## Reference – absolute global averages surface flux of BC – global surface flux of SO2 – global surface concentration of SO4 – global surface concentration surface concentration of SO2 – global 1.4e-09 1.50e-09 1 2e-11 1.2e-10 $\mathrm{emibc}\,(\mathrm{kg}\,\mathrm{m}^{-2}\,\mathrm{s}^{-1})$ 5.2e-13 emiso2 $(kg m^{-2} s^{-1})$ 1.25e-09 mmrbc (kg kg<sup>-1</sup> nmrso4 (kg kg so2 (kg kg<sup>-1</sup> 1.0e-09 5.0e-13 1.00e-09 1.0e-10 9.0e-12 7.50e-10 2002 2002 2003 2001 2002 2003 2004 2001 2002 2003 2001 2002 2003 2001 2003 2001 Year Year Year Year Year clear-sky longwave flux at TOA - global longwave flux at TOA shortwave flux at TOA net radiative flux at incident shortwave flux global global TOA -global at TOA - global -236 -335 -260 -238 rlut + rsut $(W m^{-2})$ rlutcs $(W m^{-2})$ rlut $(W m^{-2})$ $rsut (W m^{-2})$ $rsdt (W m^{-2})$ -100 -240 -345 340.4 -242 -350 -244 2001 2003 2001 2002 2003 2001 2002 2003 2001 2002 2003 2001 2002 2003 Year Year Year Year Year clear-sky shortwave clear-sky net radiative implied cloud response dry deposition rate wet deposition rate flux at TOA - global flux at TOA - global at TOA - global of BC - global of BC - global rlut + rsut - rlutcs - rsutcs (W m-2) -48 -308 -20 rlutcs + rsutcs (W m<sup>-2</sup>) $\mathrm{drybc}\,(\mathrm{kg}\,\mathrm{m}^{-2}\,\mathrm{s}^{-1})$ wetbc $(kg m^{-2} s^{-1})$ -312 $rsutcs (W m^{-2})$ -50 -316 -52 -35 -320 40 2003 2003 2002 2003 2003 2001 2002 2001 2001 2002 2003 2001 2001 2002 Year Year Year Year Year dry deposition rate of SO2 – global wet deposition rate of SO4 – global total deposition rate wet deposition rate dry deposition rate of BC - global of SO2 - global of SO4 - global $drybc + wetbc (kg m^{-2} s^{-1})$ wetso2 $(kg m^{-2} s^{-1})$ wetso4 $(kg m^{-2} s^{-1})$ $dryso2 (kg m^{-2} s^{-1})$ $dryso4 (kg m^{-2} s^{-1})$ 5e-12 4.0e-13 3.5e-13 3.0e-13 2001 2002 2003 2004 2001 2002 2003 2004 2001 2002 2003 2004 2001 2002 2003 2004 2001 2002 2003 Year Year Year total deposition rate of S – global ambient aerosol optical convective cloud cover total cloud cover (dryso2 + wetso2)/2 + (dryso4 + wetso4)/3thickness at 550nm - global percentage - global percentage - global 0.16 65 0.14 $(kg m^{-2} s^{-1})$ 30 od550aer % clt (%) cltc 20 0.12 60 0 2001 2002 2003 2004 2002 2003 2004 2002 2003 2004 2002 2003 2001 2001 2001 2004 Year Year Year Year OsloCTM3 CFSM1 F3SM **GFDI** MIROC CESM2 **GEOS GISS** NorESM2 **UKESM**