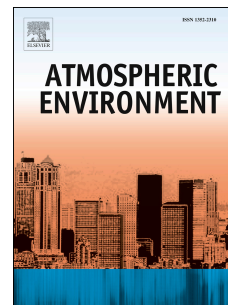


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A parameterization for the light scattering enhancement factor with aerosol chemical compositions

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1 **A parameterization for the light scattering enhancement factor with**
2 **aerosol chemical compositions**

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13 **Abstract**

14 The light scattering enhancement factor $f(RH)$, defined as the ratio of the light
15 scattering coefficient (σ_{sp}) observed under an elevated relative humidity (RH)
16 conditions to that under dry conditions, is a crucial parameter for estimating aerosol
17 direct radiative effects and atmospheric visibility. In this paper, a new $f(RH)$
18 parameterization scheme considering both the influence of aerosol chemical
19 compositions and that of particle number size distribution (PNSD) is proposed based
20 on in situ measurements in the North China Plain. The development of this
21 parameterization scheme includes three steps. First, aerosol hygroscopicity parameter
22 κ is parameterized with aerosol chemical compositions. Then, the ratio between $f(RH)$
23 fitted parameter κ_{sca} ($f(RH) = 1 + \kappa_{sca} \frac{RH}{100-RH}$) and κ is introduced to correlate
24 $f(RH)$ with κ . The ratio, influenced mostly by PNSD, is described as a function of
25 scattering Ångström exponent (SAE) because the SAE can represent the predominant
26 size of aerosol particles to some extent. Finally, $f(RH)$ cycle is parameterized with
27 κ_{sca} . Validation results show that a good consistency between the parameterized and
28 measured $f(RH=80\%)$ is achieved and the correlation coefficient is 0.80. This
29 parameterization scheme between aerosol chemistry and $f(RH)$ can be used in

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