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**Geoscientific
Model Development
Discussions**

Interactive comment on "

Development of an online radiative module for the computation of aerosol optical properties in 3-D atmospheric models: validation during the EUCAARI campaign" *by* B. Aouizerats et al.

Anonymous Referee #2

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The paper presents a radiative module for 3D atmospheric models with a focus on aerosol optical properties; the goal being to define a so low numerical cost to be useful. A part of the paper relies on an application during the EUCAARI campaign on the Cabauw tower (The Netherlands) during May 2008.

There is no contest about the interest of a 3D fast computational module (especially for aerosol properties). The question is: we know what we gain (=time) but do we know

what we lose exactly? This paper replies, unfortunately in part, to this question. So, I'm not totally convinced by the "validation" because it's not a complete validation. Authors present a case evolving apparently 1 single mode for the aerosol model. What about more complicated and realistic cases such as urban aerosol, dust, bimodal continental aerosol model (these cases are presented in the paper as the main studies to be done)?

I'm surprised about the choice of the Mie theory. Why Authors didn't choose something more developed? It has been demonstrated that a non spherical approach works better if you want to study Dust or urban environment (Mie works fine for aerosol having around 1 micrometer size). It's time consuming but it's not a problem of time, as authors use Look Up Table. I think it can be an improvement for an advance version of this radiative module.

Globally the paper is easy to read but it misses most of the relevant references. This point should be addressed. Moreover, in some aspects, there are too many details, in some others, it misses explanation or analysis.

Specific comments: - Part 1: add reference in the introduction. - Part 2, Introduction: the Mie theory is well known, so it's not necessary to re-describe it. - Part 2.2.1: Comments about Figure 1 are obvious. A figure is not necessary, and it will be more interesting to explain why you get optically this result. What's happened if you have several lognormals in the size distribution? - Part 3.1: Will you get the same result with several aerosol mode? - Part 3.3: "the scattering is mainly absorbing" I guess you wanted to write: The extinction is mainly absorbing! - Part 4: What is the environment around Cabauw? What kind of aerosol are you study about? Figure 8 suggests a mono modal aerosol, is it true? - Part 4.1.2: It's not hypothesis, it's assumption! Could you justify your assumption? Apparently, you work assuming atmospheric dry conditions. But how do you manage your module (and the fit) if you have wet condition to consider (in a 3D simulation for example)? -Part 4.2: This part is not enough developped!! I'll appreciate more detail in the analysis, and particularly more references. For example,

I'm really really surprised by your SSA values and by what you show Figure 3. A SSA=0.5 (or even 0.6; 0.7) is almost impossible in a natural environment. -Conclusion: I'm surprised to see results of the time cost in the conclusion! It should be in the main text.

Interactive comment on Geosci. Model Dev. Discuss., 3, 735, 2010.