## 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) kg-1nmrbc (kg kg-1) 3.5e-1 so2 (kg kg-1) 5e-12 6emmrso4 (kg l (kg r 3.0e-1 4e-12 emiso2 5e-10 2.5e-11 26-10 5.0e-14 2 0e-1 2002 2003 2001 2002 2003 2001 2002 2003 2001 2002 2003 2004 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 350 248 267 246 rlut + rsut (W m-2) 101 347.0 345 rlutcs (W m-2) 266 rlut (W m-2) rsut (W m-2) rsdt (W m-2) 244 99 265 346.5 264 97 346.0 263 238 2001 2003 2001 2002 2003 2001 2003 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 43 310 drybc + wetbc (kg m-2 s-1) rlutes + rsutes (W m-2) drybc (kg m-2 s-1) 42 rsutcs (W m-2) 308 wetbc (kg m-2 41 306 2.5e-13 2.0e-13 40 2003 2003 2001 2002 2003 2001 2002 2001 2002 2001 2002 2003 2001 2002 2003 Year Year Year Year Year 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 5.5e-12 9e-12 dryso2 (kg m-2 s-1) 4e-12 5.0e-12 wetso2 (kg m-2 s-1) dryso4 (kg m-2 s-1) (kg m-2 s-1)8e-12 (dryso4 + 4.5e-12 1.0e-12 1e-12 4.0e-12 9.0e-13 2e-12 wetso2)/2 + 3.5e-12 8.0e-13 1e-12 2001 2002 2003 2004 2001 2002 2003 2004 2001 2002 2003 2004 2001 2002 2003 2004 2001 2002 2003 2004 (dryso2 + 1 Year Year Year ambient aerosol optical total cloud cover convective cloud cover thickness at 550nm - sea percentage - sea percentage - sea 70 68 0.100 od550aer %) clt (%) 66 cltc 0.075 0.050 0 2002 2002 2003 2004 2002 2003 2004 2003 2004 2001 2001 2001 Year Year Year

OsloCTM3

CESM1

E3SM

**GFDI** 

**GISS** 

MIROC

NorESM2