The manuscript “Laboratory photochemical processing of aqueous aerosols: formation and degradation of dicarboxylic acids, oxocarboxylic acids and α-dicarbonyls” submitted for publication by Pavuluri et al. describes the photochemical reactions of wetted atmospheric aerosols (PM_{10}) collected in winter and summer during day time at Chennai (India). The authors performed irradiation experiments of the filter in the presence of moisture with low-pressure mercury lamp emitting mainly at 254 but also at 185 nm. Two types of ambient aerosols were collected and classified as anthropogenic and biogenic aerosols. This paper present many analysis results of the filters before and after irradiation and conclusions about the photochemical processes. However, I am also many concerns about the validity of such interpretation.

Main remarks:

1) The most important concern is due to the use of such lamp with a wavelength emission at 185 nm. With this wavelength, the photolysis processes are present for many (all) compounds take into account in this study? How the authors can separate and evaluate the significance of photolysis processes and reactivity of $HO^{\bullet}$ on the organic compounds? Experiments with such organic compounds in water and under irradiation with this kind of lamp seem very important to conclude about the photochemical processes. The wavelengths 254 and 185 nm are not present in the solar emission at the earth surface.
2) Page 1204, lines 26 and 27. Could you explain why there is no sharp increase for the compound ωC_3? There is a sharp increase for the compounds ωC_2 and ωC_4.
3) Page 1205, lines 27-28. The authors mentioned that the concentration of water soluble iron species may increase upon UV irradiation. Did you control this affirmation? What is level of the increase of concentration? This information is very important to explain or not some phenomenon.
4) About the formation of complexes between iron species and the organic compounds, the authors mentioned only the possible formation with C_2 and C_3 compounds. This complexation phenomenon increases a lot the photolysis processes and explain the sharp decrease of these two compounds. However, for the C_4 compounds the value of the stability constant with Fe^{3+} is very similar. Why in this case a formation of C_4 is observed at the beginning of the irradiation? The comment is the same for C_5.

5) In the same experiments could you explain more in detail why the authors observed an increase of the $C_{4,}$ C_5 and C_6 while the concentrations of all other diacids compounds decrease?

Minor remarks:

1) Replace “direct photolysis” by “photolysis”
2) Page 1198 lines 3, replace Stooky by Stookey.
3) Page 1199 line 2 254 nm instead of 245 nm.
4) Replace “$^{\bullet}$OH” by “HO$^{\bullet}$” IUPAC Recommendations 2000
5) The graphs are too small and it is difficult to appreciate the beginning of kinetics.
   Example page 1203, line 3 “except two cases (3 and 6h) of AA”
6) Page 1205 line 1. I think that it is not Fig.7 but Fig.6?

In conclusion, this paper presents many results to understand the photochemistry at the wetted aerosol surface. But I recommend to perform more control experiments and to give more explanations to consolidate the early conclusions.