**Atmospheric
Chemistry
and Physics
Discussions**

Interactive comment on "Organic and inorganic markers and stable C-, N-isotopic compositions of tropical coastal aerosols from megacity Mumbai: sources of organic aerosols and atmospheric processing" *by* S. G. Aggarwal et al.

Anonymous Referee #1

Received and published: 13 October 2012

General comments

The authors present a comprehensive set of measurements from a rarely sampled but critically important region for particle production. Their finding, that much of the elevated PM in the winter months is regional rather than local, is novel and surprising. This data set will provide others with a nice reference for particle loading and seasonal variability in the region. In general the article is well written and easy to follow, but there are some specific points that must be clarified before publication. In addition, there are fairly large number of typographical and grammatical errors that I have corrected below.

C8108

These changes will make the paper more accessible and better received. I consider these minor revisions and the paper should be acceptable for publication at that point.

Specific comments

Line 79 - I don't think it's even remotely fair to claim there are "few" studies (laboratory or field) describing the possible pathways of SOA formation. The authors have provided four excellent examples of ways in which SOA forms, and a few references for each. There are many, many more but an exhaustive list provides nothing. The authors should actually replace "few" with "many" and perhaps consult one of the several review articles on this topic (Carlton et al., 2009; Ervens et al. 2011; Hallquist et al., 2009). The fact that at least three review articles were written on this topic in the past three years alone illustrates that "few" is not an appropriate term to describe the number of SOA studies. Despite the large number of studies, much remains to be discovered, which is likely the author's point.

Lines 94-102 - The authors argue that we need more measurements of particle transformations to improve global climate models, which is a valid statement. However, it is unclear to me how this work will contribute to that knowledge given that the authors are not sampling in multiple locations at the same time. Rather than comment on this need (which is real) the authors should motivate their work by discussing how their specific results are contributing to the advancement of the field.

Line 125 - What gap?

Line 154 - Given the information presented in line 135 regarding the resuspension of soil dust, is the assumption that carbonate carbon is negligible valid?

Line 310 - Is the PBL height available from meteorological records? If so, it should be very simple to include this and seems quite important since the authors argue that it's one of the main causes of the fluctuation in concentrations across the seasons.

Lines 330-333 - The difference in inorganic nitrogen could be due to elevated tem-

C8109

peratures in summer (rather than additional sources in winter) which would result in evaporation of the inorganic nitrogen, and loss to the gas phase.

Line 324 - before discussion the isotopic ratio data it would be helpful to provide a one sentence summary of how the ratios are interpreted (what does high vs low mean?)

Lines 343-344 - Since the values are not very far apart it's worth noting that they are statistically different at the 95% confidence level, using the Student's t-test (two tailed, pooled equal variance).

Lines 405-408 - It would be helpful to remind the reader which direction the delta 13-C ratio shifts when enriched in 13-C. Not all will be familiar with isotopic ratios.

Line 458 - It is unclear what the authors mean by "the WSOC fraction is largely processed in the atmosphere," since WSOC is nearly always associated with oxidative aging. Rather, the WSOC/OC ratio would tell you about the relative aging of the particles.

Figure 5 - Was the Pearson's correlation coefficient calculated using a least squares regression or a "total" least squares regression" such that the uncertainty in the dialed measurements was treated as equally important as the uncertainty in the MSA? Same question applies for Figure 7.

Table 2 - Replace "Some marker" with "Selected marker"

Technical comments

Line 26 - replace "samples from Munbai" with "in Mumbai"

Line 33 - replace "dominant" with "predominate"

Line 36 - insert a comma after "nssSO4"

Line 62 - insert "the" before "Indian"

Line 67 - This sentence is grammatically poor. Replace with, "One of the major out-

comes of the INDOEX campaign was the discovery of significant loading of pollutants over the Indian Ocean."

Line 87 - replace "as far as" with "as long as"

Line 90 - Replace "These changes do not only limit to the modification of their chemical properties..." with " These changes are not limited to the modification of chemical properties; physical properties including color and hygroscopicity are also impacted (references)."

Line 121 - Insert "the" before "Mumbai metropolitan area"

Line 122 - Omit "to" in the phrase "to the Arabian Sea"

Line 267 - Change "result" to "results"

Line 282 - "both species give a good correlation" implies that each is being correlated to a third parameter or variable. Instead the line should read "Diacid and MSA correlate well"

Line 320 - neither "content" nor "composition" should be pluralized

Line 323 - replace "sources and possibly on the secondary nitrogen" with "and secondary nitrogen sources"

Line 389 - replace "such as trend" with "such a trend"

Lines 398 and 401 - in both cases the "is" should be "was" as the studies are completed

Line 401 - "ascribed to" means "due to " pick one or the other

Line 432 - specify if "higher" means in magnitude or absolute value

---