

Response to A. Robichaud

Comment: In the parameterization of emission, recent field measurements of fluorescence show that there is an increase of primary biological particle during rainfall. It is likely that rain droplet splash would aerosolize more fungal spores and other biological particles. Your parameterization does not include a precipitation term to reflect that. Other authors (Huffman et al. 2013 doi:10.5194/acp-13-6151-2013; Schumacher et al. 2013, doi:10.5194/acp-13-11987-2013) have provided such a parameterization for rainfall. Could you comment on that?

Response: Indeed, our three emission parameterizations do not include a precipitation term. Our purpose is to test the available emission parameterizations using our model. Based on the assessment of the uncertainties related to this type of measurements, described in detail in the manuscript, we cannot build at this stage a new parameterization based on these findings. The rainfall-induced emissions have also been shown to be variable as a function of geography and season. I.e. Schumacher et al. (2013) shows relatively strong post-rainfall emissions of what the authors suggest are fungal spores, but primarily during the summer months in relatively arid Colorado forest. The same paper shows only a minimal effect in the boreal forest of Finland. In even stronger contrast, no rain-related enhancement of fluorescent (biological) particles was observed at the Amazon site and also many others (Huffman et al. 2012). Given the complexity of the ability to predict rainfall-related emissions, we did not explore rainfall with this model.

Comment: 2) Burrows et al (2009) provided surface bacteria fluxes for terrestrial ecosystems. But over oceans, there is also bacterial fluxes. Is there an account for ocean flux bacteria in your model ?

Response: In table SI1 we provide the emission fluxes derived from Burrows et al (2009b). Indeed the sea emission flux is set to zero. As explained in Burrows et al. (2009a), there is no observational evidence, at least at the time of publication, about total bacteria concentration in remote marine air. The references suggest rather that dust plumes are the major source of bacteria in marine air (see section 9 "bacteria in the marine air").