000 2001 2002 2003 2004 2000 2001 2002 2003 2004 2000 2001 2002 2003 2004 2000 2001 2002 2003 2004 2000 2001 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 - high-soconvective cloud cover - highof S - high-so4 thickness at 550nm - high-s 2e-01 1e-01 1e+00 1.5e+01 od550aer 1.0e+01 ; ا کا کا -1e-01 0e+00 0e+00 -2e-01 -6e+01 0.0e + 00-5e-02 -5e-01 2000 2001 2002 2003 2004 20002001200220032004 2002 2003 2004 2000 2001 2002 2003 2004 2000 2001 Year Year Year Year Year ice water path - high-so4 surface concentration column mass burden column mass burden column mass burden of DMS - high-so4 of BC - high-so4 of SO2 - high-so4 of SO4 - high-so4 4e-01 1.0e+00 1.5e+01 -1e+00 7.5e-01 1e+00 oadso2 5.0e-01 -3e+002.5e-01 5.0e+00 0e+00 0.0e+00 0e+00 -4e+00

∆ emibc

2000 2001 2002

2003 2004

Year

