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Reply to D. K. Woolf

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I would like to provide the following reply to Woolf's comments, each paragraph responding to one of the comments.

Aerosol composition. At the time of completing my article (Wu, 1989), the work of Blanchard and Syzdek (1988) was not available. A power law was proposed to describe the production of film drops by bursting bubbles reported by Resch et al. (1986) for the diameter range of droplets from 8 to about 240 μm,

$$n_f = 0.65 D^{2.15}, \quad 8\ \mu\text{m} < d < 240\ \mu\text{m}, \tag{1}$$

where n_f is the number of film drops produced by a bubble having the diameter D, and d is the diameter of film drops. Subsequently, we found that the film drops reported by Blanchard and Syzdek (1988) followed the same power law with a different coefficient (Wu, 1990),

$$n_f = 0.42 D^{2.15}, \quad 0.01\ \mu\text{m} < d < 8\ \mu\text{m}. \tag{2}$$

Most interestingly, the size range covered by Blanchard and Syzdek, from 0.01 to 8 μm, compliments so well that covered by Rasch et al. By combining two sets of data, we have the total production of film drops. Referring to eqs. (1) and (2), we see that small film drops ($d < 8\ \mu$m) contribute only about 39% of the total film drops produced. Due to an overwhelming dominance of jet drops to the marine aerosols shown in Wu (1989), the dominance of jet drops is still there, even when the results of Blanchard and Syzdek are included. The size range discussed here from 0.01 to 240 μm extends substantially beyond that of 0.5 to 20 μm, on the basis of which Woolf et al. (1987) obtained their results.

"Crucial issue". After reading the second paragraph through a few times, I am still at a loss concerning the so-called "crucial issue". At any event, recent measurements of film drops were quantified in Wu (1989, 1990), which provide an estimate of the relative importance of film and jet drops. I mentioned earlier (Wu, 1989) that these recent results apparently provided a similar conclusion to that of Blanchard and Woodcock (1957).

Research concept. Experiments of Cipriano and Blanchard (1981) and Woolf et al. (1987) have contributed to the advance of marine-aerosol production. This is especially true when the production of film drops was not quantified. Thanks to the difficult measurements of Resch et al. (1986) and Blancahrd and Syzdek (1988), other avenues, however, have been opened up to provide (at least we think) a better estimate of the aerosol production.

Justifiable interpretation. I only wish to state that the the size spectra reported by Kolavayev (1976) and Johnson and Cooke (1979) and reanalyzed by Wu (1988) have been used to justify the particular laboratory study of marine aerosols (Monohan, 1982), from which (Woolf et al., 1987) these comments have originated.

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