Reference – absolute sea averages surface concentration of BC – sea surface concentration of SO4 – sea surface flux of BC - sea surface flux of SO2 - sea surface concentration of SO2 – sea 7e-12 emibc (kg m-2 s-1) mmrso4 (kg kg-1) nmrbc (kg kg-1) 3.5eso2 (kg kg-1) 5e-12 6e (kg r 3.0e-1 4e-12 emiso₂ (5e-10 2.5e-1 26-10 5.0e-14 2 0e-1 2002 2003 2001 2002 2003 2001 2002 2003 2001 2002 2003 2001 2002 2003 2001 Year Year Year Year Year upwelling longwave flux at TOA – sea upwelling shortwave flux at TOA – sea incident shortwave flux at TOA – sea upwelling clear-sky longwave flux at TOA - sea net radiative flux at TOA - sea 350 248 100 246 rlut + rsut (W m-2) 347.0 rlutcs (W m-2) rlut (W m-2) rsut (W m-2) sdt (W m-2) 244 340 346.5 242 90 346.0 240 262.5 85 2001 2003 2001 2002 2003 2004 2001 2003 2004 2001 2002 2003 2001 2002 2003 Year Year Year Year Year upwelling clear-sky shortwave clear-sky net radiative dry deposition rate wet deposition rate total deposition rate flux at TOA - sea flux at TOA - sea of BC - sea of BC - sea of BC - sea 45 2.5e-13 (kg m-2 s-1 rlutcs + rsutcs (W m-2) 44 drybc (kg m-2 s-1) rsutcs (W m-2) 2.0e-13 43 wetbc (kg m-2 2.5e-310 drybc + wetbc 42 2.0e-13 41 2003 2003 2003 2003 2001 2002 2001 2002 2001 2002 2001 2002 2002 2003 Year Year Year Year Year (dryso2 + wetso2)/2 + (dryso4 + wetso4)/3 (kg m-2 s-1)wet deposition rate of SO4 – sea dry deposition rate wet deposition rate dry deposition rate total deposition rate of SO2 - sea of SO2 - sea of SO4 - sea of S - sea dryso2 (kg m-2 s-1) wetso2 (kg m-2 s-1) dryso4 (kg m-2 s-1) wetso4 (kg m-2 s-1) 4e-12 6e-12 9.0e 1e-12 2e-12 1e-12 2001 2002 2003 2004 2001 2002 2003 2004 2001 2002 2003 2004 2001 2002 2003 2004 2001 2002 2003 2004 Year Year Year ambient aerosol optical convective cloud cover total cloud cover thickness at 550nm - sea percentage - sea percentage - sea 0.14 0.12 68 40 % clt (%) cltc 64 0.10 20 60 0.08 0 2002 2003 2002 2003 2004 2002 2003 2004 2004 2001 2001 2001 Year Year Year

CFSM1

CESM2

F3SM

GEOS

GFDI

GISS

MIROC

NorESM2

OsloCTM3

UKESM