Reference - absolute NH-sea averages surface flux of SO2 - NH-sea surface concentration of BC – NH–sea surface concentration of SO4 – NH–sea surface flux of BC - NH-sea surface concentration of SO2 – NH–sea 2.0e-13 7e-11 emiso2 (kg m-2 s-1) mmrbc (kg kg-1) 1.5e-13 so2 (kg kg-1) mmrso4 (kg 2e-10 2001 2002 2003 2001 2002 2003 2001 2002 2003 2004 2001 2002 2003 2001 2002 2003 Year Year Year Year Year upwelling longwave flux at TOA – NH-sea upwelling shortwave flux at TOA – NH-sea incident shortwave flux at TOA – NH–sea upwelling clear-sky longwave flux at TOA - NH-sea net radiative flux at TOA - NH-s 350 270 249 rlut + rsut (W m-2) 102 345 rlutes (W m-2) rsut (W m-2) rsdt (W m-2) 99 243 96 352 335 237 2001 2003 2001 2003 2004 2001 2003 2001 2003 2001 2003 Year Year Year Year Year dry deposition rate of BC – NH–sea wet deposition rate of BC – NH–sea upwelling clear-sky shortwave clear-sky net radiative total deposition rate flux at TOA - NH-sea flux at TOA - NH-sea of BC - NH-sea 1.6e-13 drybc + wetbc (kg m-2 s-1) 43 rlutcs + rsutcs (W m-2) drybc (kg m-2 s-1) wetbc (kg m-2 s-1) 42 3.6e-41 308 40 306 2001 2002 2003 2001 2002 2003 2001 2002 2003 2001 2002 2003 2002 2003 Year Year Year Year Year (dryso2 + wetso2)/2 + (dryso4 + wetso4)/3 (kg m-2 s-1)dry deposition rate of SO2 – NH-sea dry deposition rate of SO4 – NH–sea total deposition rate of S – NH–sea wet deposition rate of SO4 – NH–sea wet deposition rate of SO2 - NH-sea 2.00e-12 6e-12 wetso2 (kg m-2 s-1) (kg m-2 s-1)dryso4 (kg m-2 s-1) 1.75e-12 4e-12 2e-12 1.50e-12 wetso4 2e-12 2001 2002 2003 2004 2001 2002 2003 2001 2002 2003 2004 2001 2002 2003 2002 2003 2004 Year Year Year ambient aerosol optical thickness at 550nm – NH-sea convective cloud cover percentage – NH–sea total cloud cover 0.16 66 0.12 % clt (%) ctc 0.08 62

emibc (kg m-2 s-1)

rlut (W m-2)

rsutcs (W m-2)

dryso2 (kg m-2 s-1)

od550aer

2001

2002

2003

Year

2004

60

2001

2002

2003

Year

2004

CESM1

E3SM

0

2001

GFDI

GISS

2002

2003

MIROC

NorESM2

Year

2004

OsloCTM3