

## ***Interactive comment on “Parameterization of sea-salt optical properties and physics of the associated radiative forcing” by J. Li et al.***

**J. Li et al.**

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Reviewer 2 made some important points, and by updating the manuscript and parameterization to account for these points has strengthened the work. We have addressed all his points below.

According to the reviewer 2's suggestion, we have revised the parameterization so that the single scattering albedo and asymmetry factor are now parameterized by linear function. It is found that the relative error is generally  $<0.5\%$ . New results are presented in Fig. 3 and Table 1.

For the linear forcing comment, we have updated the manuscript. Since the sea salt loading is associated with optical depth, so perturbation could be referred to either sea salt loading or aerosol optical depth. We never meant that the perturbation is to

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gaseous optical depth.

Chylek and Wong (1995) don't address specifically sea-salt. They were just updating the forcing formula that was often used to account for an aerosol that could be partially absorbing. The Haywood and Shine (1995) paper addresses sulphate and soot (scattering and absorbing aerosol) but do not show the types of plots that we illustrate, nor do they address sea-salt. Our work illustrates that it occurs for sea-salt. We have updated the paper to include these articles.

Minor comment:

We wish to retain the WAC parameter, as it consistent with published papers and also is the aerosol equivalent of what is accepted for cloud, e.g. LWC (liquid water content), IWC (ice water content), etc..

The typo on p.5822 line 20 is corrected.

Figure 2 has been updated to pressure units to agree with other plots. Figure 2 is for wet particle (clearly mentioned in the revised version). We do find that the dry effective radius decreases with height owing to sedimentation and deposition processes. However, due to growth processes associated with relative humidity, the wet size doesn't necessarily decrease with height, as shown in Figure 2.

The typo in the Figure 3 axes have been corrected.

The 'solar' has been changed to 'shortwave'.

On p. 5816, line 4, we have clarified the water: solute rate change.

On p. 5817, line 23, The sea-water drop description has been updated to include "and minor inorganic and organic compounds".

On p. 5817 line 1, we have added " or unit they fall back into the sea".

On p. 5817 line 5, we have added a reference paper for log-normal distribution.

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On p. 5817 and Figure 2, the caption is updated to state that the plots are for wet aerosol particle.

On p. 5819 lines 21-22, if  $\eta$  is only dependent on  $\mathcal{H}$  then

$$n(r) = n(r_d/eta)/\eta$$

distortion still exist, i.e. the dry size and wet size are not the same.

On p. 5820, line 12, generally the growth is still dependent on size, the dependence is very weak for size larger than  $0.1 \mu$ . Therefore we prefer using approximation.

On p. 5821, line 12, this typo is corrected.

On p. 5821, line 14, the reference for refractive index is now cited. We agree that the mole weight is more physically correct than volume weight, though the difference is small. We re-calculated all results, since we decide to use the bulk growth based on Tang's observation. The combined effect for both changes are shown in the figures and table 1.

On p. 5823, line 17, we now directly use the bulk growth equation based on Tang's observation for growth. We clearly state it in the updated manuscript.

I appreciate Reviewer 2 very much for his helpful comments

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Interactive comment on Atmos. Chem. Phys. Discuss., 8, 5813, 2008.

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