Reference – absolute land averages surface concentration of BC – land surface flux of BC - land surface flux of SO2 - land surface concentration of SO4 – land surface concentration of SO2 – land 4.0e-09 emibc (kg m-2 s-1) emiso2 (kg m-2 s-1) 1.6e-12 3.5e-09 mmrbc (kg kg-1) so2 (kg kg-1) 3.00-09 mmrso4 (kg 3.0e-10 2.5e-09 2 0e-1 1.5e-09 2.0e-10 2001 2003 2004 2001 2002 2003 2001 2003 2004 2001 2002 2003 2001 2002 2003 Year Year Year Year Year upwelling longwave flux at TOA – land upwelling shortwave flux at TOA – land incident shortwave flux at TOA – land upwelling clear-sky longwave flux at TOA - land net radiative flux at TOA - land 360 236 355 327.0 m-2) rlutcs (W m-2) rlut (W m-2) rsut (W m-2) rsdt (W m-2) 254 232 rlut + rsut (W 326.5 253 326.0 345 228 252 325.5 25 110 340 2001 2003 2001 2003 2001 2003 2001 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 - land flux at TOA - land of BC - land of BC - land of BC - land 5e-13 (kg m-2 s-1) 330.0 drybc (kg m-2 s-1) rsutcs (W m-2) rlutes + rsutes (W 75.0 wetbc (kg m-2 s 1.2e-12 327.5 drybc + wetbc 72.5 325.0 70.0 320.0 2001 2003 2001 2003 2001 2003 2001 2003 2002 2003 Year Year Year Year Year wetso2)/2 + (dryso4 + wetso4)/3 (kg m-2 s-1) dry deposition rate wet deposition rate dry deposition rate wet deposition rate total deposition rate of SO2 - land of SO2 - land of SO4 - land of SO4 – land of S - land dryso2 (kg m-2 s-1) wetso2 (kg m-2 s-1) dryso4 (kg m-2 s-1) wetso4 (kg m-2 s-1 8e-12 1.2e-11 4e-12 2.0e-12 5e-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 - land percentage - land percentage - land 0.20 57.5 0.15 55.0 od550aer % % cltc ; 52.5 0.10 50.0 0.05 2002 2002 2003 2004 2002 2003 2004 2001 2003 2004 2001 2001 Year Year Year OsloCTM3 CESM1 **GFDI** MIROC

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