Reference – absolute NH-atlantic averages surface flux of BC – NH–atlantic surface flux of SO2 – NH–atlantic surface concentration of BC – NH–atlantic surface concentration of SO4 – NH–atlantic surface concentration of SO2 – NH–atlantic 1 25e-11 2.0e-13 $\mathrm{emibc}\,(\mathrm{kg}\,\mathrm{m}^{-2}\,\mathrm{s}^{-1})$ emiso2 (kg $\mathrm{m}^{-2}\,\mathrm{s}^{-1}$) mmrbc (kg kg⁻¹) nmrso4 (kg kg¯ so2 (kg kg⁻¹ 7.50e-12 2003 2001 2002 2003 2001 2002 2001 2002 2003 2001 2002 2003 2001 2002 2003 Year Year Year Year Year longwave flux at TOA – NH–atlantic net radiative flux at TOA –NH–atlantic incident shortwave flux at TOA – NH–atlantic clear-sky longwave flux at TOA - NH-atlantic shortwave flux at TOA – NH–atlantic -330 -270 $rlut + rsut (W m^{-2})$ -335 -248 rlutcs $(W m^{-2})$ rlut (W m^{-2}) $rsut (W m^{-2})$ $rsdt (W m^{-2})$ -340 -252 353 -90 -345 -276 352 2001 2003 2001 2003 2001 2003 2001 2003 2001 2002 2003 Year Year Year Year Year wet deposition rate of BC – NH–atlantic clear-sky shortwave clear-sky net radiative implied cloud response dry deposition rate of BC - NH-atlantic flux at TOA - NH-atlantic flux at TOA - NH-atlantic at TOA - NH-atlantic rlut + rsut - rlutcs - rsutcs (W m⁻²) 1.6e-13 rlutcs + rsutcs (W m⁻²) -310 -20 $\mathrm{drybc}\,(\mathrm{kg}\,\mathrm{m}^{-2}\,\mathrm{s}^{-1})$ wetbc $(kg m^{-2} s^{-1})$ $\rm rsutcs \ (W\ m^{-2})$ -25-42 -30 -320 -35 2003 2003 2003 2001 2003 2001 2001 2003 2001 2002 2001 2002 Year Year Year Year Year total deposition rate dry deposition rate wet deposition rate dry deposition rate wet deposition rate of BC - NH-atlantic of SO2 - NH-atlantic of SO2 - NH-atlantic of SO4 - NH-atlantic of SO4 - NH-atlantic $drybc + wetbc (kg m^{-2} s^{-1})$ wetso2 $(kg m^{-2} s^{-1})$ $dryso2 (kg m^{-2} s^{-1})$ wetso4 (kg m⁻² s⁻¹) dryso4 (kg m^{-2} s⁻¹) 6.0e-12 4.0e-12 2001 2002 2003 2004 2001 2002 2003 2001 2002 2003 2004 2001 2002 2003 2001 2002 2003 Year Year total deposition rate of S – NH–atlantic ambient aerosol optical convective cloud cover total cloud cover (dryso2 + wetso2)/2 + (dryso4 + wetso4)/3percentage - NH-atlantic 0.200 62.5 $(kg m^{-2} s^{-1})$ 60.0 od550aer clt (%) % 30 cltc 0.150 57.5 20 55.0 0.125 0 2002 2003 2004 2002 2003 2002 2003 2002 2003 2001 2001 2004 2001 2004 2001 2004 Year Year Year Year

CFSM1

CESM2

F3SM

GEOS

GFDI

GISS

MIROC

NorESM2

OsloCTM3

UKESM