CORRESPONDENCE

Corrections to "Infrared Radiative Transfer in Polluted Atmospheres"

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It has recently been brought to our attention (M. Baker, personal communication) that the computer program used to compute the aerosol extinction properties quoted in our paper was unfortunately in error. This error affected both the cross-sectional values and the phase function values used in the radiative model calculations. These calculations have been repeated using the corrected aerosol parameter values and are presented here in the same fashion and using the same labels as in the original paper.

A comparison of the revised Table 3 with the original shows that the previous calculations used too large a value of both the aerosol extinction and scat-

Table 3. Aerosol extinction parameters for a wavenumber of 1050 cm^{-1} (9.5 μm) for various aerosol concentrations.

	Aerosol concentration		
	Light	Average	Heavy
n_r (large)	2.63	2.63	2.63
n_i (large)	0.80	0.80	0.80
n_r (small)	1.98	1.98	1.98
n_i (small)	0.11	0.11	0.11
$\tilde{\omega}_0$ (a)	0.4563	0.2543	0.1076
ω_1	0.6423	0.5681	0.3398
$\tilde{\omega}_2$	0.4732	0.4266	0.2830
$\tilde{\omega}_3$	0.3360	0.2943	0.1659
k_ν	1.89×10^{-6}	1.89×10^{-6}	1.89×10^{-6}
$\tilde{\omega}_0$ (t)	$<10^{-5}$	0.0299	0.0493
τ (1 km)	0.079	0.098	0.192

Table 4. Cooling rates (K day^{-1}) for light and average aerosol concentrations for four infrared bands. Excess cooling denotes the increase in amount of cooling due to aerosol; $\overline{\Delta z}$ is the thickness (km) of the layer over which the cooling is averaged.

		Aerosol concentration		
Band	$\overline{\Delta z}$	Light	Average	Excess cooling
15 μm	1.75	−0.103	−0.103	0.0
6.3 μm	1.75	−0.551	−0.562	−0.011
Rotation	1.75	−0.483	−0.493	−0.010
Window	1.75	−1.401	−1.483	−0.082
Window	1.00	−1.668	−1.811	−0.143
Window	1.00	−1.668	−2.596 (heavy)	−0.928

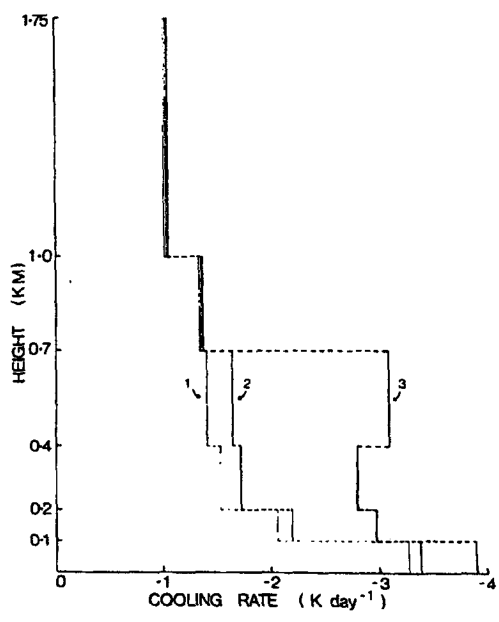

Fig. 4. Comparison of boundary layer cooling-rate profiles for the light aerosol (1), the average aerosol (2) and the heavy aerosol (3) in the lowest kilometer.

tering cross section and too small a value of the asymmetry factor. As can be seen from the revised cooling rates given in Table 4 these two factors, more particularly the former, produced a cooling substantially larger than the correct values. The effect of the aerosols on the cooling is reduced by about a factor of 4 from the values cited in our previous paper. The comparison of the various vertical profiles shown in Fig. 4 also bears out these reductions. The effect of the average aerosol concentration is to cause a slightly enhanced cooling while the heavy aerosol concentration produces a notably larger cooling but much reduced in magnitude from our previous calculations. The reduced absorption of radiation in the aerosol layer produces in turn a reduced emission which causes a smaller reduction in the net flux at the ground as shown in the corrected Table 6.

In view of these results the conclusions of our paper also have to be revised. The results shown in Table 4 certainly indicate that urban aerosol effects are not significant in any of the gaseous absorption bands. Heavy concentrations of aerosols do produce enhanced atmospheric cooling in the window region of the infrared spectrum but of considerably less magnitude than the heating occurring due to absorption of solar radiation. The infrared cooling is approximately a 10% effect compared to the solar heating. In light of these revised results it would seem that the effect of typical urban aerosols is likely to be fairly small except in those areas such as Los Angeles where large concentrations do occur. In this latter case the effect of the aerosols on infrared radiation in the 8–12 μm region in the spectrum may produce non-negligible atmospheric cooling.

TABLE 6. Net flux (positive upward) at the ground for the different bands and aerosol concentrations (units: ergs cm^{-2} s^{-1})

	Window region	6.3 μm band	15 μm band	Rotation band
Light aerosol	9.642×10^4	1.564×10^4	6.351×10^2	1.407×10^4
Average aerosol	9.428×10^4	1.533×10^4	6.351×10^2	1.384×10^4
Heavy aerosol	8.295×10^4	—	—	—