## shp-80p-red: absolute difference surface concentration of BC – sea surface flux surface flux surface concentration surface concentration of BC - sea of SO2 - sea of SO4 - sea of SO2 - sea $\mathrm{emibc}\,(\mathrm{kg}\,\mathrm{m}^{-2}\,\mathrm{s}^{-1})$ nmrbc (kg kg-1) 5.0e-14 emiso2 (kg m $^{-2}$ s $^{-1}$ -8.0e-12 3.5e-22 so2 (kg kg – 1) mmrso4 (kg kg -4 6e-13 2.5e-14 -1.0e-1 -3.5e-11 -3.3e-21 -2.5e-14 -1 2e-1 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 longwave flux at TOA – sea upwelling shortwave flux at TOA – sea upwelling clear-sky longway flux at TOA - sea net radiative flux incident shortwave flux at TOA – sea at TOA – sea 5.0e-02 1.2e-01 -1.0e-0.11 5e\_02 -lut + rsut $(W m^{-2})$ rlutcs (Wm-2)rlut (Wm-2)-1.5e-01 rsdt (Wm-2)8.0e-02 1.0e-02 E 0.0e + 0.0ِ -1.5e-01 5.0e-03 4.0e-02 -2.5e-01 -2.5e-02 0.0e + 0.0-3.0e-01 0.0e+002000 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 clear-sky net radiative implied cloud response dry deposition rate wet deposition rate flux at TOA - sea flux at TOA - sea at TOA - sea of BC - sea of BC - sea rsutcs (W m<sup>-2</sup>) 1.9e-16 3.3e-16 -1e-02 lutcs + rsutcs $(W m^{-2})$ -3e-02 -5.0e-02 rsutcs (W m-2) 1.4e-16 8.1e-17 drybc (kg $m^{-2} s^{-1}$ vetbc (kg m<sup>-2</sup> s<sup>-</sup> -3e-02 -4e-02-1 0e-01 8.6erlutes -4e-02-5e-02 3.5e-17 rsut -6.7e-16 + <u>+</u> 10. 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 dry deposition rate of SO4 – sea total deposition rate of BC – sea dry deposition rate of SO2 – sea wet deposition rate of SO2 – sea wet deposition rate of SO4 – sea 5.2e-16 $drybc + wetbc (kg \, m^{-2} \, s^{-1})$ -2.4e-13 dryso2 (kg m $^{-2}$ s $^{-1}$ 2.2e-16 wetso2 (kg m<sup>-2</sup> s<sup>-</sup> dryso4 (kg m<sup>-2</sup> s<sup>-</sup> wetso4 (kg m<sup>-2</sup> -7.3e-17 -3.5e-13 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 dryso2 + wetso2)/2 + (dryso4 + wetso4)/3Dimethyl sulphide (DMS) mole frac total deposition rate cloud cover Ice water path - sea ambient aerosol optical of S - sea thickness at 550nm - sea 1e-02 1e-04 expression cltc (%) clivi (kg $m^{-2}$ ) \_lom lom) smp 5e-03 $(kg m^{-2} s^{-1})$ 0e+00 od550aer 0e+00 -1e-04 -2.7e-13 -1.0e-13 -5e-03 -3e-04 20002001200220032004 2002 2003 2004 2000 2001 2002 2003 2004 2000 2001 2002 2003 2004 2000 2001 Year Year Year Year Year load load of so2 - sea of bc - sea 3e-11 -6.0e-08 loadso4 (kg m<sup>-2</sup>) loadbc (kg m $^{-2}$ ) 2e-11 -8.0e-08 0e+00 -1.2e-07 2000 2001 2002 2003 2004 2000 2001 2002 2003 2004 Year