

Interactive comment on “Quantifying the impact of sub-grid surface wind variability on sea salt and dust emissions in CAM5” by K. Zhang et al.

Anonymous Referee #2

Received and published: 24 September 2015

This paper advances the field in performing a novel parameterization and quantification of the effect of subgrid-scale wind variability on fluxes of sea salt and dust aerosols. The result that this subgrid-scale wind variability is important to dust emission, but not particularly important to sea salt emission, is interesting albeit not surprising. The paper is well written and interesting.

The main deficiency of the paper is the lack of a test of whether including the SGV parameterization actually improves the model fidelity. Without that, the value of this work to the community is limited. I suggest the authors for instance use hourly AERONET AOD measurements for this, or the SEVIRI satellite product.

Other comments:

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- Equation (5) for the saltation flux repeats an error in the original White (1979) paper. See Namikas and Sherman (1997) for the correction. Please correct.
- P. 7257: How exactly is the effect of moisture on u^*t accounted for?
- P. 7261: The simplification here eliminates the threshold dependence of dust fluxes. This threshold dependence makes dust emissions very sensitive to SGV, so eliminating it will cause a substantial underestimate of the effect of SGV on dust emissions. This should be discussed here.
- P. 7270: I find it non-intuitive that a larger C means a smaller influence of SGV. I would suggest inverting C in its definition in Eq. (25), such that the importance of SGV scales with C .
- P. 7277 and 7278: I think the negative values of TOA flux difference over the ocean has more to do with the low albedo of the ocean surface, and much less with changes in the dust optical properties during mixing. Please correct / discuss this.
- Why does the relative error reverse sign at $k \sim 1.5$ in Fig. 7a? That seems odd - please explain.

Interactive comment on Geosci. Model Dev. Discuss., 8, 7249, 2015.

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