

Interactive comment on “Observations of aerosol optical properties at a coastal site in Hong Kong, South China” by Jiaping Wang et al.

Anonymous Referee #1

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General comments: Field observations of aerosol optical properties in different regions are needed due to the spatial and temporal variations in aerosol optical properties which are important to assess the aerosol radiative forcing. In this study, a comprehensive research on aerosol optical properties at a coastal station in Hong Kong based on more than two years' field observation was presented. As similar studies on aerosol optical properties at the same site was conducted a decade ago, this work is necessary and meaningful to reveal the current aerosol optical properties and their variations over the past decade in Hong Kong. Meanwhile, long-term observations of several key aerosol optical properties including AAE, SAE and SSA and studies on the relationships between optical properties and particle size were presented in this study, which were limited in Hong Kong over the past decade. In addition, a range of methods including the ratio of $\Delta BC/\Delta CO$ and SO_2/BC , LPDM and PSC analysis were employed

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to intercept the temporal variations in aerosol optical properties and their quantitative linkage to multi-scale transport. The important influence of ship emissions on aerosol optical properties at Hok Tsui was presented, especially under the southwesterly winds prevailed condition in summer. Overall, this manuscript is well organized and discuss aerosol optical properties and their variation in detail associated with the source analysis. The subject of this study is within the scope of this journal. Several specific comments are listed below. A minor revision is needed before being accepted.

Specific comments: (1) There is a little confusion of the logicity of the sentence 'Correlation analysis showed that the darkest aerosols were smaller in particle size but showed strong scattering wavelength dependencies. . .' in Lines 18–19 on Page 1. Small particles should have high scattering Angstrom exponent, i.e., strong scattering wavelength dependencies. (2) A PM_{2.5} cutoff was deployed for the measurement of Aethalometer, thus, the absorption coefficients of PM_{2.5} were measured. However, the scattering coefficients of TSP were measured by Nephelometer. Which size did the derived SSA represent? PM_{2.5} or TSP? (3) As stated in Lines 15–17 on Page 8, the SSA at Hok Tsui was slight lower than that observed at a coastal station in Norway in summer (0.91 ± 0.05). However, the average SSA was 0.93 as presented by the authors in Lines 13, higher than the value of 0.91. (4) How the authors concluded that the data clusters with modeled and measured aerosol scattering coefficients fit close to 1:1 is most probably associated with polluted continental air? Have the authors analyzed the retroplume associated with these clusters? (5) Are the absorption and scattering coefficients listed in Table 2 all measured at the same wavelength of 550 nm? Moreover, did the site 'Cape D'Aguilar' in Table 2 represent 'Hok Tsui' station? (6) The diurnal variations of SSA, AAE and SAE are recommended to be presented. Because these parameters represent the aerosol optical properties better which are independent of the absolute aerosol concentrations. (7) The definition of selected episodes in Figure 13, i.e., GH, SP, NC, AGC, should be illustrated in detail in the manuscript. In other words, what criterions to identify these episodes? (8) The measurement of aerosol optical properties was conducted for more than two years. What about their variations

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in different years during the observation period?

Technical corrections (1) The full name of 'LPDM' and 'PSC' in Lines 22 on Page 1 should be introduced as they first appeared. (2) Similar to (1), the full name of the corresponding symbol should be introduced as they first appeared. For instant, the full name of σ_{ap} should be illustrated as aerosol absorption coefficient before it first appear in Line 15 on Page 7. By contrary, an abbreviation should be used throughout the manuscript once it was defined. For example, an abbreviation of SSA is recommended to be used in Line 31 on Page 3 instead of the full name of single scattering albedo, since this abbreviation has been defined above. The authors was recommended to check through the manuscript to avoid such mistakes.

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