Geophysical Research Abstracts, Vol. 8, 09417, 2006
SRef-ID: 1607-7962/gra/EGU06-A-09417

Observations and modeling the surface aerosol radiative forcing during UAE2 experiment.

K. M. Markowicz (1), P. J. Flatau (2), J. Remiszewska (3), E.A. Reid (4), J. S. Reid (4), M. Witek (5).

(1) Institute of Geophysics, Warsaw University, Poland, (2) Scripps Institution of Oceanography University, (3) Institute of Geophysics, Polish Academy of Sciences, Poland, (4) Naval Research Laboratory, Marine Meteorology Division, USA (5) Interdisciplinary Centre of Mathematical and Computational Modelling, Warsaw University, Poland (kmark@igf.fuw.edu.pl / Fax +48 22 55 46 882)

We present aerosol optical properties and aerosol radiative forcing in the Persian Gulf region observed during the Unified Aerosol Experiment in United Arab Emirates (UAE2). The experiment was conducted in August and September 2004 during clear sky and very stable weather conditions. Instruments were employment on the Mobile Atmospheric Aerosol and Radiation Characterization (MAARCO) facility, which was located in costal region about 60 km from Abu Dhabi. We discuss diurnal variability of aerosol properties and aerosol radiative forcing at the surface due to land-sea breeze circulations. During land breeze we observed larger aerosol forcing in compare to sea breeze as a result of change the aerosol optical properties. Onshore winds bring cleaner air mass which is reflected in increasing values of the single scattering albedo and in consequence reduction of solar radiation at the surface is smaller. The mean value of the surface aerosol forcing during UAE2 campaign was about -20 Wm-2 and is caused by the large aerosol optical thickness (0.45 at 500 nm). The aerosol forcing efficiency was relatively small (-45 Wm-2) because of the large aerosol optical thickness and the high value of the single scattering albedo (0.93). Based on the surface optical measurements and sun photometer observations (AERONET retrieval) we designed 5 aerosol models which were used to calculate the aerosol radiative forcing. These models are combination of the aerosol optical properties for spherical and spheroid particles with vertical distribution determines by CEILOMETER observations. Comparison of the aerosol radiative forcing shows the best agreement for spheroid particles. Mean bias between observations and this model is close to zero (1.9 Wm-2) but the RMS is sig-

nificant (6.2 Wm-2). Models based on the AERONET retrieval data show systematic larger (in absolute value) aerosol forcing. This difference comes from the asymmetry parameters which is significant smaller than for the surface observations and therefore the model produces significant larger forcing. Difference of the aerosol forcing between the spherical and the spheroid model is relatively small but important.