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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Contribution of fungi to primary biogenic aerosols in the atmosphere: active discharge of spores, carbohydrates, and inorganic ions by Asco- and Basidiomycota" *by* W. Elbert et al.

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In response to the comment concerning the contribution of particles aerosolized from ruptured fungal spores and fragmented hyphae, there is likely to be a diversity of particles emitted from fungi, other than the spores and fluids that were used in the published estimate. These would include large fragments of hyphae, particles released from spores, and cytoplasmic debris emitted from fragmented hyphae.

Recent studies into the emission of submicronic particles from fungi have included

chamber experiments (Cho et al 2005, Gorny et al. 2002, 2003, 2004, Glovsky et al. 2003), in vitro microscopy observations, and indoor air sampling (as reviewed by Green et al. 2006). While confirming that a range of particles, other than spores, are released from fungi, the contribution of these particles to the atmosphere remains to be assessed. The amount emitted varied according to the fungal type and the experimental conditions, such as moisture, wind speed, substrate, and mechanical vibrations. For example, Glovsky MM , Taylor PE, Esch R, Miguel AG, House J, Tran L and Flagan RC (Respirable allergenic aerosols produced from pollen and molds. In: Asthma: From Genes to Clinical Management. Ed: R. Sepiashvili. Monduzzi Editore, Bologna, Italy, 2003, p155-160) showed that Alternaria spores were released in much larger mass and concentration than the submicronic fraction. Submicronic particles were thought to derive from fragmenting hyphae, although direct observations were lacking. Taken together, these emission chamber studies have shown that submicronic particles are released into the air from fungal cultures, but there is insufficient data to estimate emissions into the outdoor environment with convincing temporal and spatial resolution.

There were broad variations in counts of observable (large) fragments of hyphae reported from indoor air sampling studies, but few counts reported from outdoor studies. Due to limitations with available sampling and analytical methods, there is a paucity of information concerning the contribution of fungi to the submicronic fraction of the indoor air (Green et al. 2006), as well as the outdoor atmosphere. Observations of the release of particles from fungal spores into a moist milieu, in vitro, do not enable us to estimate the amount that is aerosolized outdoors.

Thus, currently, we cannot estimate the large-scale contribution to the atmosphere for particles released from ruptured spores and fragmented hyphae. Measuring the vertical distribution of fungal spores, and implementing the technologies needed for quantification of submicron fragments aerosolized from fungi, are both required to refine the global estimate. The use of mannitol as a marker for submicron fungal emissions, along with recent developments in immuno-analysis, may assist in this future investigation.

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Interactive Comment