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***Interactive comment on “Estimation of isoprenoid emission factors from enclosure studies: measurements, data processing, quality and standardized measurement protocols” by Ü. Niinemets et al.***

**Anonymous Referee #1**

Received and published: 29 June 2011

**General Comments** This review/perspective paper addresses the fact that “ES depends on applied experimental protocols and on data processing and reporting”. The paper then examines the literature deciding what to consider quantitative, semi-quantitative, and qualitative with guidelines on how to produce quantitative VOC emission and associated meta data in the future. These detailed experimental guidelines for generating quantitative VOC emission data and the associated measurement/data processing errors are excellent and much needed. In my opinion, the description of, “standardized experimental and calculation protocols for generating quantitative biogenic VOC emis-

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sion data” should be the focus of the article (and possibly the title).

However, many of the same coauthors recently published a paper which is not well discussed in the current manuscript entitled, “The emission factor of volatile isoprenoids: stress, acclimation, and developmental responses” By Niinemets et al. Biogeosciences Discuss., 7, 1529-1574, 2010. The main point of this paper is that  $E_s$  is not a constant but rather a dynamic variable that changes on timescale of seconds to decades, “overall indicating that the constancy of values used from study to study is illusion.” The manuscript describes  $E_s$  as being highly sensitive to current biotic and abiotic factors as well as those from the past which make the modeling concept of  $E_s$  less useful. For example, the authors state that, “it is essentially impossible to simultaneously standardize leaf previous environment, leaf age, and stress status to determine a single species-specific value of  $E_s$ .” Moreover, as additional insights into the biological functioning of isoprenoids are revealed, novel biological processes will likely need to be included as controls over  $E_s$ .

The authors of Niinemets et al. 2010 encouraged the use of the “variable  $E_s$ ” approach which, “separates between the instantaneous effects of light, temperature and internal  $CO_2$  concentration on the emission rate and the leaf-specific capacity for isoprenoid formation ( $E_s$ ) that depends on longer term factors”. Surprisingly, there is no discussion in the current manuscript on the use of “variable  $E_s$ ”. Rather, the current manuscript treats  $E_s$  as a constant. Given that  $E_s$  is highly susceptible to human created artifacts and biotic and abiotic past and present conditions, one might therefore argue that the  $E_s$  concept has limited value within an Earth System modeling framework creating the need for a more mechanistic and dynamic understanding for how environmental conditions and biology interact to produce the given isoprenoid emission rate. What is essentially missing in this paper is the framework for a new practical modeling approach that embraces the ideas of the “variable  $E_s$ ” rather than ignoring it and attempting to generate controlled and constant  $E_s$  values.

Specific comments I believe the authors mistakenly consider vegetation as only

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sources of isoprenoids without considering their further metabolism.

Introduction: When referencing text here, please include only the most relevant references. Including 10 or more references reduces the readability. When using statements like accuracy with respect to Es, the authors are treating Es as if it is a constant.

Static vs Dynamic enclosures; What about very large mesocosm and whole enclosed biome ecosystems which contain both autotrophs and heterotrophs?

Why is condensation a problem for isoprenoids? They are generally very poorly water soluble and are not expected to be lost in condensed liquid water.

What about artifacts in measuring volatile isoprenoids by PTR-MS? Several biogenic compounds fragment or share the protonated parent molecular mass ions. Eg. MBO and isoprene.

Do you mean infinitely precise? Or infinitely accurate?

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Interactive comment on Biogeosciences Discuss., 8, 4633, 2011.

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