so2-at-height: percent difference surface flux of BC – arctic surface flux surface concentration surface concentration surface concentration of SO2 - arctic of BC - arctic of SO4 - arctic of SO2 - arctic 1e+00 0.0e+00 5.0e-04 -5.0e+00∆ mmrbc 2.5e-04 0e+00 0.0e+00 -2e+00 -6e+01 -1.5e+012000 2001 2002 2003 2004 2000 2001 2002 2003 2004 2000 2001 2002 2003 2004 2002 2003 2004 2000 2001 2002 2003 2004 2000 2001 Year Year Year Year upwelling longwave flux at TOA – arctic upwelling shortwave flux at TOA – arctic upwelling clear-sky longwav flux at TOA - arctic net radiative flux incident shortwave flux at TOA - arctic at TOA - arctic 8e-01 2e-02 6e-01 0e+00 0e+00 ∆ rlutcs 4e-01 0e+00 2e-01 -2e-07 -4e-02 -4e-02 0e+00 2002 2003 2004 2001 2002 2003 2004 2000 2002 2003 2004 2002 2003 2004 2002 2003 2004 2000 Year Year Year Year Year upwelling clear-sky shortwave flux at TOA – arctic clear-sky net radiative flux at TOA – arctic implied cloud response dry deposition rate wet deposition rate at TOA - arctic of BC - arctic of BC - arctic rsutcs 8e-01 1e+006e-01 rlutcs -2.5e-01 ∆ wetbc 4e-01 ∆ rlutcs + 0.0e+00 0e+00 rsut – 0e+00 0.0e+00 2000 2001 2002 2003 2004 2000 2001 2002 2003 2004 2000 2001 2002 2003 2004 2000 2001 2002 2003 2004 2002 2003 2004 2000 2001 Year wet deposition rate of SO2 – arctic dry deposition rate of SO4 – arctic total deposition rate dry deposition rate wet deposition rate of SO2 - arctic of SO4 - arctic of BC - arctic 3.5e+01 1e+01 3e+01 1e+00 3.0e+01 6e+01 2.5e+01 ∆ wetso2 -1e+01 ∆ dryso4 0e+00 4e+01 2.0e+01 -2e+011 50+01 -1e+00 20+01 1e+011.0e+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 $\frac{1}{3} dryso2 + wetso2)/2 + \frac{1}{3} dryso4 + wetso4)/3$ Year total deposition rate ambient aerosol optical total cloud cover - arctic convective cloud cover - arc surface cloud cover - arcti of S - arctic thickness at 550nm - arctic 2.0e+36 0e+00 6e+01 ∆ od550ae ∆ clt -5 0e-01 0e+00 4e+01 5.0e+35 -7.5e-01 -4e+01 _2e_01 2e+01 0.0e+00-1.0e+00 20002001200220032004 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 ice water path - arctic surface concentration column mass burden column mass burden column mass burden of DMS - arctic of BC - arctic of SO2 - arctic of SO4 - arctic 7.5e-01 2e+00 2e+00 3e+01 5.0e-01 6e+01 1e+00 ∆ loadso2 2.5e-01 2e+01 ∆ loadso4 1e+00 4e+01 0.0e+00 -1e+001e+01 -2e+00 -2.5e-0 0e+00 -3e+00 -5.0e-01 -1e+002000 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 CAM5 E3SM **GISS** OsloCTM3 CESM1 **GEOS** MIROC **UKESM** CESM2 GFDL NorESM2