

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

### **Anonymous Referee #3**

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Review comments on paper 'Parameterization of sea-salt optical properties and physics of the associated radiative forcing' by J. Li et.al.

In this paper, the authors have conducted two parts of studies: One is to develop a parameterization of the sea-salt aerosol optical properties based on wet sea-salt size distributions. The second is to investigate the sensitivity of sea-salt radiative forcing due to several influencing factors. This study is useful to the community as the sea-salt aerosols are major component of marine aerosols that provide a significant contribution to the aerosol environment due to the large source area of the oceans. Accurate treatment of the sea-salt aerosol optical properties is obviously important in improving the model simulations of aerosol radiative forcing. The content presented in this paper has shown a promising contribution to this goal. The parameterization based on wet

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sea-salt size distributions developed in this paper has a sound physical basis and it clearly produces better sea-salt aerosol optical properties than that based on dry size distributions.

I found that the parameterization proposed by Lewis and Schwartz (2006) for sea salt growth factor does not fit the growth curve well. Although it does not affect the method developed in this paper, such poor parameterization could mislead the research associated with sea salt growth process.

The sensitivity studies presented in this paper also show some interesting features that are not commonly known and therefore enrich our understanding on the sea-salt radiative forcing.

In addition, the method proposed in this paper is simple and easy to use in GCM models. I like this kind of fruitful study and will consider implementing this scheme in our model. Base on the above comments I recommend the paper be published in Atmospheric Chemistry and Physics with few minor revisions as suggested below.

1) I suggest Authors considering to modify the scheme by including the effective radius explicitly in the parameterization. This will make the parameterization even easier to use. Your results have indicated that this approach is possible. For example, you can fit the reference results to RH for a number of effective radii. The fitting coefficients are then a function of  $R_e$ . You can fit these coefficients to  $R_e$ . Alternatively, you can fit  $R_e$  first and RH second.

2) Some wording corrections:

Page 5815, line7-10: delete 'as well'

Page 5816, line 11: replace 'by being' with 'in that it is'

Page 5816, line 16: insert 'zenith' after 'solar' Page 5818, line 28: may add 'a' before 'significant' or change 'error' to 'errors'

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Page 5822, line20: should you use rather than | here?

Page 5822, line 11: It reads better if 'however' is deleted. Line 15: change 'dry two' to 'two dry'

Page 5828, line 5: delete 'by' here.

Page 5830, line 2: k is repeatedly explained here

Page 5828, line16-17: The forcing is defined as difference at TOA here, but your figure 5 shows results at 200 mb and surface. Should you change this to make it consistent with your figure?

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

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