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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Characteristics, seasonality and sources of carbonaceous and ionic components in the tropical Indian aerosols" *by* C. M. Pavuluri et al.

Anonymous Referee #2

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General comment: The authors' have presented temporal variations in the mass concentrations of carbonaceous and inorganic constituents in the tropical Indian aerosol (PM10) collected on day- and night-time bases during winter (23 January to 6 February) and summer (22–31 May) of year 2007 from Chennai, India. Overall, the paper is well written and provides an interesting data set on carbonaceous and inorganic aerosols. However, the text and discussion of results require further clarification. Perhaps, it is not appropriate to state in the abstract that samples collected from tropical site in India (Chennai, 13.04 °N, 80.17 °E) can better characterise south and southeast-Asian aerosols. In the same context, it is incorrect to state in the MS title as "tropical Indian aerosols". It may rather be referred as tropical aerosols from Indian region. There

are some studies reported from tropical climate in western India. The paper may be published in ACP after a minor revision.

Major comment: The variability in the mass concentrations of carbonaceous and inorganic aerosols has been attributed to the origin of air masses and their source strength. Although day- and night-time variability in the mass concentrations of chemical constituents is an important outcome of this work; authors may like to compare their data set from other sites in the context of Indian aerosols. Also, authors should discuss WSOC/OC and WIOC/EC ratios with other studies from Indian region.

Specific comments: P3941, Section 2.1: Please discuss day-night variability in aerosol constituents. P3942, L5: The analytical errors for duplicate analysis: 1.2% (for OC) and 1.7% (for EC) are very low. What are the detection limits for these two constituents? P3942, L11: "TC" needs to be spelled out in the early text. P3943, L4-5: How the authors know that aerosols in Chennai (mainland) are affected by wood smoke a priory? P3943, L12-13: What are the minimum OC/EC ratios used for the estimation of SOC in summer and winter?

Section 3.1: Simultaneous discussion of carbonaceous and inorganic aerosols is often confusing in the text. This section requires reorganisation.

P3946, L 5-7: Average equivalent ratios of total cations to anions are 0.85 and 1.21 in winter and summer respectively; suggest that aerosols are more acidic in winter than summer. Authors attribute the acidity due to H+ ions (not measured in this study) in aerosols. Could this be attributed to the seasonal variability in organic acids in aerosol samples? Authors may like to address these points in greater detail.

P3946, L 10-12: NH4+/SO42- equivalent ratios are much lower in Chennai aerosols (0.63 in winter and 0.81 in summer) compared to those over other Indian regions (as per the cited references). What could be the reasons? The possible association of acidic species with mineral dust (Ca2+ and Mg2+) need to be addressed.

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P3946, L 15-16 and P3591, L9-11: Higher concentrations of EC and some ionic species have been attributed to the origin of air masses and their source strength. What are the representative OC/EC ratios for different air masses?

P3946, L 17-18: Additional sources of organic aerosols in summer are discussed except secondary formation. These could be important sources of OC in summer as secondary aerosol formation could contribute to OC but not to EC. This may also be reflected in OC/EC, WIOC/EC and WSOC/OC ratios in winter and summer.

Section 3.3: The day- and night-time variability in both winter and summer has been discussed for various chemical constituents. Authors may like to address on the formation of secondary inorganic aerosols. It is surprising to note that K+ concentration (biomass burning tracer) higher during daytime. This observation needs better explanation.

P3946, L 11-12: What evidence authors may like to provide for SO42- and MSA- production from biomass burning emission?

P3951, L18-19: The OC/EC ratios are characteristically different in summer (6.2) and winter (1.6) (Table 2). A large temporal change can not be attributed to SOA formation alone. A close similarity in WSOC/OC ratios in summer and winter; P3953, L26) further supports this fact. Authors needs to consider that WIOC/EC ratios in winter and summer (0.8 and 3.6, respectively; P3954, L21-22) are quite different; suggesting that sources could be different in summer and winter.

P3953, L26: WSOC/OC ratios for day- and night-time samples can be stated as it is not clear from the Fig. 6. Why authors compare WSOC/OC and WIOC/EC ratios over the world but not from Indian regions. A separate discussion on the WSOC/OC ratios over Indian regions should be added in the text.

Table 2: Data for Manora Peak and Mt Abu needs to be checked for EC and OC concentrations.

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