## so2-at-height: absolute difference surface flux of SO2 – SH–land surface flux surface concentration surface concentration of BC - SH-land of BC - SH-land of SO4 - SH-land of SO2 - SH-land $\mathrm{emibc}\,(\mathrm{kg}\,\mathrm{m}^{-2}\,\mathrm{s}^{-1})$ əmiso2 (kg $\mathrm{m}^{-2}\,\mathrm{s}^{-1}$ mmrbc (kg kg – 1) mmrso4 (kg kgso2 (kg kg-1) 0.0e+00 -3.9e-19 2.5e-\_9 7e\_19 -3e-13 -3e-10 0.0e+00 -5.0e-13 -1.6e-18 2000 2001 2002 2003 2004 2002 2003 2004 2000 2001 2002 2003 2004 2000 2001 2002 2003 2004 Year Year Year Year Year upwelling longwave flux at TOA – SH–land upwelling shortwave flux at TOA – SH–land incident shortwave flux upwelling clear-sky longwa flux at TOA - SH-land net radiative flux at TOA - SH-land at TOA - SH-land 1e-01 0.0e + 000e+00 rsut (W m rlut(Wm-2)0e+00 rsut (Wm-2)rsdt (Wm-2)rlutcs (W m--5.0e-02 -1e-01 -1e-01 -1.0e-0 -5e-07 -2 0e-01 -1.5e-01 2000 2001 2002 2003 2004 2000 2001 2002 2003 2004 2000 2001 2002 2003 2004 2000 2001 2002 2003 2004 2000 2001 2002 2003 2004 Year Year Year Year Year upwelling clear-sky shortway flux at TOA - SH-land clear-sky net radiative flux at TOA - SH-land implied cloud response at TOA – SH-land dry deposition rate of BC – SH–land wet deposition rate of BC – SH–land + rsut - rlutcs - rsutcs (W m<sup>-2</sup>) rsutcs (W m<sup>-2</sup>) 1e-01 1e-01 wetbc $(kg m^{-2} s^{-1})$ $drybc (kg m^{-2} s^{-1})$ rsutcs (W m-2) -5 0e-02 0e+00 0e+00 -1e-01 1e-0 -2e-01 -2 0e-01 를 2000 2001 2002 2003 2004 2000 2001 2002 2003 2004 2000 2001 2002 2003 2004 2000 2001 2002 2003 2004 2000 2001 2002 2003 2004 Year Year Year Year Year total deposition rate of BC – SH–land dry deposition rate of SO2 – SH–land dry deposition rate of SO4 – SH–land wet deposition rate of SO4 – SH-land wet deposition rate of SO2 - SH-land 3.0e-15 2.0e-13 $drybc + wetbc (kg m^{-2} s^{-1})$ vetso2 (kg m<sup>-2</sup> s<sup>-1</sup>) wetso4 (kg $\mathrm{m}^{-2} \mathrm{s}^{-1}$ dryso4 (kg m<sup>-2</sup> s<sup>-</sup> dryso2 (kg ${\sf m}^{-2}\,{\sf s}^-$ -4.0e-16 -9.0e-13 -1.2e-12 0.0e+00 0.0e+00 -3.8e-15 2000 2001 2002 2003 2004 2000 2001 2002 2003 2004 2000 2001 2002 2003 2004 2000 2001 2002 2003 2004 2002 2003 2004 Year Year total deposition rate of S – SH–land ambient aerosol optical thickness at 550nm - SH-lar total cloud cover convective cloud cover (dryso2 + wetso2)/2 + (dryso4 + wetso4)/3percentage - SH-land percentage - SH-land 2e-01 0e+00 3e+35 expression clt (%) 1e-01 $(kg m^{-2} s^{-1})$ 양 -2.0e-13 -2e-02 2e+35 0e+00 expression -2.5e-13 1e+35 -4e-02 -3.0e-13 -2e-01 -3.5e-13 -6e-02 200@001200220032004 2000 2001 2002 2003 2004 2000 2001 2002 2003 2004 2000 2001 2002 2003 2004 Year Year Year Year

CAM-ATRAS

CESM

CESM2

E3SM

**GEOS** 

GFDL-ESM4

GISS modelE

NorESM2

MIROC-SPRINTARS

OsloCTM3

UKESM1