Reference – absolute sea averages surface flux of BC – sea surface concentration of BC – sea surface concentration of SO4 – sea surface flux of SO2 surface concentration of SO2 – sea $\mathrm{emibc}\,(\mathrm{kg}\,\mathrm{m}^{-2}\,\mathrm{s}^{-1})$ $\rm emiso2~(kg~m^{-2}~s^{-1})$ mmrso4 (kg kg^{_1} nmrbc (kg kg⁻¹ $so2 (kg kg^{-1})$ 3.0e-1 7.5e-14 4e-12 2.5e-1 5.0e-14 2 0e-1 2002 2002 2003 2003 2001 2002 2003 2001 2003 2001 2002 2003 2001 2001 2002 Year Year Year Year Year net radiative flux at TOA –sea incident shortwave flux at TOA – sea clear-sky longwave flux at TOA - sea longwave flux at TOA shortwave flux at TOA sea -262.5 -240 -335 rlut + rsut $(W m^{-2})$ 347.0 -265.0 _90 $rlutcs \left(W \; m^{-2}\right)$ rlut $(W m^{-2})$ $rsut (W m^{-2})$ $rsdt (W m^{-2})$ -242 -340 -267.5 -95 -244 -345 -270.0 -246 346.0 -100 -350 -272.5 2001 2003 2001 2003 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 - sea flux at TOA - sea at TOA - sea of BC - sea of BC - sea rlut + rsut - rlutcs - rsutcs (W m-2) 2.5e-13 rlutcs + rsutcs (W m⁻²) -305 $drybc (kg m^{-2} s^{-1})$ wetbc $(kg m^{-2} s^{-1})$ $\rm rsutcs \, (W \, m^{-2})$ 1.5e-13 -43 -44 -315 -45 2003 2003 2001 2003 2001 2001 2002 2003 2001 2003 2001 2002 Year Year Year Year Year dry deposition rate of SO2 – sea wet deposition rate of SO4 – sea total deposition rate wet deposition rate dry deposition rate of BC - sea of SO2 - sea of SO4 - sea $drybc + wetbc (kg m^{-2} s^{-1})$ $\rm dryso2 \ (kg \ m^{-2} \ s^{-1})$ wetso2 $(kg m^{-2} s^{-1})$ wetso4 $(kg m^{-2} s^{-1})$ dryso4 (kg m^{-2} s⁻¹) 2.5e-13 2.0e-13 1e-12 1e-12 2001 2002 2003 2004 2001 2002 2003 2001 2002 2003 2004 2001 2002 2003 2004 2001 2002 2003 Year Year Year Year total deposition rate ambient aerosol optical convective cloud cover total cloud cover (dryso2 + wetso2)/2 + (dryso4 + wetso4)/3of S – sea thickness at 550nm - sea percentage - sea percentage - sea 0.14 68 40 0.12 $(kg m^{-2} s^{-1})$ od550aer % clt (%) cltc 0.10 20 60 0.08 0 2002 2003 2004 2002 2003 2004 2002 2003 2004 2002 2003 2001 2001 2001 2004 2001 Year Year Year Year

CFSM1

CESM2

F3SM

GEOS

GFDI

GISS

MIROC

NorESM2

OsloCTM3

UKESM