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Atmos. Chem. Phys., 8, 1311-1327, 2008

www.atmos-chem-phys.net/8/1311/2008/

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Modelling sea salt aerosol and its direct and indirect effects on climate

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Abstract. A size-dependent sea salt aerosol parameterization was developed based on the piecewise log-normal approximation (PLA) for aerosol size distributions. Results of this parameterization from simulations with a global climate model produce good agreement with observations at the surface and for vertically-integrated volume size distributions. The global and annual mean of the sea salt burden is 10.1 mg m^{-2} . The direct radiative forcing is calculated to be -1.52 and -0.60 W m^{-2} for clear sky and all sky, respectively. The first indirect radiative forcing is about twice as large as the direct forcing for all-sky (-1.34 W m^{-2}). The results also show that the total indirect forcing of sea salt is -2.9 W m^{-2} if climatic feedbacks are taken into account. The sensitivity of the forcings to changes in the burdens and sizes of sea salt particles was also investigated based on additional simulations with a different sea salt source function.

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