Atmos. Meas. Tech. Discuss., 4, C2064–C2067, 2011
www.atmos-meas-tech-discuss.net/4/C2064/2011/

Atmospheric Measurement Techniques Discussions

Interactive comment on "Autofluorescence of atmospheric bioaerosols – fluorescent biomolecules and potential interferences" *by* C. Pöhlker et al.

Anonymous Referee #1

Received and published: 11 November 2011

Contents

This paper is a combination of a review paper and an original work paper, introducing the reader to the fundamentals of fluorescence bio-particle detection. It is divided in five major parts:

- In the first part "Introduction" the origin and importance of primary biological particle (PBAP), physical principles of fluorescence and recent PBAP detectors are introduced.

- In the second part “Materials and Methods” techniques and chemical substances used in the original work part of the paper are summarized.
- The third part gives a “Literature synthesis” of fluorescence properties related to six fluorophore groups divided in amino acids, coenzymes and vitamines, biopolymers and cell wall components, pigments, secondary metabolites and other fluorophores like RNA and DNA. Possible interfering, non biological compounds like humic-like substances (HULIS), secondary organic aerosols (SOA) mineral dust and polycyclic aromatic hydrocarbons (PAHs) are discussed at the end of this section.
- The forth part of this work “Results and Discussion” shows excitation-emission matrices (EEMs) of pure biological fluorophores that are considered in section three to be most relevant within PBAP. These matrices give the fluorescence spectrum response of the specific fluorophore as function of the excitation wavelength (Fig.2). Also a summarizing map of key bio-fluorophores is provided (Fig.3). This map can be used to interpret EMMs of mixtures of different fluorophores (Fig 4). EMMs of interfering, non biological particles is discussed (Fig 5) and for two distinct excitation wavelengths used in recent PBAP detectors the fluorescence emission spectral response for key biological and non biological material are shown in Fig.6.
- The paper ends with a conclusion and outlook on future work using fluorescence microscopy.

1 General :

The presented work is a well written paper. The overall length of 45 text pages (not including references (more than 280!) and figures (75 pages in total + 10

AMTD

4, C2064–C2067, 2011

pages supporting online material) is on the first look not acceptable. But reading this paper as a review paper with a part of original work (12 pages), the overall length seems to be justified. I asked myself how to shorten the paper significantly – but found no good solution. For example there is a lot of prose in the text in section 3 -at least the information is also condensed in table 1- but (for a review paper) is necessary to the reader, who is not completely familiar with the subject. Splitting the paper in two parts (Part A : Review part and Part B own measurements) is the most likely way but has also disadvantages. Thus, the selection of fluorophores measured is motivated by the review part and the results of section 4 contribute significantly to the "complete view". The authors have done a great job! I recommend this paper strongly for publication with minor changes.

Minor Points

- Separate the "review" part (1+3) from the "original work" part (2,4,5) by moving the chapters / renumbering. E.g. section 2 seems to be unmotivated in between the two review sections.
- The authors use lots of abbreviations, please add a look up table to be gentle to the reader.
- P5874/17

  > *For each EEM, a constant normalization factor (NF) was determined by taking the mean of the* ***measured fluorescence intensity*** *values along a line 40nm above the center of the excitation line (as shown in Fig. S1 in the Supplement) and dividing the entire matrix by this NF.*

  In the supplement you have correctly stated that (P2,41) *"this light cannot*

AMTD

4, C2064–C2067, 2011

be considered fluorescent"; Please use the formulation you have used in the supplement (P2/39f).

– You have motivated the necessity of EMM normalization but not the way you are normalizing (why 40 nm above 1^{st} order Rayleigh scattering, ...).

Interactive comment on Atmos. Meas. Tech. Discuss., 4, 5857, 2011.