Reference – absolute NH-sea averages surface flux of BC - NH-se surface flux of SO2 - NH-se surface concentration surface concentration surface concentration of BC - NH-sea of SO4 - NH-sea of SO2 - NH-sea 1.2e-09 $\mathrm{emibc}\,(\mathrm{kg}\,\mathrm{m}^{-2}\,\mathrm{s}^{-1})$ emiso2 (kg m⁻² s⁻ mmrso4 (kg kg⁻ mmrbc (kg kg⁻ so2 (kg kg⁻¹ 1.0e-10 2002 2003 2004 2000 2001 2002 2003 2004 2002 2003 2004 2002 2003 2004 2002 2003 2004 Year Year incident shortwave flux clear-sky longwave flux at TOA - NH-sea longwave flux at TOA - NH-se shortwave flux at TOA - NH-s net radiative flux at TOA - NH-: at TOA – NH-sea -240 300 rlut + rsut $(W m^{-2})$ $lut (W m^{-2})$ $rsut (W m^{-2})$ 200 rlutcs (W m^{-2}) $rsdt (W m^{-2})$ -340 -244 100 0 -273 -248 -350 2002 2003 2004 2000 2001 2002 2000 2001 2002 2003 2004 2000 2001 2002 2003 2004 2000 2001 2002 2003 2004 2000 2001 2003 2004 Year clear-sky net radiative flux at TOA - NH-sea implied cloud response at TOA – NH–sea clear-sky shortwave flux at TOA - NH-sea dry deposition rate of BC – NH–sea wet deposition rate of BC – NH–sea rsut - rlutcs - rsutcs (W m⁻²) rlutcs + rsutcs (W m⁻²) wetbc $(kg m^{-2} s^{-1})$ $drybc (kg m^{-2} s^{-1})$ rsutcs (W m^{-2}) -310 -315 5 0e-14 -320 ij 0.0e+00 2000 2001 2002 2003 2004 2001 2002 2003 2004 2000 2002 2003 2004 2000 2001 2002 2003 2004 2000 2001 2002 2003 2004 Year Year Year Year Year total deposition rate of BC – NH–sea dry deposition rate of SO4 – NH–sea wet deposition rate of SO4 – NH–sea dry deposition rate wet deposition rate of SO2 - NH-sea of SO2 - NH-sea 2.0e-12 0.03 $drybc + wetbc (kg \ m^{-2} \ s^{-1})$ $dryso2 (kg m^{-2} s^{-1})$ wetso2 $(kg m^{-2} s^{-1})$ wetso4 (kg m⁻² s⁻¹) $dryso4 (kg m^{-2} s^{-1})$ 0.02 0.01 2000 2001 2002 2003 2004 2002 2003 2004 2000 2001 2002 2003 2000 2001 2002 2003 2004 2002 2003 2004 Year Year Year Year Year total deposition rate of S – NH–sea (dryso2 + wetso2)/2 + (dryso4 + wetso4)/30.015 $(kg m^{-2} s^{-1})$ 0.010 0.005 0.000 2000 2001 2002 2003 2004 Year

