

Interactive comment on “Methods for identifying aged ship plumes and estimating contribution to aerosol exposure downwind of shipping lanes” by Stina Ausmeel et al.

Anonymous Referee #1

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The study correlates measured particle data with individual ships in the region of the measurement station, using AIS data to identify ship and ship position, and measured wind patterns to calculate expected plume arrival time allowing assigning of plume peaks to individual vessels. Hourly meteorological data were interpolated to 1 minute. Other components of ship plumes did not yield significant peaks. The reference list is rather short and the Introduction too brief. It should cover expected characteristics of particles and other components of ship plumes (including particle size distribution and plume dispersion) as well as SECA regulations including fuel S content and possible use of scrubbers. P 8 last para – why is there no correlation with ship size? While the interpolation of hourly wind data to one minute yielded quite good correlation

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between ships identified by AIS and arrival of detected plumes at the measurement station, more detailed meteorological data might have allowed estimation of the extent of dispersion of the ship plumes and the location of the core of the plumes relative to the measurement station. This may have allowed better correlation between ship size and detected plume. For instance, the main part of a plume from a large ship might pass some distance from the measurement station with only the more dispersed outer extent of the plume registering at the station. This is likely the reason for the poor correlation between ship size and size of particle number peaks. At Line 30 it is stated that there was no information on engine operation and fuel. However, this can be derived from the AIS data according to well established methodologies which assign main engine power according to ship speed, size and other characteristics. Fuel type would most likely be 0.1% MGO within the SECA unless scrubbers are used. The use of scrubbers by particular vessels can also be identified from certain databases. The paper is well written and the conclusions appear to be mostly justified although the contention that the plume identification worked well and that better meteorological data were not needed could be questioned because of the reasons given above. The question also remains as to the usefulness of the measurements if only particle number concentration showed distinct peaks. More discussion as to the reasons for only particle number concentration showing distinct peaks would be useful. This reviewer does not have sufficient expertise to evaluate the particle measurement techniques.

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